Flanders
is agriculture and fisheries

Annual report 2019

ILVO
Flanders Research Institute for Agriculture, Fisheries and Food

www.ilvo.vlaanderen.be

Publisher Joris Relaes

Coordination Nancy De Vooght
Greet Riebbels
Sofie Vandendriessche
Ellen Claeys
Nele Jacobs

Translation Miriam Levenson

Photographs ILVO

Lay-out Nancy De Vooght

To order

by e-mail ilvo@ilvo.vlaanderen.be
by telephone +32 9 272 25 00
by mail Burg. Van Gansberghelaan 92
9820 Merelbeke
Belgium
reference "Annual report 2019"

For information, questions or suggestions

T +32 9 272 25 00

ilvo@ilvo.vlaanderen.be
www.ilvo.vlaanderen.be

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Dear reader,

This ILVO 2019 Annual Report gives you an excellent overview of the most important ILVO research projects from the past year.

We have improved our layout to make a clearer distinction between the newly started projects and the projects that have been completed or that have yielded interesting interim results. We briefly present these results to you. Do not hesitate to contact the people listed if you want more information about a project.

Research is the work of many. At the end of 2019, ILVO counted no fewer than 646 staff members who, day in and day out, did their utmost best to support innovation for the Flemish agriculture, fisheries and food sectors. This total represents a net increase of 35 staff members, which can be fully attributed to ILVO's Own Capital. In contrast, the number of staff members with civil servant status is decreasing year after year due to shrinking budgets. ILVO now employs only 35% civil servants.

The vast majority of ILVO research projects are collaborations with other research institutes at home and abroad. Within Flanders, I would especially like to thank the extension research centers for our many successful collaborations, as well as other research institutions such as the VIB. Outside Belgium, I would like to call attention to our intense collaboration with the James Hutton Institute in Scotland and Teagasc in Ireland.

In 2019 we made a great effort to start up and further expand various "Living Labs" at ILVO. The aim is to stimulate co-creation an active involvement of all the relevant stakeholders and authorities. Taking the "Sustainable Development Goals" of the United Nations as a starting point, we will continue to focus strongly on climate and energy measures as a goal for research as well as for ILVO's internal operations.

We have greatly expanded the Expertise Centre for Agriculture and Climate and have made a variety of investments related to energy and climate. With our brilliant personnel survey results in mind, we look to the future with confidence and enthusiasm, a future where ILVO will continue to help society tackle the many challenges in the field of agriculture, fisheries and food using scientifically sound research.

Joris Relaes

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- Bart Sonck,
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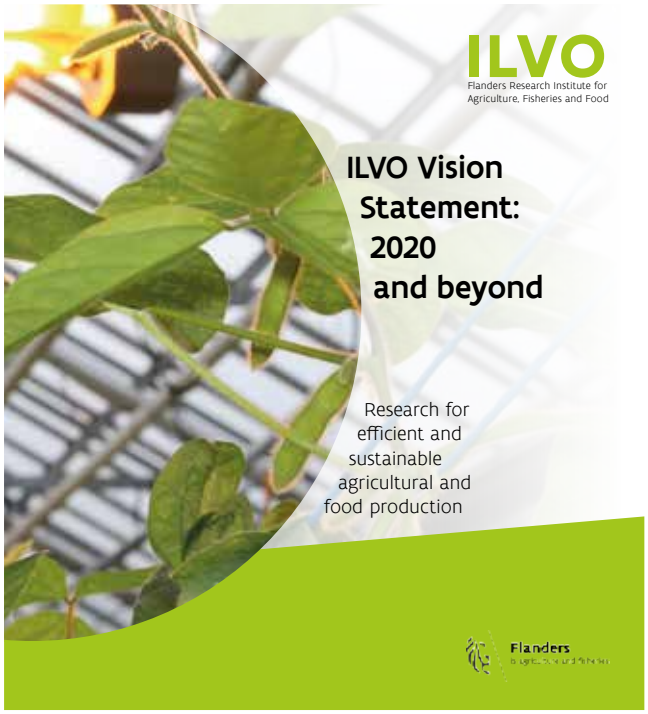


ILVO Mission and Vision

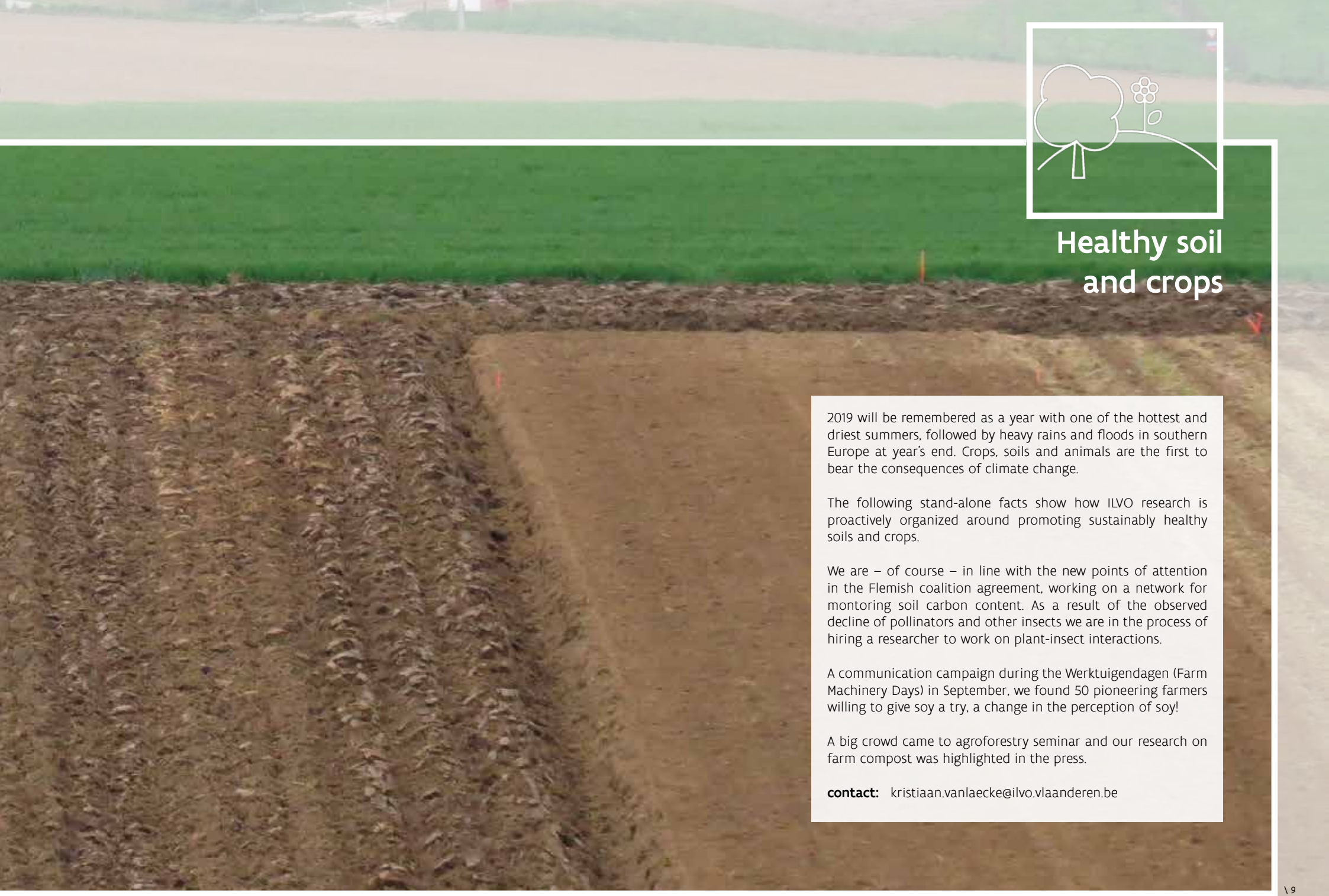
ILVO is an independent scientific research institute and service organization of the Flemish government that contributes to the promotion of a sustainable agriculture, fisheries and agri-food sector in Flanders, Belgium, Europe and the world.

ILVO aims to investigate - proactively, objectively and with impeccable integrity - new and existing pathways of optimization and sustainability for actors in the agricultural, fishery and agri-food chain and for the broader rural environment.

In doing so, ILVO enters into a regular dialogue with policy, stakeholders and society and tries to set an example via its own operations.

ILVO's vision of the future "Towards 2020 and Beyond" presents the benchmarks and ambitions of the organization.

ILVO is committed to make sustainability the basis for its daily internal operations as well as its research and services. The Sustainable Development Goals (SDGs) of the United Nations are the compass for this. An internal steering committee maps out the path ILVO will take. This ranges from very concrete actions to a reformulation of the vision and mission, with a more sustainable ILVO in mind. To support this process, ILVO became a partner of CIFAL Flanders, making it part of a network of other public companies, research institutes and the business community that take the SDGs seriously.



Healthy soil and crops

2019 will be remembered as a year with one of the hottest and driest summers, followed by heavy rains and floods in southern Europe at year's end. Crops, soils and animals are the first to bear the consequences of climate change.

The following stand-alone facts show how ILVO research is proactively organized around promoting sustainably healthy soils and crops.

We are – of course – in line with the new points of attention in the Flemish coalition agreement, working on a network for montoring soil carbon content. As a result of the observed decline of pollinators and other insects we are in the process of hiring a researcher to work on plant-insect interactions.

A communication campaign during the Werktuigendagen (Farm Machinery Days) in September, we found 50 pioneering farmers willing to give soy a try, a change in the perception of soy!

A big crowd came to agroforestry seminar and our research on farm compost was highlighted in the press.

contact: kristiaan.vanlaecke@ilvo.vlaanderen.be

NEW

Stable and resilient farming systems via enriched biodiversity

How can we describe and improve genetic and functional biodiversity (soil fungi, bacteria, insects…) in the soil to reduce the amount of external inputs needed in agriculture? How can we use (plant) disease resistance, climate mitigation and soil health techniques for a more qualitative yield? The Horizon 2020 project SOILDIVERAGRO investigates to what extent ecosystem services can have a positive impact on the stability, resilience and competitiveness of European agriculture.

In 90 agricultural fields across Europe, the initial biodiversity status will be determined. This initial map constitutes the reference for 15 field studies, in which innovative agricultural practices will be tested. Some of the techniques are the use of soil fungi, plant growth-promoting bacteria, the application of alternative crop rotations, the development of early warning systems for diseases and pests, the use of green manure, organic soil improvers and catch crops for control of diseases and pests. The most promising systems and rotations are being screened, both in terms of environmental impact as well as economic and social impact.

contact: lieven.waeyenberge@ilvo.vlaanderen.be

NEW

Prevention and remediation of soil compaction

ILVO, Inagro, Soil Services of Belgium (BDB) and Ghent University will work together to find prevention measures and solutions for soil compaction in agriculture, which has not only negative effects on rooting, nutrient uptake and consequently also crop yield, but also negatively affects water management. Through field trials and cooperation with farmers, contractors, machine constructors, and tire manufacturers, these partners are looking for efficient and feasible solutions. Ultimately, the goal is to support adoption of these measures in agricultural practice and thus contribute to sustainable agriculture. In addition, the results are of great importance for monitoring the water situation in Flanders in light of climate change.

www.bodemverdichting.be

contact: tommy.dhose@ilvo.vlaanderen.be

NEW

Quality, tailor-made compost for soil improvement

ILVO, Vlaco vzw, the extension research centers PSKW, PCS and PCA and other partners in the North Sea region aim to encourage the use of high quality compost to improve agricultural soils. Growers' confidence in compost application is stimulated by giving composting advice to the processors of the residual flows, with a focus on measuring the quality of the developed composts and matching them to the intended use, soil and cultivation system.

The added value of composting for crop and soil quality, within the context of climate change, is subjected to field and pot experiments at the various research institutes and followed up on farm. Finally, policy recommendations for certification at European level will be developed.

https://northsearegion.eu/soilcom/

contact: fien.amery@ilvo.vlaanderen.be

NEW

Looking for the right blend: sustainable growing media for horticulture

In the Vlaio-LA project 'BI-O-PTIMAL@WORK', ILVO, together with KU Leuven and PCS, will develop and test sustainable growing media for various ornamentals. The goal is to find the right materials for peat replacement and to optimize the use of soilimprovers and beneficial microorganisms.

In this project, the partners aim to manage the plants' root environment to help useful micro-organisms get the upper hand. This process requires close collaboration with ornamental horticulturists, producers, distributors and suppliers because the new growing media blend are tailored to a specific crop in terms of the product itself and the product information. The project offers a total approach where aspects of growing media quality, soil quality and nutrient efficiency, biocontrol and crop adaptation all are being addressed.

contact: jane.debode@ilvo.vlaanderen.be
bart.vandecasteele@ilvo.vlaanderen.be

NEW

Shady goings-on in the nightshade family? Screening of plant viruses present in cultivated and wild plants of the nightshade family

A non-virus-specific and therefore very broad 'High Throughput Sequencing' technique available for screening of plant viruses is the aim of project SEVIPLANT. To develop this tool the researchers focus on Solanaceae (the nightshade family), which includes potato, tomato, paprika and aubergine (eggplant). The research contributes to the assessment of the risk of virus damage in agriculture and horticulture and international policy.

contact: kris.dejonghe@ilvo.vlaanderen.be

NEW

European research project PATHOFLAX aims to control diseases in fiber flax

France and Belgium supply 80 percent of the world's production of fiber flax. Because diseases occur regularly and can lead to significant yield losses, 11 French and Belgian universities, research institutes, sector organizations and companies are going to spend the next four years looking for integrated solutions to combat diseases in flax cultivation.

The Interreg France-Wallonia-Flanders project 'PATHOFLAX' focuses on the soil-borne *Verticillium dahliae* fungus, which causes verticillium wilting in flax. The project partners, Including Inagro, UGent and ILVO in Flanders, will first examine the circumstances in which the pathogen develops. They will determine the diversity and spread of the fungus in Flanders, Wallonia and Hauts-de-France, and want to use a network of labs to help flax farmers better detect the fungus. To improve control of the fungus, the project partners will test environmentally-friendly strategies, natural components that promote the plants' immune system, and look for tolerant varieties and adapted cultivation techniques.

www.interreg-pathoflax.eu

contact: kurt.heungens@ilvo.vlaanderen.be
jane.debode@ilvo.vlaanderen.be

"ILVO Plant Sciences: in the fields, behind the scenes"

Take a look at the daily working of the ILVO Plant Sciences team. Researchers, field workers, lab technicians, students and support staff work together to find solutions for today's plant-based food production.

https://www.youtube.com/watch?v=t1cTYY-Qx7M&feature=youtu.be

1:11

NEW

Protecting tomato roots against harmful bacteria

Researchers from ILVO, VIB and Ghent University will team up to search for defense proteins within the roots of tomato plants. The final goal is to arm the plants against the bacterium *Ralstonia solanacearum*, which causes wilting and desiccation.

Usually *Ralstonia* penetrates the plant underground via the roots and spreads via water in the soil from one plant to another. In this project, researchers will gain more insight into the course of the infection of the bacterium in the roots, and more specifically on the battle between attack and defense proteins in tomato roots. Control of bacterial wilting is insufficient with conventional therapies for plant protection, thus this information can be used when breeding for resistance.

contact: jane.debode@ilvo.vlaanderen.be
johan.vanvaerenbergh@ilvo.vlaanderen.be

NEW

Hip tubers with not-so-hip diseases?

Yacon, ulluco, sweet potato, crosne, mashua oca and Jerusalem artichoke are either exotic or 'rediscovered' edible tubers that are gaining popularity. But what diseases or pests do they bring? And can they spread to traditional commercial crops? Researchers from ILVO and PCG are looking for answers within the project 'PRONC'.

The inventory of pathogenic viruses and nematodes on the newly-introduced tuber vegetables will give a better picture of the risk that these pathogens pose to the crops themselves and for other (related) crops grown in Belgium and which are a host for these viruses and nematodes. This knowledge is much needed in order to make a decision scheme for the Belgian and EU authorities, in case of detection in imported material in Belgium or the EU.

contact: kris.dejonghe@ilvo.vlaanderen.be

Salinization processes:
4 ways coastal soils gets saltier

Why and how do coastal soils get saltier? Learn about the four different salinization processes as explained by ILVO-researcher Jeroen De Waegemaeker.

https://www.youtube.com/watch?v=SjI7XdiKcsk

3:01

[RESULT]

Prevention of erosion in vegetables and corn: 4 years of GOMEROS

The problem of erosion has gotten more attention in recent years, among others due to regulatory changes regarding the most erosion-prone parcels in Flanders. Over the last four years, non-inversion tillage and a range of other technical cultivation measures have been tested and improved in the GOMEROS project to prevent erosion in fields of vegetables and maize. Farmer participation was a consistent and important element throughout the project.

Cultivation techniques to limit erosion should not only prevent erosion, they must also be feasible in practice for the farmer, without a loss of yield. In addition to optimization of existing techniques, techniques were also tested that the farmers themselves had suggested. The knowledge gained is online accessible to the general public (see www.gomeros.be and ILVO Bulletins 226, 241, 251, 256 and 257). For the farmers, technical sheets were drawn up per crop that provide an overview of the causes of erosion, concrete techniques to deal with erosion, and some practical tips.

contact: thijs.vandennest@ilvo.vlaanderen.be

[RESULT]

Box moth advances steadily: ILVO continues the search for a solution

To find more accurate and ecological ways to control the (invasion of) the box moth, a series of field experiments were again conducted at ILVO, PCS, AVBS and Landelijke Gilden in 2019. The 4 organisations will continue their intensive cooperation in the working group "SOSbuxusmot". Jochem Bonte (ILVO entomologist):

"We test whether plant-supportive formulas work preventively. And we look at the effectiveness of caterpillar-killing nematodes, bacteria and fungi for professional and domestic use."

The results are available at www.sosbuxusmot.be

contact: jochem.bonte@ilvo.vlaanderen.be

RESULT

World map of soil nematodes published, using ILVO data

In August 2019 the renowned scientific journal Nature published a large-scale study on the abundance and diversity of microscopic nematodes in the soil. As many as 57 research institutes, including ILVO as Flemish partner institute, were involved. The study provides crucial insights into the dispersal of nematodes and their important role in the carbon cycle, which should be factored into all future climate scenarios.

ILVO scientists will immediately start working with the results. The great diversity, number and distribution of nematodes, as demonstrated in the article, confirm their usefulness as a research model for crop production, soil fertility and climate.

contact: lieven.waeyenberge@ilvo.vlaanderen.be

RESULT

Evil weevils in ornamental plant cultivation? Monitoring and control of the vine weevil

Thanks to inventory and monitoring of weevil damage in the Flemish ornamental plant cultivation, there is now a warning system for the common black vine weevil *Otiorhynchus sulcatus*. The larvae of these and related weevils are hard to find as they live underground and destroy the roots of an extensive series of host plants. Their hidden life cycle hinders efficient control. The leaf damage caused by the beetles also affects the plants, but control is difficult because some are nocturnal and because there are only a few recognized and effective means available.

ILVO and PCS gathered knowledge about the time of occurrence of the different stages and times of emergence; this can be immediately included within the developed warning system. This system contributes to a more integrated control strategy for this group of weevils, enabling the farmers/growers to control these pest insects in an efficient and sustainable way, with increased operational reliability as a result. The results also suggest that global warming may lead to increased problems with these weevils

contact: jochem.bonte@ilvo.vlaanderen.be

RESULT

A computer model for longhorn beetles?

The government and sector can now rely on a scenario-based decision tool for the control strategy of the Asian longhorn beetle species *Anoplophora glabripennis* and *Anoplophora chinensis*. Using a computer model, a recommendation is given about how best to avoid and/or control these pests and the related costs.

The project focused on two beetle species of deciduous trees and shrubs from Asia which enter Europe via plant material or wooden packaging. Several outbreaks in our neighboring countries have been reported. The possible need to destroy the crop is not only drastic, it implies a very large economic impact, thus research on possible control techniques cannot come too soon.

contact: jochem.bonte@ilvo.vlaanderen.be

[RESULT]

This is what we know about the air-purifying effect of plants

What effect do plants have on indoor and outdoor air quality? Which plants should you choose and how do you plant them for optimal air purification? Thanks to Green-Air we now have an idea. Can a limited number of ferns suffice to purify the air in an office space of 9 m^2 and does a green wall have more effect on the amount of particulate matter in a narrow street than a broad-crowned tree? How many volatile organic substances, gases and particulate matter plants are effectively removed from the air depends on many factors: the amount of light, wind, initial air pollution, leaf shape, etc.

The Technology Platform for Ornamentals (ILVO, PCS, UGent, HoGent), UAntwerpen and the Flemish Environmental Agency) have been working for the past two years in the Green-Air operating group in order to collect all scientific knowledge of the air-purifying capacity of plants. They've bundled that knowledge into two attractive brochures. Not only interesting for ornamental growers and, by extension, the entire green sector, but also for the wider public.

contact: emmy.dhooghe@ilvo.vlaanderen.be

[RESULT]

Update on the Soil Passport

ILVO and Flanders Department of Agriculture and Fisheries have joined together to develop a "soil passport", an online tool where available soil-relevant data can be quickly and easily consulted for the farmer and for those with whom the farmer would like to share it. The ultimate goal is to gain insight into soil quality and its evolution, and to work towards a more sustainable soil management. The Soil Passport is based on public data (e.g. satellite images, soil map, crop monitoring), on private government data collected in a legislative framework, and on private data (e.g. results of soil analyses). With regard to the private data, the farmer can choose whether or not share that data and with whom. This will be arranged via the data exchange platform 'DJustConnect'.

In 2019, a functional analysis was carried out and the concept tested with a focus group. In 2020, a first demonstration version will be tested, and the automatic data flow will be further elaborated.

contact: greet.ruysschaert@ilvo.vlaanderen.be

[RESULT]

Botanical gardens and arboreta as hotlines for suspect diseases and pests

In 2017 the Belgian Plant Sentinel Network (BePSN) was founded by the Plantentuin Meise, ILVO and CRA-W. This Sentinel Network made up of botanical gardens and arboreta has already proved its worth. Two tree diseases were detected for the first time in Belgium: the fungal disease *Sirococcus tsugae* on cedar and *Candidatus Phytoplasma ulmi'* on elm.

The Belgian Plant Sentinel Network comprises seven botanical gardens and arboreta and two phytosanitary laboratories (ILVO and CRA-W). The aim is to support the national phytosanitary policy via early warning of new plant health risks.

contact: nicole.viaene@ilvo.vlaanderen.be

Socially supported animal production

During times when the debate about meat production and consumption sometimes seems to be divorced from numerical observations, evolutions, and impacts, ILVO opts for sustained research in animal husbandry. The sector demands feasible recipes to improve quality and value and reduce impact on the environment and climate.

Sometimes the best of intentions end up working against each other: better scores on animal welfare in poultry farming have resulted in increased nitrogen emissions, particulate matter production and even a higher climate impact (because more feed was needed, and thus more use of space).

Some feeding strategies of dairy cattle reduce the methane formation in the rumen but increase ammonia emissions.

Outdoor grazing scores well for animal welfare but works against precision feeding, which is the best way to maximize the climate robustness per liter of milk.

The systems thinking exercises, typical for ILVO, when applied to such cases generates a holistic and critical view of the problems and promotes constructive solutions. This is how we build the future of sustainable animal production, step by step.

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contact: bart.sonck@ilvo.vlaanderen.be

Monitor for Grazing Cows

Where is my grazing cow?
This smart sensor helps Flemish farmers find their cows online.

https://www.youtube.com/watch?v=PwE8OEXjc6o

4:06

NEW

Real-time indoor climate and emissions measurements inside a cow barn?

One aim of the European MilKey project is to develop a monitoring tool (OTICE) that helps the dairy farmer to implement and manage techniques for reducing barn emissions. The challenge here is to reduce ammonia and methane emissions in particular, while still guaranteeing an optimal indoor climate.

Good ventilation ensures a good indoor climate in the barn, which is an important production factor for the farmer. Ventilation is also a driving force for ammonia emissions and greenhouse gases, which are detrimental to nature and the climate. Techniques in the fields of manure management, barn ventilation and animal feed can significantly reduce these emissions. But how do you know if the desired effect is being achieved? When implementing and managing these techniques, the dairy farmer would benefit greatly from a monitoring instrument that simultaneously monitors emission levels and monitors the barn climate. ILVO will therefore develop OTICE, the "Online Tool for Monitoring Indoor Barn Climate, Animal stress and Emission levels of air pollutants". The tool will be both tested and used in in pilot barns in Flanders, Ireland, Poland, France, Germany, Greece and Norway.

contact: philippe.vanoverbeke@ilvo.vlaanderen.be

NEW

How digestible are the cell walls of silage maize? A measurement method based on Near InfraRed Spectroscopy (NIRS)

When comparing varieties of silage maize for the assessment of feed quality, the digestibility of organic matter and starch content are currently examined using NIRS. The nutrients that a cow extracts from maize silage come largely from the cob, but also partly from the stem and leaves. The purpose of new ILVO research is now to develop a robust NIRS calibration to estimate cell wall digestibility (NDFD).

The reference method for the determination of the NDFD shall be the in vitro digestibility in rumen fluid for 48 hours. If that works as an additional feed value parameter in variety list, (livestock) farmers will be able to make better choices according to their type of farm (dairy cattle or beef cattle), the stage of production of dairy cattle, and the proportion of maize silage in the ration. The knowledge of NDFD also makes it possible for breeders to make a more targeted selection toward maize with a better feed value.

contact: johan.deboever@ilvo.vlaanderen.be

NEW

Animal welfare challenges for organic and free range pigs and chickens

With PPILOW, ILVO and 22 other European partners wish to improve the welfare of pigs and poultry kept under organic farming conditions and free-range systems. First the welfare problems are mapped out. Then innovative solutions and tools are developed, tested, validated and published. Through close interaction with livestock farmers and other links in the production chain as well as policy organizations, citizens and consumers, we hope to maximize the use of these innovations by the end users. In dialogue with stakeholders, we select the most promising strategies that are tested further in experimental and practical research. At the same time we assess them against economic, social and environmental criteria, and feasible business models are worked out.

ILVO focuses in this project on keeping laying hens with intact beaks and evaluates possibilities to prevent feather pecking and cannibalism, such as the influence of the outdoor free range design or feeding live insects. In addition, ILVO coordinates the optimization of existing apps to evaluate animal welfare on free-range farms. We also assess the effectiveness of the optimized self-scanning tools on commercial free range pig and poultry farms.

contact: mirjan.thys@ilvo.vlaanderen.be

NEW

Fourteen PhDs on stress in laying hens

Europe has the ambitious aim of improving both productivity and animal welfare. A total of 16 European research centers, including ILVO, start a large-scale 4-year study to investigate the fundamental and the more practical causes and effects of stress in laying hens at all stages of their lives. The starting point is the EU ban on egg batteries in 2012, which partially missed its goal namely to increase animal welfare. The aim is to create renewed production systems that are feasible and optimal for animal welfare.

Through the doctorates, the ChickenStress project wants to gain insight into how the stress response is regulated in the bird brain. And how the genetics, the early living environment, and the current living environment of the laying hen can reduce her chronic stress. ILVO takes on the work package 'living environment' with a focus on free range chickens: To what extent are there correlations between the circumstances during the hatching of the eggs and during the first rearing phase of the chicks and the eventual use of the outdoor run and the animal welfare of the chicken? And can we, using neurobiological markers, measure how both early and later living conditions influence the capacity of the chicken to deal with stress?

contact: frank.tuyttens@ilvo.vlaanderen.be

NEW

Antibiotic (resistance) reduction in the European livestock sector by large-scale 'learning network' project DISARM

In the Horizon2020 thematic network DISARM – Disseminating Innovative Solutions for Antibiotic Resistance Management - European livestock farmers, veterinarians, consultants, researchers and industry representatives from 9 countries join forces in the battle against antibiotics and antibiotic resistance. In a large series of practical cases they are looking for the best (tried and tested) approaches to achieve two goals at the same time: improved general animal health on the farms and a permanent and drastically reduced use of antibiotics. The best practice approach is disseminated as an example to be followed for the whole of the European livestock industry.

Coordinator Frederik Leen (ILVO): *"Antibiotic resistance is a growing global problem that requires urgent and coordinated action from all concerned. DISARM therefore aims to create a robust commitment and the necessary framework for the sector in order to continue, even after this project ends, along the path towards a safe and responsible use of antibiotics in animal husbandry in the future."*

www.disarmproject.eu

contact: frederik.leen@ilvo.vlaanderen.be

NEW

Monitoring tool for the welfare of laying hens

At the request of the Flemish government, ILVO is going to develop a fast monitoring tool for the welfare of laying hens. The tool should identify areas for improvement from each stage of life of the laying hens (stay in the barn, catching and loading the hens, the transport to the slaughterhouse, the slaughter procedure). The scan will be carried out in slaughterhouses and therefore has a number of advantages: the risk of introducing disease on farms is reduced, the results provide a view of the entire cycle of the laying hens, all farmers can be efficiently monitored and benchmarked, fast responses become possible and desired actions for the future can be identified.

The ultimate goal is that the monitoring scores will lead to a welfare improvement for laying hens in all housing systems (enriched cages, barns, free range). Previous studies on the welfare of laying hens showed that there are still several things to improve in today's practice.

contact: anneleen.watteyn@ilvo.vlaanderen.be

NEW

Towards an optimal creep feed composition for organic piglets

Why do organic piglets - despite their higher weaning age – eat less well around weaning? And how can we formulate and produce organic creep feed for better uptake by the piglets, taking into account the nutrient requirements of organic piglets and made available within a certain price range? ILVO, the Pig Information Center, Ghent University, CCBT, Bioforum and Mills Dedobbeleer work together with the organic pig farmers on these questions, within the operational group BioBIG.

Concretely, the operational group wants organic pig farmers, educators, researchers and animal feed manufacturers to exchange experiences and provide tools to optimize the feed composition and strategy around weaning. By applying concrete improvement paths regarding the weaning feed composition and by tackling the critical factors in their weaning management, the organic pig farmers may wean their piglets more efficiently, e.g. by increasing their health status, improving their technical performance, and with a lower feed cost per kg of piglet.

contact: sarah.desmet@varkensloket.be

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ONTWIKKELING

NEW

Part-time group housing for rabbits?

Can rabbit does be housed part of the time in groups, and if so, what is the best time to do this? Project KONSEMI, based on visits to rabbit farms, looks for an answer. Does are housed in a group together with their young in a park shelter at different times.

The aim of the project is to investigate whether group housing for does improves their welfare while still ensuring the production numbers. For this purpose, two rabbit farms are intensively monitored by weighing the animals at regular intervals and scoring their injuries. By means of a camera setup, the rabbits are observed for a few days. These images will be used in a later stage to evaluate the behavior of the rabbits. It is important that the animals are monitored for multiple rounds of reproduction in order to be able to correctly evaluate the effect of group housing. The farm visits will be completed in April 2020, after which the research will focus on park enrichment.

contact: liesbeth.vandamme@ilvo.vlaanderen.be

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EUROPEES FONDS
VOOR REGIONALE
ONTWIKKELING

NEW

5 years of the Pig Campus

In April 2020, the Pig Campus celebrates its 5th anniversary! A good reason to celebrate this research and educational pig housing by ILVO, UGent and HoGent. In the past 5 years we have started up, optimized, answered research questions and helped students get acquainted with all the facets of pig farming.

The barn is a model in terms of biosafety, which is urgently needed due to the large number of visitors. So far we have received over 4700 visitors, including external visitors, stakeholders, and UGent and HoGent students (i.e. future professionals). Because of African swine fever, in the last year and a half these visits were limited to those with an educational function only. Thanks to the research facilities in this stable a number of research questions could be answered, such as determining the optimal carcass weight, optimizing immunocastration, improving meat quality through sow line and boar selection, reducing emissions and reducing diarrhea at weaning. At the request of industrial partners a lot of tailor-made tests are also set up with both sows, piglets as fattening pigs. By carrying out these tests, we have successfully optimized management and despite the fluctuating pig prices, grow into an economically viable trial operation.

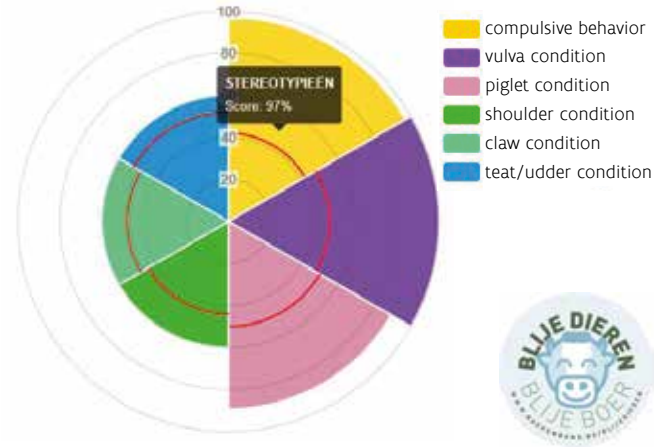
contact: marijke.aluwe@ilvo.vlaanderen.be

"Animal Welfare Self-scan: Boerenbond and ILVO"

How is the animal welfare on your farm? Use this app to get a scientifically-supported answer!

https://www.youtube.com/watch?v=e_WL8zQTNU4

[RESULT]



Animal Welfare Scan

As part of the campaign 'Happy Animals, Happy Farmer', ILVO together with Boerenbond, has developed an app with accompanying website (www.dierenwelzijnscan.be) for livestock farmers so they can assess animal welfare. The purpose of this app is to teach the farmer to look at the animals through the lens of animal welfare and create motivation to keep improving the welfare on the farm. The scan exists for pigs (sows, piglets, fattening pigs), poultry (laying hens, broilers) and cattle (dairy cattle, beef cattle).

The scan is twofold: on the one hand there are some general questions on management, housing and feed, and on the other hand, there are specific animal welfare questions. The latter are based on the five animal welfare "freedoms" and are referred to as indicators. After completing and forwarding the questionnaire, the farmer automatically receives a report with the score achieved per indicator. The most important indicators are also shown in a radar graph, which makes it visually strong. In addition, it enables the farmer to monitor the farm over time, as well as anonymously compare it with other farmers in the same sector (benchmarking).

contact: anneleen.watteyn@ilvo.vlaanderen.be

[RESULT]

Tackling ammonia formation in poultry at the source

A reduction of 10 to 20% in the crude protein (CP) content of the feed during the growing and finishing phase led to promising results in terms of ammonia concentrations in the broiler houses. This is shown by the first results of the VLAIO KUIKEMIS project, which started one year ago and strives for more sustainable poultry farming by tackling ammonia concentrations at their source.

During the trial, the effect of a reduction in crude protein (CP) content (control, -10%, -20%) and the feed form (mash or pellets) was studied on the nitrogen excretion and ammonia emissions from broilers. Reducing the CP content in the feed (in grower and finisher) by 10% had positive effects on both performance and animal welfare parameters. This also seemed to result in a decrease of the ammonia concentrations. However, it is important to preserve the digestible amino acid ratios, e.g. by the addition of synthetic amino acids.

contact: madri.brink@ilvo.vlaanderen.be

[RESULT]

Debate about scaling up: ILVO points out the need for agricultural conversion and demolition

The public debate on large-scale farming flared up in 2019. The central question raised during the debate was whether building large stables could be reconciled with a policy of "depavement" of soils?

Anna Verhoeve offers a nuanced, research-based reply: *"Mega-stables are in direct contradiction to the goal of reducing the amount of land paved, if the additional stables lead to a net increase in the paved surface area. In reality, new stables are often built on undeveloped land (greenfield development), because that is often more profitable than on an existing farm. Brownfield development, the reuse and redevelopment of old industrial sites, costs much more than greenfield development. That is true for industrial areas but also for farms. On top of that, greenfield locations often have more legal room for development and opportunities. In the end all this leads to increased pavement of open space. Scaling up, however, also offers potential starting points for depavement and can thus contribute to the story of reducing paved areas in Flanders. After all, an important driver for economies of scale in Flanders is the declining number of farms. Approximately 750 sites per year lose their agricultural function and, in theory, can be depaved or "desealed". However, we know from research that this seldom or never happens. There is an urgent need for policy instruments to organize and flank that depavement process so the vacant agricultural buildings can effectively be used to achieve the depavement targets and currently-paved farms can become productive land."*

contact: anna.verhoeve@ilvo.vlaanderen.be

[RESULT]

Vaccinated pigs – better control of Salmonella infections?

In the project SUSALVAC, carried out by UGent, ILVO, DGZ and Sciensano, different vaccination combinations were tested in order to reduce *Salmonella* Typhimurium in fattening pigs.

Vaccination of sows had a positive effect on the amount of maternal antibodies against *Salmonella* in the piglets of the vaccinated sows. Vaccination of sows and piglets, from sows and fattening pigs or of piglets only, also reduced the number of S. Typhimurium-infected lymph nodes in the slaughtered pigs. This was most pronounced when both sows and piglets were vaccinated. The vaccine strain could persist in the lymph nodes, which could have implications for *Salmonella* monitoring programs based on *Salmonella* detection in slaughterhouse samples. Also vaccination of piglets and fattening pigs may have an impact on *Salmonella* monitoring programs based on serology. *Salmonella* Typhimurium is one of the most important *Salmonella* serotypes that cause disease in humans, and the pig is the main source. It is therefore essential to deliver slaughter pigs that pose a negligible risk to *Salmonella* Typhimurium transfer to humans.

contact: geertrui.rasschaert@ilvo.vlaanderen.be

[RESULT]

Can genetics contribute to a higher-quality and tastier cooking ham?

In the selection of fattening pigs in recent decades the focus has been on producing economically viable pigs with a high carcass quality (high dressing yield and lean meat percentage) and a low feed conversion rate. But what is the impact on taste and the technological meat quality of our Flemish pigs? There is concern that the meat is less juicy and tender for the consumer and that at the meat processor it is less suitable for processing into cooking ham.

Research results from UGent (LANUPRO) and ILVO shows that it is possible to change performance (feed consumption, growth and feed conversion rate and carcass quality) via genetic selection. The effects on palatability of fresh meat and on cooking ham yields are less clearly demonstrable. However, the taste and appearance of cooking ham could not be controlled by varying the sow lines tested (Mira, TN70 and Topigs20). Nor could a difference be demonstrated between Piétrain sires selected for growth or carcass quality (Optimal and Premium).

contact: eline.kowalski@ilvo.vlaanderen.be

Nutrition and health

In its One Health vision, Europe links the health of the farm animals and plants with those of the consumer - the human who eats food - and even with intestinal flora, the human gut microbiome. ILVO follows the same chain in food safety research: which practices, what pathogens are present and are carried from primary production right onto our plate? In 2019 we have seen growing attention for this theme worldwide as well as in our own institute. The international collaborations, exchanges and requests for advice also continue to increase. This vision also includes food quality with a focus on aspects such as taste, smell and texture.

The new ILVO Working Group on Nutrition and Health presented two interesting reviews on this theme that were published in a prestigious scientific journal: The publications outline the broad framework of a balanced diet, and detect important opportunities within the agri-food system.

Multidisciplinarity is a key concept, and it is precisely that trump card that ILVO already has. At ILVO, knowledge and research are being done in many different sub-domains, from the beginning to the end of the agri-food chain for both plant and animal production.

contact: lieve.herman@ilvo.vlaanderen.be

New crops at ILVO

Discover the new crops that ILVO is studying
for protein and crop diversification.
Soy and quinoa of course,
but also oil pumpkin,
chick pea, lentils, mustard,
and more.

https://www.youtube.com/watch?v=412Ee8a60EM&t=7s

2:48

NEW

New crops in the field... ...and on our plates?

Quinoa, soy, edamame, chick pea or pumpkin seeds: the market shows a clear demand for a more varied use of vegetable ingredients and raw materials in daily food products, because of their taste, nutritional value, sustainability or health image. Producers and processors who want to respond to these new niche markets need clear, scientifically controlled, technical information.

Through the development of a knowledge matrix, CROPEXPLORE maps the potential of different (known and less known) crops and derived raw materials in terms of nutritional quality, technological functionality and impact on product and taste, as well as the sustainability features and economic feasibility. Based on a bundle of existing information combined with new analyses in case of missing information, farmers and food companies gain an overall picture of the different aspects of a range of interesting crops and the raw materials they contain.

contact: jana.baeyens@ilvo.vlaanderen.be

NEW

The importance of food for our health (care)

Nutrition is important for our health. But how important? And how can nutrition contribute to better health? How can food ingredients, preparation and logistics be adjusted according to the needs? Special foods can protect people with special health care needs from malnutrition.

In recent years, research in nutrition and care has led to new insights. Interaction between both areas of expertise offers additional opportunities to use this knowledge in function of the current and future societal needs even better. That is why the platform NuHCaS was established. The kick-off took place in September.

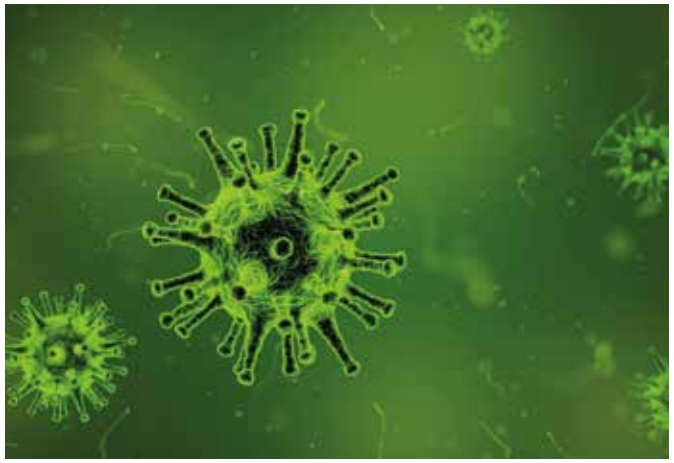
The aim of NuHCaS is to bring together expertise in nutrition and health research. A complex holistic approach where each different partner contributes their own expertise, forms the basis for this open research center. It is a place where nutrition and health research meet in come into contact and knowledge, ideas and innovations are tested against the practice of healthcare providers and companies through co-creation.

Together with Flanders' FOOD, POM West Flanders, TUA West, VIVES and KULeuven ILVO participate in the development of the platform. One of the first tasks is to explore the needs and knowledge gaps that exist at the interface where health care and food interact with each other. A systemic approach is used.

www.nuhcas.be

contact: marc.deloose@ilvo.vlaanderen.be

NUTRITION HEALTH CARE SYSTEM
NuHCaS



NEW

Hepatitis E virus detection in food: how big is the risk to the food chain?

ILVO, Sciensano and the universities of Antwerp and Liège are looking for alternative molecular methods for the determination of infectious Hepatitis E virus (HEV) in foodstuffs. Currently, there are too few methods that allow to identify HEV contaminated food products and the risk to demonstrate it for public health.

The new method should make it possible to formulate answers to questions such as "Which food products have the highest risk of transmitting the HEV to the consumer? Can methods be developed to estimate the infectivity of HEV? What is the effect of current meat processing practices on the infectivity of HEV in high risk pork products?" The aim is to reduce uncertainty about possible sources of infection.

contact: ellen.lambrecht@ilvo.vlaanderen.be

NEW

Rapid test for bacterial contamination in food

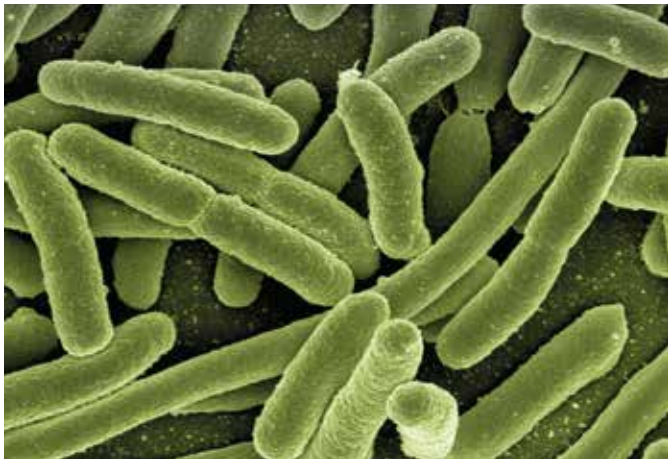
The continuous, automated and efficient detection of bacterial contamination in food is the ambitious goal of the recently started Interreg agrEUfood project. The project partners optimize new biosensor technology and make it industrially applicable, at least up to the level of a fine tuned, reliable demonstrator, with the right scale and connected to a clearly usable software platform. ILVO has the important role of sharing specialized knowledge with the local quality managers at the food companies about the microbiological applicability and on the test results of the biosensor technology with respect to the reference measurements.

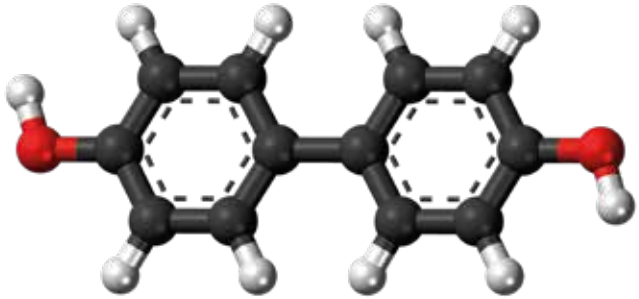
The ultimate goal is that in the short term, agri-food companies will be able to test their products for the presence of bacterial contamination using maximum automation and as continuously as possible throughout the manufacturing process. At present, that bacterial monitoring is still based on random samples, which are analyzed (mainly manually) in a lab.

contact: marc.heyndrickx@ilvo.vlaanderen.be

agrEUfood

Interreg Vlaanderen-Nederland
Europees Fonds voor Regionale Ontwikkeling





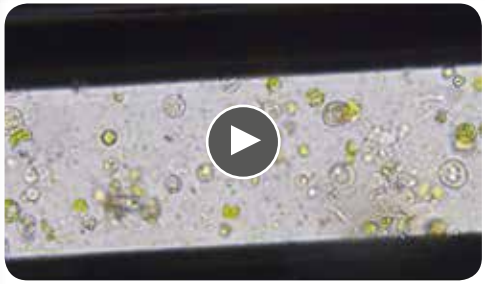
NEW

Bisphenols and obesity?

Plastics with bisphenols are often used for items that come into direct contact with food such as packaging, kitchen equipment, coating of metal cans, etc. Although today many bisphenol A (BPA)-free products are being produced, structural analogues are being used that have similar endocrine-disrupting, negative effects (in terms of reproduction and development, immunity, and cardiovascular and metabolic systems), and with a possible obesogenic (obsesity-promoting) effect. In the European project OBEMIRISK, the data obtained, tools and possible biomarkers are exchanged to help contribute to the EFSA scientific assessments. This is done by the increase of knowledge on bisphenol exposure, its impact on the intestinal microbiome, dysbiosis and obesity.

ILVO is partner, together with the French INRAE, the Polish TUL (Lodz University of Technology), the Slovak 'University of Veterinary Medicine and Pharmacy in Kosice" and the Spanish INYTA (Institute or Nutrition and Food Technology), which is coordinator.

contact: els.vanpamel@ilvo.vlaanderen.be



“Taking the allergen out of celery”

For the first time, asymmetrical protoplast or cell fusion was applied in celery. The nucleus of a celery cell and the cytoplasma (plasma around the nucleus) of a carrot cell have been joined to form a new cell.

https://www.youtube.com/watch?v=fH2OEDGZUwk

0:05

Hyperspectral camera VLAIO Proeftuin 4.0

The Food Pilot has a camera that can discern different types of meat, even when minced. And the percentage of ground spices? What about foreign objects among vegetables on a conveyor belt? That is all visually possible with a hyperspectral camera linked to machine learning software.

https://www.youtube.com/watch?v=JT-6IZSXS6M

1:49

RESULT

ILVO TAKES FIRST STEPS TO MAP THE SPREAD OF ANTIBIOTICS AND ANTIBIOTIC RESISTANCE VIA MANURE

ILVO has developed a method that makes it possible to map how antibiotics are distributed into the environment via manure. With this method, 69 antibiotics can be traced simultaneously, including the difficult to trace - but important for human medicine - colistin. A first exploratory screening of a limited number of antibiotics in a limited number of manure and soil samples highlights the importance of further research.

Marc Heyndrickx (ILVO): *“In the context of the ‘One Health’ battle against antibiotic resistance, it is important that we gain more insight into the ways that antibiotics and resistance genes spread to and from humans, animals and the environment. In this doctoral research project Tina Van den Meersche has taken the first steps to map out the environmental route.”*

ILVO, together with UGent and UCLouvain, has already launched follow-up research into the effect of antibiotic residues and -resistance genes in the soil on crops and the possibility of risk to human health arising from the consumption of those crops. The importance of this is great, because antibiotics are essential in the treatment of the majority of bacterial infectious diseases in humans and animals.

contact: marc.heyndrickx@ilvo.vlaanderen.be

[RESULT]

A healthy diet for a healthy life

More research is needed on the relationship between our diet, the microbiome and risk of chronic disease. Within the framework of accelerating, developing and increasing the impact of the intestinal microbiome research in relation to human health, the "HDHL-INTIMIC Knowledge Platform on Food, Diet, Intestinal Microbiomics and Human Health" (KP Intestinal Microbiomics - INTIMIC)" was established within the "Joint Programming Initiative a Healthy Diet for a Healthy Life (JPI HDHL)". More specifically, it concerns the creation of a knowledge platform with the goal of promoting national and multidisciplinary collaborations and networking.

ILVO is part of the consortium, under the coordination of the "Dutch Organization for Applied Scientific Research (TNO)'. This consortium consists of about 50 partners from 9 different countries (the Netherlands, Belgium, Germany, Austria, Sweden, Italy, France, Spain and Israel). More information can be found at https://www.healthydietforhealthylife.eu.

contact: els.vanpamel@ilvo.vlaanderen.be

[RESULT]

Staying under the radar with foodborne infections? Not anymore!

Whole Genome Sequencing (WGS) is a new, breakthrough analytical technique that give micro-organisms a very detailed fingerprint. The technique is so strong that it can differentiate organisms from each other down to the strain. *"For the food companies, a real revolution is about to happen,"* predicts Lieve Herman (ILVO and Food Pilot). *"From now on, it will be possible to monitor around the world how one strain started to spread. Also outbreaks with an unknown origin will be able to be found retroactively."* The new molecular detection techniques are thus a game changer.

"Address food safety issues thoroughly, and quickly." advises Lieve Herman. *"The time has come that not only policymakers decide what is acceptable, but also the critical consumer, who will have more and more access to information."*

Read the full article in VMT Food 2 - June 2019

contact: lieve.herman@ilvo.vlaanderen.be

[RESULT]

Tin is in

Canning is quite a sustainable way of storing food, but the method requires large amounts of energy and water and can influence the quality of the food preserved. In the framework of the ERA-NET SUSFOOD project INPROVE, ILVO is a research partner of Greenyard Prepared to (among others) evaluate a newly developed tin can with a different shape. This type of tin can could be the solution that makes canned foods more attractive in the future.

The new tin looks like the old ones but with a hole in the middle, and still exists only as a prototype in the laboratories of European food scientists. This new shape allows the tin to be heated on the inside and the outside, which improves the quality of the food and makes the process more energy-efficient. As a result, manufacturers can save both time and energy costs and offer a better product to the consumer.

In 2019, experiments were carried out on products such as potatoes, salsify, tomato-mushroom sauce and tomato soup with vegetables. During the experiments, the prototypes were tested next to regular cans and they look promising. It became clear that the maximum product temperature, depending on the processed food, could be achieved 8% to 60% faster with the new shape. Definitely worth pursuing!

contact: bart.vandroogenbroeck@ilvo.vlaanderen.be

Protein diversification

First of all this: the current change in protein use is sometimes referred to as 'transition', sometimes as 'diversification'. It is important to see the difference. Because "transition" suggests dropping one in favor of another, ILVO opts for "diversification" of protein sources. Yes, if we want to feed the population with food that is balanced, climate- and environmentally conscious, then -here in Europe- we will have to eat less animal protein and replace it with protein from a different origin.

As researchers, in particular we see a great need for integrated research and development. Throughout the entire agrifood system (i.e. from field to fork), different protein sources need to be found and researched in terms of functional and nutritional suitability, the influence of processing on those proteins, the chemical and microbiological food safety, allergenicity, digestibility, LCA, etc. as well as taste, texture and acceptance by the consumer and certain target groups.

"ILVO now has a protein team at work. One of the related investments that we are particularly pleased about is the brand new Plant Protein Pilot line in the Food Pilot. This allows us to develop innovative protein-rich food products in a targeted manner."

contact: geert.vanroyen@ilvo.vlaanderen.be

Soy cultivation is growing in Flanders

A report by PlattelandsTV

https://www.youtube.com/watch?v=g5C7Vjs81l4

7:11

NEW

ILVO and Arvesta launch bold campaign: "Discover soy and pioneer with us, for agriculture and climate"

In 2019 ILVO and Arvesta looked for farmers with enough appetite and guts to pioneer soy cultivation on their own land. With the campaign "Discover soy", launched during the Werktuigen Dagen (machinery days) in Oudenaarde, after 7 years of research and field trials, they hope to accelerate the introduction of cultivation in Flanders.

Soy is a promising new crop for Flemish agriculture with proven climate and environmental benefits. To eliminate the remaining bottlenecks, scaling up the acreage will be necessary. Kristiaan Van Laecke (ILVO): *"On the one hand, it will help improve insight into the influence of soil type and other local variations, and on the other hand, we'll get feedback from the people growing it - the farmers themselves."*

ILVO and Arvesta combine their expertise and provide an individual and collective counseling program for the selected candidates, from sowing to marketing. Esther Monard (Arvesta): *"Thanks to the close cooperation between researchers, cultivation advisors and fellow soybean pioneers, we want to make sure that more farmers are learning the 'craft of soy'. In this way we can increase the acreage."*

contact: joke.pannecoucque@ilvo.vlaanderen.be

NEW

Processing of locally-grown soy proteins

Texprosoy focuses on plant-based material as an alternative protein source, more specifically locally grown soy.

In collaboration with KU Leuven, this project mainly involves strategic fundamental research. Among others the impact of processing steps of the soybeans to achieve a protein extract ready for processing will be evaluated. More specifically this research concerns the effect of the extraction process itself and the texturing process via extrusion on the various micro- and macromolecular properties of the soy protein.

This research started on 1 October 2019.

contact: geert.vanroyen@ilvo.vlaanderen.be

Processing of locally-grown soy proteins

NEW

Quinoa in a higher gear

To introduce a profitable conventional and organic quinoa crop in Flanders, while preserving the "green image" of this crop and without use of pesticides and/or herbicides: this is the purpose of the newly started QUILO (QUINOA LOCAL). By increasing crop and cultivation knowledge, ILVO, Inagro, the Praktijkpunt Landbouw Vlaams-Brabant and other organisations want to improve the quality and profitability of their crops, so quinoa can help to expand the crop rotation and the preservation of business activities on the individual innovative land-bound farm.

With QUILO and synergies with other projects, we are focusing on raising awareness of quinoa among producer and customer and on responding early to opportunities that arise from the market and processing sector. Innovative applications within the food sector will improve the market for agricultural products and the quinoa acreage will increase (added value for the farmer).

contact: gerda.cnops@ilvo.vlaanderen.be

NEW

Microbial protein: digestible? allergenic?

In addition to plant and algae protein sources, ILVO will also conduct research into microbial protein as an alternative protein source within protein diversification.

Within the Prometheus project, a collaboration with VITO and various industrial partners which started on 1 March 2020,

ILVO explores the possibilities for the use of proteins produced by specific micro-organisms within food and feed. ILVO's research role is to explore the nutritional, techno-functional and allergenic characterization of the microbial protein, as well as its digestibility and identification of potential food applications.

contact: geert.vanroyen@ilvo.vlaanderen.be

NEW

Seaweed and microalgae: European production, European flavor

How can we sustainably produce seaweed and microalgae that is suitable for food applications on the European market? The European market demands consistent quality and an attractive flavor palette. The 12 partners from Belgium, the Netherlands, France and Great Britain are seeking answers in the new Interreg-2 seas project ValgOrize. ILVO coordinates.

Seaweeds and microalgae can play an important role in feeding the world, but that potential is barely being met in Europe. Both consumers and food producers are reluctant. The obstacles are known: lack of knowledge about the taste of algae, lack of reliable supply and lack of knowledge of what the European consumer thinks is tasty.

With this research we are looking for a new source of protein for human food. The project is also looking into whether algae can be a full-fledged alternative to soy in chicken feed.

contact: johan.robbens@ilvo.vlaanderen.be

Interreg
2 Seas Mers Zeeën
ValgOrize

Spirulina: one of the algae under study in the Profuture project

NEW

To extract and characterize the protein from algae

The Profuture project is a European H2020 project in which the potential from microalgae is being studied.

The tasks of ILVO, among others, focus on extraction of the algae proteins and drying them, but also on the characterization of these flows, both in terms of their nutritional value, functionalities, sensory characteristics, microbial and chemical safety and potential applications in feed and food.

This research started on 1 October 2019 and is linked to an ILVO doctoral study on protein from microalgae.

contact: keshia.broucke@ilvo.vlaanderen.be

NEW

Introsect: A six-legged herd?

Cultivating insects is being seen as a new, challenging agricultural activity. But what is possible on an existing farm? Which insect thrives best in an existing space? Which adjustments are needed and which difficulties are found in relation to this type of farming?

In the VLAIO trajectory 'INTROSECT' the partners Inagro, ILVO, VIVES, KU Leuven/Thomas More and the National Experimental Garden for Chicory are seeking answers to these and other questions. During the project farmers interested in a partial or complete conversion to the professional insect culture will receive guidance during the effective start-up of this challenging activity. The experience gained will be translated into an "insect barometer". Through this tool, other farmers can also see whether this new agricultural activity would be a good match for them.

contact: evelyne.delezie@ilvo.vlaanderen.be

[RESULT]

Pumpkin seed proteins: as powder, as textured vegetable protein and as high moisture extruder

Are cooded sausages, meatballs and chicken nuggets with more plant-based proteins (still) tasty?

Meathybrid is an international project that explores the extent to which meat proteins could be replaced by textured or non-textured vegetable proteins, without compromising the sensory and nutritional quality of the final product. In cooperation with the German Institute for Food Technology (DIL) and the University of Hohenheim the potential of peas, sunflower seed, pumpkin seeds and potato protein are estimated in cooked sausages, meatballs and chicken nuggets.

The results show that replacements of up to 50% in these products are possible without a great loss of consumer appreciation. This project ended on 31 December 2019.

contact: geert.vanroyen@ilvo.vlaanderen.be

[RESULT]

A better protein balance for the cow

More than half of the protein that ruminants extract from feed is microbial protein, i.e. protein from bacteria that originate in the rumen (first stomach) from the fermentation of plants. In the Interreg project PROTECOW, Belgian and French researchers explore how to formulate rations to maximize the use of the microbial protein from the rumen. This not only saves money for the farmer, but is more ecological. Producing high-quality milk with less (imported) soybean meal and more locally-sourced protein is the ultimate goal.

The role of the cow in the supply of animal protein is quite unusual. The microorganisms in the rumen can produce full-fledged microbial protein from non-protein nitrogen. Cattle farmers can apply part of the nitrogen in cows' rations via a simple source of nitrogen, namely urea. Optimal microbial protein production requires good synchronization between the nitrogen present and the energy present. Feed urea releases the nitrogen very quickly, whereas a slow-release urea is formulated in such a way that nitrogen is released less quickly.

ILVO shares its experimental research on this subject with the PROTECOW farmers from Flanders, Wallonia and the northern part of France: in order to make optimal use of the ration, it is especially important that to provide it throughout the day. If a dairy farmer feeds classic urea several times a day with his feed mixer or concentrates, it is as good as using a - much more expensive - slow-release urea once a day.

www.interreg-protecow.eu

contact: leen.vandaele@ilvo.vlaanderen.be

[RESULT]

Machines for vegetable proteins and meat analogs

In order to keep up to date in the field of extraction and processing possibilities in the context of protein diversification, ILVO has either planned or has already invested in its living lab 'Agri-food and Technology', living lab Food Pilot.

The "plant protein extraction line" has been extended with a pilot line for extracting and concentrating high quality protein from various vegetable raw materials. Investments will be made in equipment for shelling, degreasing, centrifuging, decantation, clarification and purification of vegetable raw materials. This can be used to generate knowledge for isolating and concentrating high-quality proteins which are then translated into product innovations for the food industry. This last step can be realized by combining this new line with the current pilot food processing equipment in the Food Pilot.

These investments will be made starting in 2020 in the framework of an ERDF investment project in collaboration with Flanders' FOOD.

Already in 2019, investments were made to expand the extrusion equipment with a "high moisture extrusion" module, so that in addition to dry textured vegetable proteins textured proteins can also be produced to formulate meat analogs.

contact: katleen.coudijzer@ilvo.vlaanderen.be


BIZERBA

Profitable production systems and added value creation

Despite the efficiency of many production systems in the Flemish agricultural and agri-food sector, profitability is often under pressure. Among other things, this has to do with the dependence on what's happening on the world market, unequal value distributions in the chain and costs that can rise sharply. It also has to do with an extensive list of societal expectations, e.g. environmentally friendly, climate-friendly and animal-friendly production.

In 2019, ILVO continued to put a lot of effort into socioeconomic research that contributes to profitable and sustainable production systems. The research is very diverse: from specific adaptations of processes on farms, such as rationing adjustments in order to reduce climate emissions, to integrating new crops (e.g. soya, quinoa) and setting up new earning models that may or may not involve different types of chains (e.g. agro-forestry, short chain).

contact: jef.vanmeensel@ilvo.vlaanderen.be

BioBoost (EN spoken) – From green clippings to clothing and from leftover tomatoes to healthy drinks

Horticulture produces large amounts of "green waste" such as green clippings (leaves and stems) and unmarketable but still healthy fruit and veg.
Currently most of that green biomass gets either thrown away, used for compost or used to make biogas. In the BioBoost project, we're looking for ways to better valorize it using research and testing with industrial and research partners.
This video shows the first results.

https://www.youtube.com/watch?v=tLNwikvBQ20

3:50

Free, personalized advice tailored to your short-chain initiative

Kratos - Slegershof

https://www.youtube.com/watch?v=N-MCGZrYm0Y

2:22

Free, personalized advice tailored to your short-chain initiative

Farm shop De Nil

https://www.youtube.com/watch?v=52XAnFPvvgI&t=1s

2:23

NEW

A food transition by 2030?

With the FoodSHIFT project, 31 European partners wish to launch an ambitious, citizen-driven transition within the European power systems. This transition should lead to circular systems with a low carbon footprint, including a shift to a more plant-based diet. In nine cities, including Ostend, accelerator labs are being set up.

Each accelerator lab has an innovation focus and will undertake actions to implement existing innovations relating to helping grow different food systems, combining them and scaling them up. The focus is on technological development and social compatibility. In Ostend we will work towards operationalization of an agricultural park, with attention to issues such as food waste, urban agriculture, short chain agriculture and food from the sea.

www.foodshift2030.eu

contact: maarten.crivits@ilvo.vlaanderen.be

Food SHIFT | 2030

NEW

Economic resilience of the short chain as a revenue model

Short-chain agriculture is often cited as an alternative and/or complementary earning model for conventional agriculture. In many cases, attention is given to the higher price and the greater share of value within the chain that returns to the farmer. In this context, ILVO and Steunpunt Korte Keten perform research into the economic resilience of the short chain as a revenue model.

The focus of the project is on the identification of the success factors of the short chain for profitable and sustainable farming. In addition to these success factors, a number of master classes are also being developed and carried out in order to provide farmers with advice in a practical and participatory way. The research focuses on the short chain as a whole and is neither sector-specific nor channel-specific. This means that dairy, meat, fruit and vegetables as well as the multitude of possible sales channels and expansion of activities will be included in the study. Also the more innovative concepts such as vertical farming, roof gardens, and aquaponics are an integral part of the research.

contact: olivier.guiot@ilvo.vlaanderen.be

NEW

Local malting barley in Flanders?

In March 2019, ILVO and brewery Huyghe from Melle signed a collaboration agreement on the cultivation of local malting barley. The signing happened with the then-Flemish Minister of Agriculture and Fisheries Koen Van den Heuvel. At ILVO, malting barley is, after hops, the second brewery-related agricultural crop that has gotten attention.

Minister Van den Heuvel: *"The food processing industry needs raw materials with certain technical characteristics. Innovation and guidance in this dossier will ensure that Flemish agriculture will eventually produce a local, character-rich malting barley."*

Brewery Huyghe has been investing for years in the sustainability of its production process, and also takes steps with this collaboration towards more local raw materials. The barley, which is converted into malt to make it suitable for the brewing process, now comes mainly from abroad. *"Thanks to the collaboration with ILVO we will produce about 60 tons of locally-produced barley. And we've also recently started a test with Belgian hops. Where possible, we use local raw materials,"* says Alain De Laet (CEO brewery Huyghe).

contact: kristiaan.vanlaecke@ilvo.vlaanderen.be

NEW

Digital tools for agricultural consultants

Twenty-two research centers, agricultural practice- and advisory centers and agribusiness organizations from 15 European countries are working together over the next 5 years to increase knowledge and daily use of existing useful digital tools by farm visitors such as veterinarians and agricultural advisors. That is happening via the launch of the new European H2020 FAIRshare project in Dublin, Ireland, home of the coordinator, the Irish Research Institute Teagasc. FAIRshare stands for Farm Advisory digital Innovation tools Realised and Shared.

In Flanders, ILVO, Inagro and Proefbedrijf Pluimveehouderij are partners. *"We are convinced that the use of digital tools by advisors will lead to better service for the farmers themselves, and thus to a more efficient and sustainable agriculture."*

contact: fleur.marchand@ilvo.vlaanderen.be
stephanie.vanweyenberg@ilvo.vlaanderen.be

i2connect
INTERACTIVE INNOVATION

NEW

A different role for advisors in innovation processes? i2connect explores

How can advisors contribute to more interactive innovation processes, and what role can/must they play in this? This is the central question within the European H2020 i2connect project, which started on 1 November 2019.

In interactive innovation, the role of advisory services needs to be reconsidered to some extent: advisors become so-called "innovation brokers", acting as a kind of connecting point between the different types of actors. The role as an innovation broker, where a person supports and facilitates the interactive innovation process, requires very specific competencies. I2connect's goal is to provide advisors and strengthen the advisory bodies to take on this role, and to develop competences to actively support farmers, foresters and other stakeholders in interactive innovation processes.

contact: lies.debruyne@ilvo.vlaanderen.be

NEW

Agroforestry master classes in Flanders

Within the framework of the FARM-LIFE project, ILVO will work with six Dutch partners on innovative business models for livable and resilient agroforestry systems. Through a series of master classes, the project partners wish to support all stakeholders, thus facilitating the transition to a feasible and efficient agroforestry.

Within the master classes, tools, courses and information of all kinds are provided based on the knowledge acquired in Agroforestry Flanders and the experience of farmers and other experts. Technical, economic and legislative aspects are covered. The partners will also try to tackle barriers or exploit concrete opportunities, by getting the right people around the table at these master classes and making space for discussion. There are two parallel series: a general series accessible to all, and an area-focused series that will focus on development of a stimulating environment for agroforestry within the Bulskampveld landscape park.

www.agroforestryvlaanderen.be

contact: bert.reubens@ilvo.vlaanderen.be

Farmlife
Farming the future

[RESULT]

More efficient generation of F1-hybrids in chicory: a stepping stone to higher inulin production

An improved technique for the production of parent lines for so called F1-hybrids of industrial chicory can contribute of chicory roots with an estimated 20% more inulin. That's the most striking result of the ILVO-UGent doctoral study of Jeroen Van der Veken. The greatest success lay in the preparatory work: the making of haploid plants (with half of the DNA as each chromosome is present only once) which serve as starting material for the parent lines.

ILVO has had an important breeding program since the 1950s for this niche agricultural crop that first focused on coffee chicory but more recently on inulin production. The inulin extracted from the chicory roots is a widely used basic ingredient for a number of food companies.

contact: tom.eeckhaut@ilvo.vlaanderen.be

[RESULT]

Tool for pig farming: calculating carcass growth per kg feed

Due to the increasing pressure on economic margins in pig farming, the importance of more efficient production is growing. Feed is the biggest cost in fattening pigs, with feed representing around 75% of the total fattening costs. Feed costs depend on feed prices, but also on feed conversion (FC), a rough indicator of how much feed is needed to obtain 1 kg of growth. Reducing FC results in economic gain as well as reduced environmental impact. When feed is reduced, the amount of minerals excreted also drops. Despite the importance of FC, there is no uniform calculation. Therefore, ILVO and UGent, together with the sector, searched for a suitable parameter and launched a corresponding calculation tool.

The tool (https://www.varkensloket.be/tools/karkasgroei) makes it possible to calculate the (standardized) carcass growth per kg of feed. Six numbers are needed: the average laying weight of piglets, the number of piglets laid, the number of pigs delivered, total amount of feed consumed during the fattening period, the duration of fattening and the mean carcass weight (hot or cold).

contact: ilias.chantziaras@ilvo.vlaanderen.be

[RESULT]

European research project improves recipes for successful demonstrations

What are the do's and don'ts when organizing demos for farmers? How can you make a program instructive, easy to understand, and attractive? Which tools do you use to stimulate good interaction between participants? And how do you discuss more sensitive topics? Thanks to 3 European FarmDemo projects (AGRIDEMO-F2F, PLAID and NEFERTITI, who work together intensively) there is now a training kit and a handy step-by-step plan with tips and good examples, compiled on the basis of scientific observations and analyses of nearly 60 European cases. In order to further disseminate these best practices, Europe has created a living network between demo farmers. The database already contains 1400 farms and organizations. About 40 are located in Flanders.

Fleur Marchand: *"The Flemish educators and advisors do a good job compared to their foreign colleagues, but improvement is always possible. For example, we see that they are often demonstrate with one-way traffic, while in fact interactions between farmers stimulate learning best. Thanks to FarmDemo we have identified some simple tricks to stimulate those interactions."*

contact: fleur.marchand@ilvo.vlaanderen.be

“Fruit Trees in Agroforestry”

Farmers share a variety of tips about how to best use fruit trees in agroforestry.
Part of the AFINET project.

https://www.youtube.com/watch?v=FATNefrp-1o&t=11s

14:50

RESULT

What can stimulate scaling up of agroforestry in Flanders?

The majority of Flemish farmers are not currently considering agroforestry. A lack of certainty about profitability, adaptability, knowledge and competencies but also a some poor legal framework, inflexible support measures, and the lack of broad support from the agricultural sector stand in the way of scaling up. To overcome these barriers a joint commitment is required of research institutes, public authorities, civil society organizations, (agricultural) businesses, and consumers. Those are the findings of doctoral researcher Lieve Borremans.

“To get agroforestry off the ground as an agroecological innovation in agriculture, 5 areas need to be tackled in Flanders: more research and technological development, other earning and financing models, better legal and policy framework, more knowledge sharing and education, broader support and a shared vision.”

www.agroforestryvlaanderen.be

contact: bert.reubens@ilvo.vlaanderen.be

RESULT

International consortium AFINET plants first tree of food forest

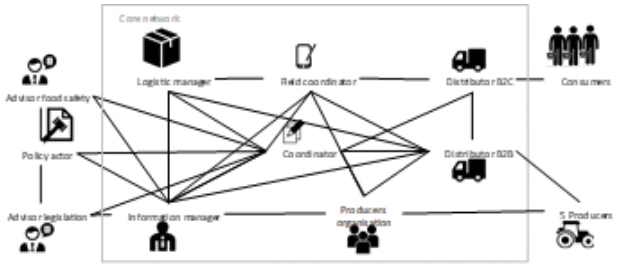
Between 2017 and 2019, 9 European countries and 13 countries exchanged questions, ideas and experiences about agroforestry. ILVO was a partner in this H2020 project AFINET (Agroforestry Innovation Networks). The partners want to help agroforestry get adopted within the modern agricultural context and promote innovation within this sustainable form of agriculture. To give the sector a boost, the partners worked together to plant a new “food forest” of over 3 ha in Asse. On December 10, 2019 they planted the first tree.

“Each region has its own characteristics in terms of land use, climate conditions, socio-economic context and policy. Anyone wanting to start with agroforestry must take this into account”, clarifies ILVO researcher Bert Reubens. “Nevertheless, we can learn a lot from each other. We get inspiration from each other’s experiences for innovative applications. Many challenges are very similar across national borders. And when it comes to getting policymakers moving, an international message also sounds much stronger than a local story.”

www.eurafagroforestry.eu/afinet

contact: bert.reubens@ilvo.vlaanderen.be

[RESULT]



Transformations of food systems: the potential of agri-food networks

Our current food system is confronted with multiple sustainability challenges, such as climate change, price volatility and maintaining consumer confidence. Meeting these challenges and achieving sustainable food production requires collective efforts and actions. ILVO-UGent researcher Marianne Hubeau researched whey - among the many initiatives that emerge – most still fail to achieve their goal and often stop before a certain transformation is realized. Eight initiatives or agri-food networks (in which at least three organizations of the food system work together, such as for example, a supermarket with a few farmers and an NGO) were scrutinized in order to gain insight into the success factors.

The results show that a common culture, including trust, is crucial to the development and continuation of these networks. Two lessons for future initiators: (1) take time in the initial phase to develop a shared network culture and (2) reflect regularly to value the different outcomes of agrifood networks. Marianne Hubeau also made three policy recommendations:
(1) Encourage new forms of governance and cooperation in agri-food networks,
(2) integrate a holistic and systemic perspective into policy, and
(3) Encourage radical innovations in agrifood networks. This doctoral study also developed some system tools to enable such initiatives.

contact: fleur.marchand@ilvo.vlaanderen.be

[RESULT]

ILVO, HOGENT and TRIAS join forces with Peruvian farmers and researchers on potato TUNTAs

ILVO, HoGent and TRIAS guided a local Peruvian agricultural cooperative and university in optimizing the semi-industrial production of their traditional tuntas – white freeze-dried potatoes that occupy an important place in the daily diet of the locals.

Due to climate change, the potato farmers in Kishuara (Peru) have been forced to move artisanal production from the plateaus in the Andes to a small tunta factory which is less dependent on weather conditions. But the final quality of these new tuntas does not yet match that of the traditional ones. During the 2-year project North-South VLIRUOS project OPTITUNTA, ILVO and HoGent offer their expertise to solve the bottlenecks in the production process. Development cooperation organization TRIAS facilitates.

In June 2019, a Peruvian delegation came to the Food Pilot to optimize the production of the tuntas in a cooperative factory in the Andes. Flemish food technologists in Belgium performed experiments and analyses together with the Peruvians. The development cooperation project, should raise the level of quality of the tuntas and make it possible to produce all year round - even in the rainy season
.

contact: nathalie.bernaert@ilvo.vlaanderen.be

Rural development in the metropolis of Flanders

For ILVO, rural research goes hand in hand with collecting factual knowledge. We map the Flemish rural situation to the extent possible. In the project on the reuse of farms, for the first time we calculated how many farms are converted to residential use. In addition, the inventory of the paved area on farms started as a new research theme in 2019.

The continuing and inexorable use of open space (and thus arable land) for all kinds of paved and unpaved functions remained high on our agenda. We unravel mechanisms that can support the preservation of open space. We are broadening our view on this theme: in the context of a European project we are investigating, within and together with 4 European cities, the local instruments for safeguarding open space in peri-urban areas.

In addition to mapping rural dynamics we will also continue to engage in dialogue with a wide range of actors. In 2019, several projects focused on the getting to know those actors better and building bridges with and between them. A tool has been developed to ask as many actors as possible about their favorite green space. Many farmers were involved in a water quality process. We also set up a citizen science program by letting rural inhabitants tend to a square meter garden and collect data on biodiversity and yield.

contact: elke.rogge@ilvo.vlaanderen.be

BEL-Landschap: a citizen-science project on biodiversity and yield

ILVO en Rurant VZW are looking for hobby gardeners to help with a scientific project on biodiversity and yield.
Citizen-scientists from the area around Antwerp are needed to tend a square-meter garden and perform regular measurements.
The gardeners get tips,
group meetings,
and personal guidance in the garden.

https://www.youtube.com/watch?v=EHxWqHf57fE

1:56

NEW

Farmer clears field: Paved farm becomes productive ground

"Farmer clears field (*Boer ruimt veld*)" is a new project on depavement (desealing) for and by farmers. In open space there is an increasing need for well-considered and broadly-supported depavement with the ambition to preserve and strengthen open agricultural space. Therefore ILVO is studying, together with Boerenbond, KU Leuven and Voorland, the opportunities, obstacles and needs for depavement and we identify workable depavement recipes for agriculture.

This experimental garden aspires to a cultural change towards depavement within the agricultural sector. In addition, we acquire the required knowledge on how to concretely to achieve depavement of newly-available agricultural sites and which policy actions and support for this are needed. As a result, we expect that more of the newly-available agricultural sites and land will be re-used within the profession of farming (food production), rather than by other non-agricultural functions. We expect that this knowledge is also important - in accordance with the objectives of the strategic vision of the Flanders Spatial Policy Plan - for creating open space and and reducing pavement in open spaces.

contact: anna.verhoeve@ilvo.vlaanderen.be

NEW

My Green Place: Which green spaces are used by residents and how can we build their appreciation into spatial planning?

In addition to economic value, green open spaces also offer multiple social and environmental benefits, which benefit the quality of life of the users. The need to preserve these spaces is a matter of course, and Citizen Science is one way to achieve that goal.

Within the RECOMS project, this civil science is based on Participatory Geographical Information Systems (PGIS). This makes it possible to map a community's appreciation of green spaces through a bottom-up approach including how "the silent majority" can get a say in how the environment is shaped. Such an approach enables community values to be taken into consideration for good management, but it is currently being insufficiently applied by governments. This project therefore aims to demonstrate the power of the tool through application at 3 spatial scales, i.e. Ghent as a city, Woluwe as a river basin and Flanders as a region. A test version of the PGIS, currently under development, can be seen at
www.welovegent.be

contact: nohemi.aranda@ilvo.vlaanderen.be

NEW

Bridging the worlds of urbanism and agriculture

On 1 October 2019 ILVO organized a lunchtime lecture in which the interface between agriculture, countryside planning and urban design was explored. The participants were offered a look at the Danish countryside in the presentations by the Danish professors Lone Kristensen and Jørgen Primdahl. In their lecture *"Stories about contemporary rural planning in Denmark - a landscape approach"* they showcased innovative examples of rural development through collaborative planning.

Copenhagen is an inspiration for urban planners, as ILVO researcher Jeroen De Waegemaeker confirms: *"The highly sophisticated plan for the urban containment of Copenhagen, the so-called finger plan, contrasts sharply with our Flemish cities. Our local post-war urban planning was 'chaotic'. But if we look at the possibilities of food production in the open space around the city, than our fragmented landscape does offer opportunities. In Copenhagen they are a bit stuck in their urban bubble. You need to bike for at least an hour in Copenhagen before you come across the first farms. In contrast, you can bike from the Grand Place in Brussels to the farmland in under 20 minutes."* The Danish professors that closely examined the rural zone around Copenhagen were critical about the (historical and current) absence of food production in the finger plan. In Flanders, more and more city planners are talking about the need to design and actively protect the valuable farmland around the city. *"That's a break with the past and the Flemings are further ahead than their Danish colleagues in that respect"*, says Jeroen De Waegemaeker. *"The future of a sustainable city could lie in a combination of the Danish and the Flemish viewpoints: a thorough planning for urban containment and active development of the food productionaround the cities"*

contact: jeroen.dewaegemaeker@ilvo.vlaanderen.be

NEW

FABulous Farmers lifts agriculture a level higher

The European project FABulous Farmers - FAB stands for Functional AgroBiodiversity - stimulates farmers to preserve nature in a smart way within their farm management. Specifically, the partners want to make farmers less dependent on external inputs such as fertilizers and crop protection products by specifically stimulating biodiversity in and around the fields.

The project runs in five countries and has 12 pilot areas. ILVO specifically supports farmers' networks in the pilot areas and focuses on the knowledge that farmers need. Demonstration fields are also made so farmers can see for themselves which effect(s) a certain measure has. The measures taken by farmers on their own farm can be strengthened by similar adaptations in the environment. ILVO coordinates these activities in the pilot areas, including collaboration with other stakeholders such as landowners and municipalities, to develop a plan where these actions are integrated into the landscape. At the same time, the local population is included in the FAB story through citizen science. Through different tools, ranging from apps to square-meter gardens, citizens will work with farmers to measure the effects of the FAB measures applied.

contact: marlinde.koopmans@ilvo.vlaanderen.be

[RESULT]

Mental stress in farmers is serious

On the occasion of World Mental Health Day on 10 October 2019, ILVO drew attention to the first interim results from research into the well-being of the Flemish farmer (men and women). Most striking is the fact that farmers usually don't go looking for help when they develop severe and prolonged stress-related complaints.

More than 80 farmers or family members registered for a confidential interview or a group discussion as part the study. In total, 285 farmers answered a written questionnaire. The size of the group that has stress complaints report is calculated quite accurately. In addition, the survey and interviews clearly revealed the causes of the mental pressure. Farmers appear to be much less inclined to seek help if their mental stress complaints have to do with personal problems (24%) than for problems on the farm (42%). Because of the taboo around mental complaints, farmers prefer to avoid their personal problems. Also the long working days without a break complicate the search for help. Moreover, when they do take the step, there is no guarantee that they will find the right help. Only 1 in 3 finds a resource that really helps (both for business and personal problems). The cost and availability of professional help is also a bottleneck for many farmers.

contact: lies.messely@ilvo.vlaanderen.be

[RESULT]

Strong residentialization of vacant farms

Almost 40% of the vacant farms in East Flanders are converted into villas. Until now, this source of urbanization in the countryside has been misunderstood. Only 10.5% remain in agricultural use, and this is often temporary. The figures come from a inventory drawn up by ILVO in the context of the RDPO project *"Re-use of farms, a challenge,"* initiated by the Province of East Flanders.

Anna Verhoeve (ILVO researcher): *"In the last 20 years, it appears that the farms that lose their agricultural function, become an important factor of urbanization of rural East Flanders, in addition to new subdivisions and infrastructure works. Until now it was thought that there were mainly businesses taking over those vacant farms, but this inventory shows that the function "rural living" is much bigger. For a sustainable East Flemish rural policy, it is important take the impact of this phenomenon into account, in terms of open space and active farming."*

contact: anna.verhoeve@ilvo.vlaanderen.be

Climate mitigation and adaptation

Climate was seen everywhere in the news during 2019. The ILVO Center of Expertise for Agriculture and Climate (ELK) noticed this too. To accelerate the success of ELK, ILVO invested in additional staffing for the most pressing climate themes. A first is research towards feasible reduction strategies for methane emissions in cattle farming. The Covenant on Enteric Emissions Cattle that was signed in 2019 by ILVO, the Flemish government and a broad representation of the sector, sets a tough challenge: a reduction of emissions of these enteric emissions by 19% as compared to 2005, by 2030 at the latest.

A second theme is the correct measurement of climate impact. ILVO is committed to refining the life cycle analysis (LCA) and the development of a climate scan as a tool for the climatic and environmental impact of agricultural products, respectively. In this way farms can get a better picture of the measures they take. A third theme is carbon storage via soil organic matter. And a fourth, relatively new theme at ILVO, is smarter water management.

The return on investment in the ELK is still a matter of time, but ILVO looks to the future with confidence. In the meantime, we are also trying to use all kinds of communication to eliminate the statistical confusion about the climate impact of agriculture.

contact: sam.decampeneere@ilvo.vlaanderen.be

“Sustainable Development Goals”:
ILVO becomes even more sustainable

ILVO has committed to the European Sustainable Development goals.
Why is this important and
what is ILVO doing on an operational level?
Find out here.

https://www.youtube.com/watch?v=uz_rrD0zNAI&t=192s

7:57

ILVO Presents its Climate Plan

A report by PlattelandsTV from the Agribex trade show

https://www.youtube.com/watch?v=e1fWq4r3OII

1:45

NEW

KLIMREK, A CLIMATE PROGRAM FOR DAIRY, PIG AND ARABLE FARMERS

The KLIMREK project, part of the VLAIO agricultural trajectory, started in September 2019. ILVO, the Innovation support center and VITO will work together for 4 years on a climate trajectory for dairy farmers, pig farmers, and arable farmers that have potatoes in their rotation. The climate consultant visits the farmer with a targeted climate scan, and a climate trajectory to support farmers in making the transition towards a more climate-friendly and climate-robust management where the convenience for the farmer and the economic feasibility play a central role. The climate scan is a farm-specific consultation tool that clearly reveals where the company's climate impact lies.

We develop a climate scan per sector based on a life cycle analysis (LCA), which the climate consultant uses when visiting the farmer in order to obtain the necessary data and then propose certain measures and discuss calculated scenarios. At the same time, a cost-benefit analysis is drawn up in order to also assess the economic feasibility. In the climate trajectory, the climate consultant and the farmer search together for those climate measures which, on a farm-by-farm basis, will make the farm the most climate-friendly and/or the most climate-robust and work the best for that farm. Participating farmers shall be followed up each year to realize multiple implementations, to map their personal evolution and to learn from their fellow farmers. The development of the climate trajectory takes place in co-creation with different stakeholders to maximize the support for the project and make it as correct and user-friendly as possible.

www.klimrekproject.be

contact: veerle.vanlinden@ilvo.vlaanderen.be

NEW

EKOPTI, MORE EFFICIENT USE OF FEED PROTEIN FOR CATTLE IN RESPONSE TO TIGHTER CLIMATE AND ENVIRONMENTAL LEGISLATION

Protein savings through improvement of roughage quality, precision feeding and more efficient cows, that's the triple goal of the VLAIO project EKOPTI (Protein and Cow Optimization). This protein savings must be an economical way to benefit the environment - through reduction of excretions and emissions and reduced climate impact. EKOPTI will achieve this by investigating different protein-saving strategies in terms of animal performance, production, protein saving, feed efficiency, economic viability and environmental and climate impact. "

Farms needing to reduce their ammonia emissions due to stricter regulations already are asking for this type of knowledge. EKOPTI wants to prepare the whole sector for possible new legal obligations and prevent that farmers will only downsize or make additional investments in response to tighter climate and environmental legislation", explains researcher Tine Van den Bossche.

contact: leen.vandaele@ilvo.vlaanderen.be
tine.vandenbossche@ilvo.vlaanderen.be

NEW

HOW DO YOU MEASURE METHANE EMISSIONS FROM GRAZING COWS?

To what extent can we use sensors and precision farming techniques to determine the methane emission from grazing cows, and then reduce it by management interventions? Those are the two big questions of the Grastech research project.

In the highly controllable (feed and management) conditions of a modern dairy herd, methane emissions have already been determined and some climate strategies investigated. Under grazing, however, the parameters vary. Still, the researchers wish to develop solutions for the climate impact of dairy farming. The bovine enteric emissions in Flanders must be reduced by 2030 by 19% reduction compared to 2005.

This project investigates the possibilities of grazing management within the agreements for "pasture milk". The aim is to choose the optimal number of grazing hours and to adjust the ration in the barn, possibly with use of methane-reducing feed additives. In addition, there is a strong focus on the selection and implementation of existing and recently developed precision livestock farming technologies with the aim of improving production efficiency in those systems.

contact: mirjan.thys@ilvo.vlaanderen.be

RESULT

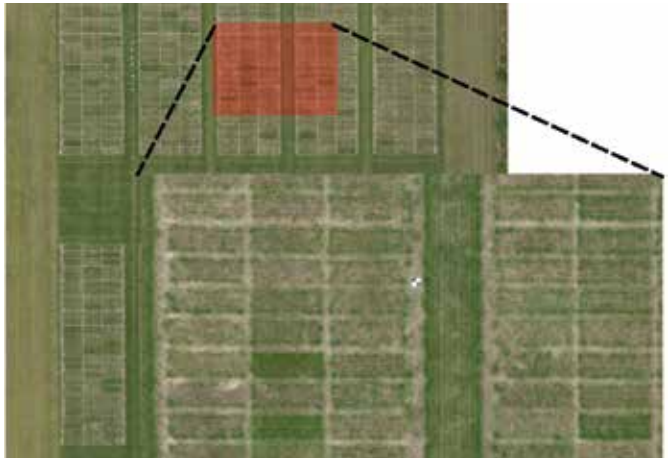
New digital 3D growth model improved by adding water availability factor

For the first time, the factor 'water availability' has been added to the factor 'photosynthesis' in a digital 3D plant model for soy. This allows for better explanation of the growth of the crop. In plant research, 3D models help researchers to understand the behavior of an individual plant as a reaction to varying circumstances, even without performing field experiments.

ILVO-UGent PhD researcher Jonas Coussement: *"Being able to model water availability is important in the context of the climate challenge, where we will get longer periods of drought together with more intense thunderstorms. Breeders of more climate-adapted plants, or who wish to make their cultivation practice more climate-robust, can play with more variables in the model and thus get a faster view of which choices are better."*

contact: tom.deswaef@ilvo.vlaanderen.be

RESULT



Detecting drought tolerance in the genetic archives of perennial ryegrass

Over three years we evaluated 482 wild populations and 32 varieties of perennial ryegrass at three European locations (Germany, France and Belgium) for vigor and quality. The wild populations were collected in the very wide distribution area of perennial ryegrass and are maintained in gene banks. This was linked to genetic research.

In a phylo-geographical study based on 500,000 genetic markers we have shown that especially climatic changes in the Pleistocene determined the demographic changes in perennial ryegrass. Human
interventions have had a much more limited impact on the current geographical distribution of the diversity of this species. Today's natural populations are still quite diverse, but the diversity appears to have been insufficiently exploited in the breeding of improved varieties for agriculture.

From the field trials we could deduce that the wild populations from drier regions good drought tolerance while populations of regions with more rainfall often had a good vigor but a lower drought tolerance. The genetic variation available in nature is therefore invaluable in meeting the challenges we face in the context of climate change, and will facilitate our adaptation to the grassland to the climate of the future.

contact: hilde.muylle@ilvo.vlaanderen.be

RESULT

LCA (Life Cycle Analysis) in the agricultural context?

Adaptations in the LCA methodology now make it possible to evaluate the environmental sustainability of agriculture and food products better and more comprehensively. By developing measurable indicators for the complex terms 'restoration of soil quality' and taking 'ecosystem services' into account, you get a more refined picture of sustainable productivity. That is what Lieselot Boone concludes in her UGent-ILVO PhD.

"We can now better compare agricultural practices for their contribution to sustainability and climate friendliness. This is a chance for policy to make a difference. With this adapted LCA methodology you can show farmers more clearly why certain choices are more cost-beneficial."

contact: veerle.vanlinden@ilvo.vlaanderen.be

Midday meeting at the Flemish Parliament
Joris Relaes

"One steel company - Arcelor Mittal - emits more CO_2 than all of the farmers combined"

https://www.youtube.com/watch?v=if9y7S3hV-s

1:28

[RESULT]

Feed strategies in the fight against climate change

Of the portion of global greenhouse gas emissions coming from animal husbandry, 65% originates in cattle farming. Methane, which is mainly is formed during rumen fermentation, is the most important greenhouse gas emitted by cattle. In addition, production of the fodder for dairy cattle produces a fair amount of greenhouse gases.

In her doctoral study, Dorien Van Wesemael shows that reducing methane production in the rumen is a first important strategy. Different feeding strategies have succeed in effectively reducing methane emissions. In addition, her dissertation illustrates the great contribution of feed production to the total carbon footprint of dairy farming. The choice for local roughage, concentrates and by-products from the food industry makes a substantial difference. For example, imported soybean meal can be replaced by local rapeseed meal and/or brewers grains, a by-product of beer production. By implementing different feeding strategies, it is possible for cattle farmers to book considerable climate gains.

contact: dorien.vanwesemael@ilvo.vlaanderen.be

[RESULT]

Learned early, done forever: starting at birth or even before, how to steer the path of a cow's life

Recent research suggests that the rumen flora of ruminants can be steered starting at a young age with lasting results. Methane emitted by ruminants is produced precisely by this rumen flora, thus an adjustment in this respect could possibly reduce the emission of this greenhouse gas in adult animals. Sieglinde Debruyne studied in her PhD whether nutritional supplements in very young ruminants could influence their subsequent methane emissions or production.

"The feed supplements did do something beneficial but not what we were expecting." The programmed reduction of methane did not occur. But in goats, supplements given to the pregnant mother led to temporary or long-term (negative) effects on the (microbial) development of the rumen and the growth of the animal. In addition, adding the feed supplements after birth to heifer calves had positive effects on daily growth and feed efficiency. In both studies, however, the hoped-for reduction of methane emissions was not realized.

contact: matthieu.frijlink@ilvo.vlaanderen.be (Rundveeloket)


C
B

Bioeconomy and closing cycles

In the past 10 years, ILVO has evolved from a mainly agricultural and fisheries institute to a broader research institute in which food and, to an emerging extent, also bioeconomy play an important role. Research into the potential of primary biomass and wet residual flows – from agriculture as well as from the food industry – as well as renewable raw materials for cultivation substrates and soil improvers, technical biomaterials, green chemicals and biopolymers like rubber are examples.

ILVO not only looks at the technical challenges, such as "How do you stabilize the residual flows and then process them?" but also to logistical and economic challenges such as "How do you build local value-added chains and which earning models can this be facilitated?"

A relatively new question is how all this fits into the circular thinking that is gaining importance within agriculture. How can agriculture and the food sector contribute to the circular economy? Residual flows from other sectors can be valorized in agriculture and vice versa. Further along this theme, ILVO takes a holistic view of problem-shifting or avoiding unwanted side effects.

contact: hilde.muylle@ilvo.vlaanderen.be

NEW

Ambition with soil. The added value of biochar application for sustainable land use

Biochar from residual biomass as economically valuable and sustainable end product – that is the starting point of the BASTA project. Within the project different biochar types are selected for further upscaling and application in manure and biomass processing and in soilless cultivation. In doing so, the aim is a 25% reduction in greenhouse gas & ammonia emissions, 10% higher process efficiency, 10% less use of chemical crop protection products, 30% less nutrient losses,

10% more water retention capacity and 20-40% peat replacement in growing media. The knowledge gained during BASTA should allow biochar to be valorized by individual companies from specific starting materials or targeted applications through short R&D trajectories. Based on successful experiments at lab scale at UHasselt and ILVO, companies can take steps for further valorization and develop business models.

contact: bart.vandecasteele@ilvo.vlaanderen.be

Compost on ILVO

Curious how ILVO makes and measures compost? See all the steps here.

https://www.youtube.com/watch?v=4oPZnePr2TE

0:36

RESULT

Under-utilized fish (products) become valuable, cost-effective feed additives, via silage technology

Fish heads, trimmings from fish processing plants, and also landed undersized fish that are illegal to sell for human consumption all may get a higher value and be processed more sustainably than has been the case so far. Using a silage technique, it is now possible to stabilize the by-products of the (small) Belgian fishing industry so that the high-quality fish proteins remain intact awaiting further processing steps. The technology has been developed by ILVO-UGent doctoral researcher Mike Van 't Land, who also evaluated the nutritional, biochemical, technological and economic aspects of the silage. The results are very promising.

"With fish silage, we do not aim to replace a high-quality protein product such as fishmeal", says Mike van 't Land. *"Rather, we want to launch a product that can be used as a low-cost feed additive. Fish silage can then be used to improve digestibility, taste and mouthfeel of feed and at the same time add locally-produced proteins and fats."*

contact: els.vanderperren@ilvo.vlaanderen.be

[RESULT]

Apple residues – a seedy story

Improve valorizes apple biomass after pressing for juice

The SUSFOOD project Improve is specifically looking for a solution for the apple press cake that the Konings juice company is left with after pressing apples into juice. Currently, these residual flows are used in animal feed because the seeds present an obstacle for use in human food. The project is a collaboration between ILVO, UAntwerp, pcfruit, Konings, and the universities of Pisa, Talinn and Dublin. ILVO has already successfully developed an efficient way to remove the seeds from the pulp, and use the remaining fibers as an ingredient for drinks.

Among others, the other partners within the consortium are aiming for the extraction of polyphenols from the remaining press cake through innovative extraction technologies. In addition to apple press cake, olive press cake is also being examined.

contact: nathalie.bernaert@ilvo.vlaanderen.be

IMPROVE
INNOVATIVE PRE POMACE VALORIZATION PROCESS

[RESULT]

New raw materials from waste – the Volatile project

Organic waste is not just the basis for renewable energy via anaerobic fermentation, but can also be a source of new raw materials. The goal of the H2020 project Volatile is to develop a technology that allows volatile fatty acids be extracted via a platform that can be integrated into anaerobic digestion plants. Volatile fatty acids can be used for the production of bioplastics, omega-3 fatty acids, and as building blocks for the oleochemical industry. ILVO researches how this technology can be incorporated in waste processing plants.

On the basis of interviews with business cases, economic data and technical data acquired during the project, an online decision support tool was created with the aim of to provide operators of waste treatment and biogas plants with an initial insight into the potential of Volatile technology in their local installation. Web developers from the Volatile consortium are currently developing the website where everyone will be able to find the tool.

contact: jef.vanmeensel@ilvo.vlaanderen.be

[RESULT]

Hello Belgian endive croquette! Food from Food gets value from food loss

With the Interreg project 'Food from Food', Dutch and Flemish entrepreneurs receive scientific and technical guidance on how to get value from their food loss. It's about plant-based food loss such as unsold bananas, orange peels, second-class strawberries, Belgian endive leaves and so on. 20 cases, where the 11 partners within Food from Food have all leaned in, are in progress or have already been completed.

ILVO deployed technical and scientific expertise in more than 12 cases. The results are already visible: the developed Belgian endive croquettes are a sought-after product in the catering industry, the berry juice is ready to market and the carrot fibers are finding application in new food products.

contact: nathalie.bernaert@ilvo.vlaanderen.be

Provincie Oost-Vlaanderen · Interreg Vlaanderen-Nederland · food from food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Precision agriculture and data technology

The call for sustainability in the agri-food chain is growing louder and louder. Data, in particular integrated data, can play an important role in this.

A good example of this can be found in the vegetable and fruit sector. By combining data from soil scans, historical crop yields, weather information and drone and satellite imagery, and translating them into a smart task map, a machine can variably fertilize or sow a parcel. Before we tried to work as homogeneously as possible using GPS, but now we are trying to go a step further in precision agriculture by fine-tuning the fertilizer application to the needs of the soil. Is there a compacted strip the plot? Then the machine doesn't sow a production crop there, but rather a bee-friendly floral mixture. For greening measures, this can also be an important step forward.

But before that happens, the researchers still have some work to do. Not least, data sharing needs to be made possible in practice. Two fundamental conditions are required to make this story succeed: a high-performing IT architecture and confidence in the new 'data chain'. In 2019 ILVO took an important step forward in both areas by launching the data sharing platform Djust Connect.

contact: jurgen.vangeyte@ilvo.vlaanderen.be

DjustConnect

With #DjustConnect, ILVO and partners AVEVE, Boerenbond, CRV, DGZ en Milcobel launch a data-sharing platform with a special mission: to be THE bridge between farmers and data.
In modern-day farming, sensors produce thousands of different datasets for the Flemish agri-food chain.
Milk temperature, time of harvest, soil quality, crop yield, you name it. If all of this data could be combined, it would deliver new insights that farmers and the other links the food chain could use to optimize their processes.
DjustConnect makes it a lot more efficient, more transparent and safer to share these data.

https://www.youtube.com/watch?v=XGeT3w66jL0&t=2s

2:00

NEW

Launch of 'DjustConnect': a platform for sharing data in the agri-food chain with remarkable properties

After more than a year of intensive preparation, ILVO, together with AVEVE, Boerenbond, CRV, DGZ and Milcobel, launched a unique DATA-SHARING platform for advanced data sharing in the Flemish agri-food chain. The platform is called DjustConnect, a name that alludes to performance and efficiency. Ingenious are the control functions for the farmer that are built into the architecture management. The farmer remains the data owner and decides if, and with whom, those data may be shared.

DjustConnect becomes the 'highway' where the farmer's data gets exchanged in a smooth, regulated way. From now on the sector has a central fundamental tool to develop more accurate and smarter applications. *"Such apps provide benefits such as administrative simplification, management support or technical advice. The fact that data can now be shared more easily benefits the farmers themselves, as well as businesses throughout the chain,"* say the founding agricultural cooperatives.

contact: stephanie.vanweyenberg@ilvo.vlaanderen.be

NEW

Smart Farming 4.0 – Smart crop protection in potato and fruit cultivation, thanks to Flemish technology

Smart cameras on drones or tractors can detect plant diseases in crops. In this way farmers can detect local outbreaks of disease among the plants and treat them according to the principle of precision farming, which leads to better crop protection. The new industry 4.0 pilot 'Smart Farming 4.0', which the Flemish government organizes via VLAIO, develops and demonstrates user-friendly and reliable applications for potato and fruit cultivation during the next three years.

For the experimental garden 'Smart Farming 4.0' seven research centers are working together, each of which brings a range of expertise. In addition to ILVO and imec, pcfruit vzw, VITO, KU Leuven, Flanders Make and the VLAIO-supported non-profit innovation cluster Smart Digital Farming.

contact: simon.cool@ilvo.vlaanderen.be

NEW

Innovation portal of SmartAgriHubs speeds up the digitization of European agriculture

On 17 September 2019, the long-awaited Innovation portal of SmartAgriHubs was launched. In just a few days hundreds of interested stakeholders registered, and they could immediately enjoy the added value of the functions within the portal. The portal is the result of months of development and adaptation to the needs of stakeholders.

The goal of the SmartAgriHubs Innovation Portal is to expand the network of AgriTech stakeholders in Europe and strengthen their connections. The portal is therefore multifunctional: it's a search engine, a marketplace of one-stop-shops, a library, a learning platform, a network, a discussion forum and a matchmaking service. The design is based on the needs of internal and external stakeholders, which were translated into a logical portal structure. As a result, the portal is user-friendly and interactive. With just a few mouse clicks and searches you will find the knowledge centers, SMEs, digital innovation hubs, documents and trainings that can provide answers to common needs or problems. And that is narrowed down within the right region and sector, with virtually endless filtering possibilities.

www.smartagrihubs.eu

contact: anneleen.devisscher@ilvo.vlaanderen.be

NEW

Two new mixing systems live in demo

In 2019, the Food Pilot invested, with the support of the ERDF, in a vacuum high shear mixer and a colloid mill as an addition to the Food Pilot equipment. Food companies were present at the demo in large numbers.

A vacuum high shear mixer is a highly versatile device that the makes the most difficult preparations possible thanks to the combination of vacuum, high shear, heating, cooking and cooling. The companies were impressed by the live preparation of mayonnaise, vegetable salsa and chocolate milk. The colloid mill is a grinder that makes an extremely smooth mass. It is a versatile, robust technique that converts wet solids into smooth emulsions. During the live demo a peanut paste was prepared with 2 consistencies and a fruit smoothie was also prepared in 2 consistencies.

contact: karen.verstraete@ilvo.vlaanderen.be

Preparation of mayonnaise with the high shear mixer in the Food Pilot

Preparation of a smoothie with the colloidal mill in the Food Pilot

NEW

'Agri-food 4.0': cameras and sensors

As part of the VLAIO Living Labs 4.0, the Food Pilot, under the coordination of Flanders' Food, has been fitted with extra sensors that are shown to interested parties during demonstrations. With knowledge about sensors, smart algorithms and engineering, processes in food companies are becoming further optimized and made more sustainable. The project provides business advice and demonstrations to companies.

Within the ILVO living lab 'Agrifood Technology' the focus is on innovative technologies for the agri-food sector, from primary production to processing, including digitization and engineering. One theme is visual inspection systems, which the agri-food industry can use for a wide range of applications such as detection of anomalies, inspection of product parameters and classification. For many problems that arise, however, the potential is still under-exploited. Therefore, investments were made to create a flexible pilot line with different cameras and processing software to test the feasibility of sensor systems as solutions to specific problems via small-scale experiments. This gives them a better insight into the direction of a solution.

In addition, the UHT device (Ultra High Temperature Treatment) of the pilot plant was extended with 28 additional temperature sensors and a data processing system (PLC) for more intensive temperature monitoring. The objective is to better support companies in optimizing their pasteurization and sterilization processes. Thanks to the additional sensors and data processing, it is now possible to get a better approximation of the F0 (FO value is a measure for sterilization).

contact: karen.verstraete@ilvo.vlaanderen.be
simon.cool@ilvo.vlaanderen.be

NEW

Promoting precision agriculture via a safe and powerful computing environment

Precision agriculture means processing ever larger amounts of data and the latest algorithms (artificial intelligence) are getting more and more complicated. In research and development, high performance computing (HPC) is therefore used more and more often, but gaining access to these supercomputers is currently still a task for the real IT experts.

The European H2020 project CYBELE therefore wants to work towards a more accessible and more widely applicable environment for HPC use, specifically for the agri-food sector. This can then open the way to more advanced analyses for scientists and policy, faster response times and improved decisions for companies and parties in the chain and more transparent and more efficient use of the data available in the chain. This is demonstrated within the CYBELE project through various demonstrations - cases in precision agriculture and precision livestock farming. ILVO is work package leader in the project and is involved in the implementation of two demonstration cases ('sustainable pig production' and 'open sea fisheries') where various HPC applications are being developed and tested.

contact: jarissa.maselyne@ilvo.vlaanderen.be

ILVO Glitch

Energy-efficient greenhouses
50% less energy needed for greenhouse cultivation? The GLITCH project brings the EXEKAS technology that ILVO-UGent research Filip Bronchart "invented" closer to the market. Filip explains in this campaign video.

https://www.youtube.com/watch?v=612DMSpitOw

0:55

RESULT

Matchmaking in the plant world?!

Male infertility of celery through cell fusion with carrot can give breeders efficiency and stability

For the first time, cells of celery and carrot were fused and grown into sprouts. Once mature, it is possible that these fused plants may no longer be self-fertilizing via pollination of their own stamens. Only another celery plant can then provide fertilization. In breeding that opens up important perspectives. *"Male sterility is in breeding of hybrid seeds is very desirable because it is precisely there that two breeding lines are crossed in a very controlled and predictable way. That's not so obvious with self-pollinators"*, says PhD student Silvia Bruznican. Moreover, the technique she applies is cheaper, faster or more effective than existing techniques to control pollination.

Whether the fused plant is effectively male sterile and whether that sterility remains stable in all circumstances, needs further investigation. But the fact that the fusion technique has been successfully applied and the protocol Is now established, is an important step forward from a scientific point of view

contact: tom.eeckhaut@ilvo.vlaanderen.be

[RESULT]

Location tracking of free-range chickens? Useful for welfare and health research

High-tech tracking systems are integrated into different types of wearables per animal species, to minimize the chance of discomfort or injury to the animal. In the European CORE Organic project FreeBirds, 'backpacks' on free-range chickens should answer why the outdoor run is used more or less, and what influence better free-range behavior has on welfare (e.g. feather pecking), on health (e.g. parasitic contamination), and on soil contamination (due to point contamination around the henhouse door).

ILVO, together with industrial and academic partners, develops, tests and uses tracking sensors for three agricultural animal species: chickens, pigs and cattle. In every situation, the researchers assess the desired and effective accuracy of the position measurements.

In the ZeuSens and I-Sense projects, the link between tracking of sows (changes in activity or in use of functional zones in the pen) and possible emerging health problems is examined. There are also several development projects regarding tracking the location of cattle on the pasture and within an open barn.

contact: frank.tuyttens@ilvo.vlaanderen.be
jarissa.maselyne@ilvo.vlaanderen.be

[RESULT]

Improved methodology for detection of antibiotic residues in milk and meat

ILVO and UGent have optimized an analytical method for antibiotic residues in milk and meat matrices that is faster, cheaper, and at least as easy and reliable in comparison to existing methods. In his doctoral thesis, ILVO researcher Geert Van Royen obtained especially remarkable results in the clean-up phase: he developed a clean-up with 'pre-programmed' polymers (molecularly imprinted polymers or MIPs).

"*This is a good stepping stone to an antibiotic sensor, which will all carry out analysis phases at once, revealing the concentrations of residual antibiotics immediately.*" Now that everyone feels the need to further reduce the use of antibiotics in humans and animals, it is important to have powerful and very affordable measuring instruments.

contact: geert.vanroyen@ilvo.vlaanderen.be

[RESULT]

Internet of Cows

Sensors that continuously monitor lying, walking, standing, eating and ruminating behavior of dairy cows can measure estrus and calving between 2 and 24 hours in advance with high accuracy. The combination of sensors does better than one, especially at the last moment before estrus or calving, when quick action is crucial for both cow and dairy farmer. ILVO-UGent researcher Said Benaissa: *"This indicates the usefulness of the further development of multi-sensor monitoring systems as an alternative to current one-sensor solutions."*

Thanks to the doctoral research completed in 2019, dairy farming is another step closer to an efficient total monitoring. For a sector characterized by growing herd sizes, this offers interesting perspectives. In the imec-icon project MoniCow, which this doctorate was part of, other technological bottlenecks were resolved, such as the robustness of the sensor carriers (collar) and an automatic inductive charging system suitable for barn environments to avoid empty batteries and thus missed data. Also, a first estimate of the cost-benefit picture was made: according to the researchers the use of an integrated monitoring system can save the dairy farmer an average of EUR 200 per cow per year.

contact: bart.sonck@ilvo.vlaanderen.be,
frank.tuyttens@ilvo.vlaanderen.be


VISSERIJ
FERDUURZAAMT

Marine production and marine environment

It's getting busy in the Belgian part of the North Sea. The piece of Belgium at sea, which is about the size of West Flanders and covers only half a percent of the entire North Sea, is one of the busiest marine areas in the world. It has always been popular for fisheries and shipping, but other users now also want to use the same place. Think of offshore wind farms, dredging, sand extraction, sport fishing, aquaculture, pipelines, telecommunications cables, a Natura 2000 conservation area, and research.

Flanders is strong in these blue services, and dreams of further expansion of the blue economy. This increases the pressure on natural resources and the available space at sea. Strict monitoring of the impact on the marine ecosystem, in which ILVO plays an important role, therefore remains a basic task. To make this process more efficient, we're looking at new techniques based on DNA and data integration.

Other important topics for ILVO continue to be sustainability of the Flemish fisheries and the development of sustainable aquaculture. Relatively new is the focus on natural coastal protection, as part of our search for a more climate-robust coastline.

contact: hans.polet@ilvo.vlaanderen.be

"Valduvis - the Belgian fisheries are evolving"

Buyers at the Belgian fish auctions can now see on the auction clock how sustainably the fish were caught. Fishermen are continually encouraged to continue to improve their sustainability marks.

https://www.youtube.com/watch?v=HjtXwmGMnXk&t=83s

5:18

NEW

VALDUVIS TAKES TO THE SEA...AND TO THE MARKET

In 2019, the fourth phase of the development and roll-out of the VALDUVIS tool for scoring and monitoring the sustainability of individual vessels and Belgian fisheries, was completed. The score was improved on the basis of the individual guidance of each ship owner. Ship owners that participated in the collective sustainability of the Belgian fishing fleet received a personalized improvement program based on their VALDUVIS score. Vessels that achieved a threshold value and received guidance from ILVO to increase their score within a period of three years were rewarded through recognition on the auction clock, shown as ("*Visserij Verduurzaamt.*") "Towards More Sustainable Fisheries". The launch of this certification was the first step towards communicating the efforts of the Belgian fishing fleet to buyers.

The 2019-2021 phase focuses on the continuation of the individual counseling of ship owners and on the possibilities to extend recognition to the market.

contact: lancelot.blondeel@ilvo.vlaanderen.be

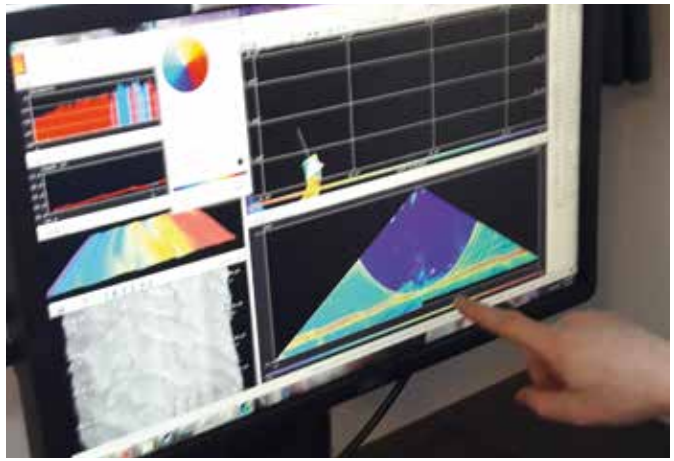
NEW

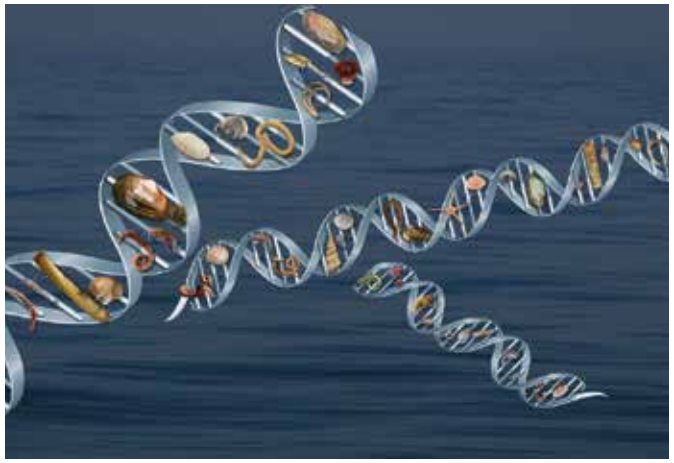
THE FOOTPRINT OF THE FLEMISH FISHERIES

To (help) develop the new European seabed impact assessment procedure and apply it to Flemish fishing gear and fishing grounds: that is the aim of the EMFF project *Benthis-nationaal*. Via this project, the Flemish fisheries and its stakeholders get a voice in European evolutions in terms of seabed impact studies, advice and management.

Specifically for this project, ILVO will determine the footprint of Flemish fishing gears and their fishing grounds (seabed sensitivity) to correctly apply the Fishery Benthic Impact Tool (FBIT) within the Flemish fishery. We then apply the FBIT tool to the fishing grounds of the Flemish fishery to indicate (i) where fishing activities are within the good environmental status of seabed impact and (ii) what impact management can have on the economic importance of the fishing grounds.

contact: jochen.depestele@ilvo.vlaanderen.be
gert.vanhoey@ilvo.vlaanderen.be





NEW

North Sea bottom dwellers mapped via automated DNA recognition

The monitoring of the marine ecosystem in the North Sea will become more accurate and more efficient over the next three years thanks to a European research project (the interreg North Sea project GEANS), which is coordinated by ILVO. Scientists from all the North Sea countries are participating. For a few hundred seabed-dwelling ("benthic") animals (worms, lobsters, shells, brittle stars, etc.) so-called DNA barcodes are being developed. Once they are placed in a digital DNA library, each of these species can be automatically detected by passing DNA from a seawater or seabed sample through a machine.

In almost all human activities in the North Sea (aquaculture, sand extraction, dredging, marine wind farms, shipping and fishing, etc.) it is legally required to assess the environmental impact. *"We're first aiming for DNA passports of species that are known as 'canaries in the coal mine' regarding ecosystem changes, so that we can quickly read the alarm signals."* says coordinator Annelies De Backer (ILVO).

contact: annelies.debacker@ilvo.vlaanderen.be

Interreg North Sea Region GEANS
European Regional Development Fund
EUROPEAN UNION

NEW

Plastics from the sea: an inventory

ILVO and RBINS - OD Nature, the research partners of the EMFF/FIVA research project MarinePlastics, have launched a study that maps out exactly how much and which types of plastic are found on the Belgian fishing grounds. It involves both larger pieces of waste (macroplastics larger than 5 mm) and minuscule plastic particles (microplastics smaller than 5 mm).

Since 2012, Europe has been asking that each Member State collect figures around macroplastics on the seabed. Starting this year there should also be data collected about microplastics in the sediment and in the water. Europe is also demanding that the waste on the beaches also gets monitored. The MarinePlastics project also investigates to what extent microplastics are appearing in the commercial species from our fishing grounds. The researchers make the distinction between the plastic particles in the fish stomach (which we don't eat) and the fish fillet (which we do eat).

contact: bavo.dewitte@ilvo.vlaanderen.be

Europees Fonds voor Maritieme Zaken en Visserij

NEW

ILVO writes new edition of the 'Fish and Seafood Guide'

From now on ILVO will write the 'Fish and Seafood Guide for professionals'. Until now it was VLIZ and ILVO who provided the editors with annual updates. In a Memorandum of Understanding which became effective on 9 July 2019, ILVO pledges to undertake the task from now on.

The Fish and Seafood Guide is a household name in the broad professional sector of seafood chefs, processors, institutes, traders, fishermen and breeders. Els Torreele (ILVO): 'They consider the guide - on paper as well as digital - as a rich and reliable source of information on all relevant fishery products. The sustainability assessments of species, fishing grounds, techniques, processing and chains are based on fishing datasets that are produced interpreted by ILVO, for all kinds of applications.

contact: els.torreele@ilvo.vlaanderen.be

Coastbusters

Natural coastal protection by building reefs with seaweed, seagrasses, shellfish and mason worms.

https://www.youtube.com/watch?v=8jKWNpjXwno&feature=youtu.be

3:34

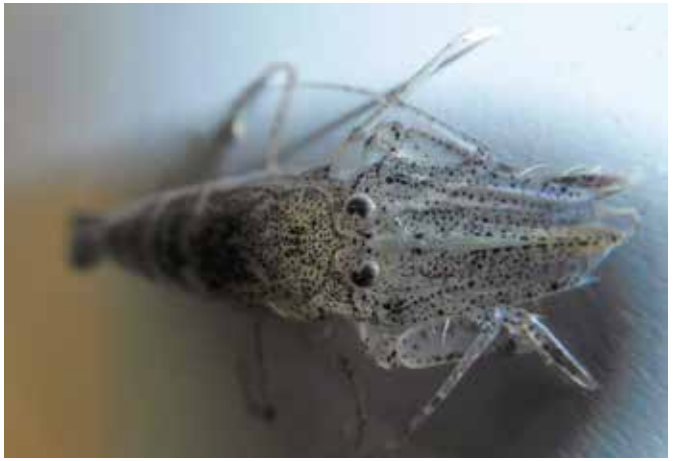
Sorting Fish
Innovative Fishing

A peek behind the scenes at ILVO Innovative Fishing

https://www.youtube.com/watch?v=UOkS8aTmhNc

0:31

[RESULT]



AQUACULTURE OF BROWN SHRIMP ON LAND GETTING CLOSER?
TWO TECHNICAL BOTTLENECKS TACKLED THROUGH RESEARCH

Progress has been made on two bottlenecks that have blocked the aquaculture of shrimp. For the first time, a doctoral student and her colleagues have succeeded in successfully raising young shrimp from larvae. Second, important steps have been made to identify and control the main pathogens (viruses) of the native brown shrimp.

"Large, live brown shrimp offer great culinary perspectives, but they are scarce and it takes (too) long and too much trouble to catch them in the wild and bring them ashore. Aquaculture of brown shrimp, certainly of the larger calibers (+7cm) offers commercial perspectives in the long run, if the technical obstacles can be overcome," says ILVO-UGent researcher Benigna Van Eynde.

contact: daan.delbare@ilvo.vlaanderen.be

[RESULT]

Landing requirements and discard bans in EU fisheries: favorable long-term impact if applied correctly, says research

Since 1 January 2019 and after 4 years of phased deployment, the so-called landing obligation is now in place for all European fisheries. According to more than 100 marine scientists, including specialists from ILVO, this landing obligation is indeed capable of achieving its goal, namely that fishing stocks could become systematically healthier. *"In the long term, the measure does not necessarily have to lead to heavy additional costs, but the most important condition is than that everyone complies with the new rules correctly."* Currently some weaknesses are seen regarding controls on whether fishermen actually comply, the investigators note.

On the European landing obligation, in January 2019 an international scientific book was published, edited by ILVO researcher Dr. Sebastian Uhlmann and two colleagues. The many research projects, the technical developments and the impact studies described in the book prove useful and necessary to help adapt the work processes in the fishing industry. These changes are quite drastic. Among policymakers, fisheries NGOs and professional associations, there are both advocates and fierce opponents. Their voices are also expressed in the book. Generally speaking, the fishermen have little enthusiasm for the landing obligation: *"Harder work, more costs, quota used up and no better price for the fish."*

contact: sebastian.uhlmann@ilvo.vlaanderen.be

[RESULT]

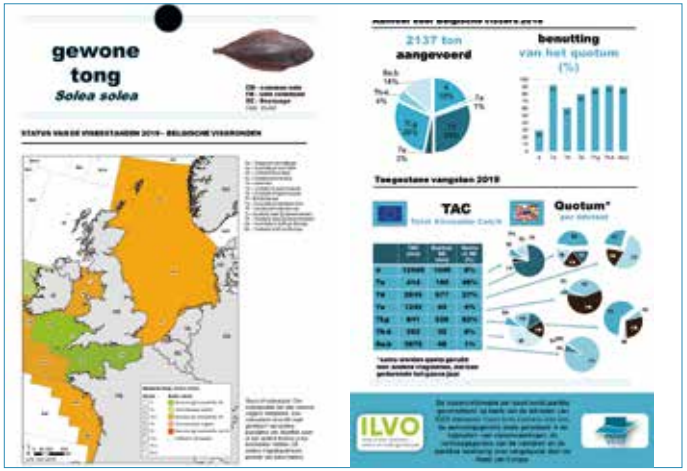
The environmental impact of offshore wind farms in Belgian part of the North Sea: a decade of monitoring, research and innovation

Since 2008, 318 offshore wind turbines have been installed in the Belgian part of the North Sea. Both construction technology and monitoring of environmental impact have changed a lot over the last decade In a new report, the scientific partners in the monitoring program, including ILVO, summarize what we've learned so far about the long-term effects on a variety of ecosystem components, from benthic (seabed-dwelling) invertebrates to birds and marine mammals. As the time series gets longer, our ability to trace the effects increases.

Striking results include that artificial hard substrates such as wind turbine foundations cannot be considered as equivalent alternatives to species-rich natural hard substrates, that wind farms some deter bird species but attract others, that the number of stranded porpoises correlated with periods of high intensity underwater noise and that offshore wind farms bring about only a subtle change in fishing activity without leading to lower catches of the main target species.

contact: annelies.debacker@ilvo.vlaanderen.be

[RESULT]



2019 updates – infographics on the status of fish stocks exploited by the Belgian fleet

Where are Belgian fishermen going to catch which species? And how are the fish stocks in those places doing? The series of infographics - first published by ILVO at the end of 2018 and VLIZ - was greatly expanded in 2019 and received 2 updates on on the basis of catch data for 2018, quotas for 2019 and quotas for 2019 and recommendations for 2020.

To get an overview of the impact of the Belgian fisheries on the fish stocks they exploit, ILVO and VLIZ publish a series of infographics each year. For each of the fished species, 3 indicators are visible at a glance: (1) how scientists estimate the state of the fished stocks, (2) how large the effective catches were by Belgian vessels in the last year, and (3) the amount of quotas allocated to Belgium in the current year.

contact: hans.polet@ilvo.vlaanderen.be

RESULT

Hobby angler at sea is male, West Flemish and 56 years old

This is the typical profile of a hobby angler, shrimp trawler, beach shrimper or beach angler. Combined, the 2900 Belgian recreational sea fishermen catch a total of more than one and a half million fish and about 100 tons of shrimp. Of the fish, 52% get thrown back while the other 48% goes home. This is shown by an extensive study of VLIZ and ILVO, carried out in close cooperation with almost 300 hobby fishermen.

contact: els.torreele@ilvo.vlaanderen.be

RESULT

Kinship between larval, juvenile and adult sole populations on a small and large spatial scale

Young sole on the Belgian coast appears to be closely related to sole from the East English Channel, according to the doctoral research of ILVO-KULeuven researcher Sophie Delerue-Ricard. She has determined the geographical origin of the young fish found arriving at the Belgian juvenile grounds. Among other techniques, she achieved this goal by using two types of genetic markers (DNA). In addition, the shape and micro-chemical composition of the otoliths or "hearing stones" of the same fish helped to further reveal the population structure on a small scale.

The new knowledge about relationships within and between fish populations contributes to even more sustainable fisheries management.

contact: kris.hostens@ilvo.vlaanderen.be

RESULT

About earthy flavors and organic flakes. Aquaculture accelerating through research and individual guidance

Entrepreneurship in aquaculture is a major challenge, but simultaneously offers many opportunities. For three years, the Interreg project 'Aquavlan2' supported the aquaculture and greenhouse horticulture sector through research and individual guidance in the border region between Flanders and the Netherlands. The project partners tackled bottlenecks such as feed, energy, infrastructure, water and raw materials through research on advanced cultivation and production systems. In this way they delivered a contribution to the sustainable expansion of the aquaculture sector. Within this program,

ILVO developed a way to reduce the earthy flavor in culture water and tested the application of organic flakes as feed for various species.

contact: daan.delbare@ilvo.vlaanderen.be

[RESULT]

Gold medal for ILVO team at Open Sea Lab

In September 2019, EMODnet, VLIZ and imec organised a second "hackathon" around open marine data. Multidisciplinary teams, each consisting of a mix of programmers, communication experts, data lovers and entrepreneurs were challenged to create knowledge and value with open marine data from various organizations, and to develop innovative solutions that address the challenges of the blue society.

ILVO's data managers captured first prize with their interactive fish stock assessment tool, so that non-specialists can also understand this fisheries-related information and interpret it.

contact: wim.allegaert@ilvo.vlaanderen.be

[RESULT]

Whiting, fish of the year 2019

2019. From a scientific point of view, ILVO supports this nomination, as fishing effort is generally decreasing, the quotas are respected and the share of more sustainable fishing techniques are on the rise. Thus, there appears to be no danger to overfishing of whiting by Belgian fishermen. In 2017, 304 tons of whiting were landed by our fishermen, mainly from the Celtic Sea and the Western English Channel (~76%). Other, smaller quantities come from the North Sea area (~23%).

The stocks from which Belgian fishermen land whiting, are therefore in good health, although the fish mortality rate is a bit too high.

VLAM www.lekkervanbijons.be

contact: heleen.lenoir@ilvo.vlaanderen.be

Organigram

Close contact

Through its many forms of service ILVO stays in touch with society and the knowledge development stays on the right track. It always boils down to combining scientific and practice-based management knowledge: co-creation. *"Our clients come to us for either very specific or complex multidisciplinary issues. They require tailor-made solutions."*

For few years already, ILVO has organized its work via thematic LIVING LABS. *"This makes our offer of expertise even clearer for professionals seeking solutions."* There are now six living labs and one expertise center of expertise. This list will certainly evolve in the years to come.

Food Pilot: 8 years on

Living lab 'Agri-Food Technology'

The Food Pilot is the living lab of ILVO and Flanders' FOOD for agri-food. Every day, companies, experts and technicians work together to solve problems and review and test new recipes, production techniques, and analysis techniques.

Recent investments

The Food Pilot makes continual investments in research capacity. Recently, the pilot plant was expanded with a cryogenic freezing line and 2 mixing systems. NIR, IR and Malditoff were purchased to detect untargeted deviations or changes in quality and safety. At ILVO's technical atelier, a flexible vision inspection system was built to optimize processing processes using data from sensors, smart algorithms and engineering.

Figures

In 2019, the number of tests carried out rose again (+9%). Tests were run for 107 clients, 40 of whom were new. Almost half of the customers were Belgian industrial food companies (47), a quarter were foreign companies (25, including 21 industrial companies). Furthermore, knowledge institutions (10), agricultural companies (5) and collective projects (20) also asked for help. Their questions concerned all possible subsectors, from ingredients, dairy and vegetables to feed.

Our laboratories carried out no fewer than 20,719 analyses on product composition, food safety and authenticity for 218 private companies. Customers include food companies, farmers, other labs, certification & inspection bodies, consumer organizations, kit manufacturers and the pharmaceutical industry. Surprisingly, last year saw a remarkably large number of new customers.

Quality assurance

Finally, our labs provided important support by organizing 32 ring tests, 20 calibration series and 22 different control sample items. ILVO performed them with a frequency from weekly to quarterly for the quality assurance of 55 different customers, including milk control laboratories, companies and kit producers.

contact: karen.verstraete@ilvo.vlaanderen.be

Living Lab Animal Husbandry

Launched at Agriflanders 2019

The Pig Information Center is already a well-known body in the pig sector. Since 2019, it has been part of the ILVO Living Lab Animal Husbandry, which now also has a Poultry and Cattle Information Center. ILVO works together with the Department of Agriculture and Fisheries and the other research and extension research centers in Flanders to develop this further. Minister Schauvliege officially launched this Living Lab at the Agriflanders trade show in Ghent.

Stimulating innovation and disseminating knowledge

The aim of this new living lab is to promote practice-oriented innovations in the animal production sector and to make existing knowledge more accessible through closer cooperation and interaction between various actors. It aims to be a platform for co-creation that is supported and driven by the entire sector.

Three places for the first point of contact

The Pig, Poultry and Cattle Information Centers play a central role in this living lab, with these core tasks:

1. disseminating research and practical knowledge
2. answering specific questions
3. facilitating consultation in order to capture practical needs in order to better tailor research to the challenges of the sector.

For and by the sector

Not only livestock farmers, but also sector organizations, government, extension research centers, other research institutes, supply, processing and retail can explore their ideas and identify points for improvement within the living lab. In addition to exchanging knowledge, experiments and development projects can also be set up in the facilities of the involved research centers and beyond.

contact:

Pig Information Center: sarah.desmet@ilvo.vlaanderen.be
Poultry Information Center: karolien.langendries@ilvo.vlaanderen.be
Cattle Information Center: matthieu.frijlink@ilvo.vlaanderen.be
Animal husbandry in general: bart.sonck@ilvo.vlaanderen.be

Centre of Expertise for Agriculture and Climate (ELK)

At the end of 2016, former Minister Schauvliege set up the ILVO Center of Expertise for Agriculture and Climate (ELK) as part of the Flemish Climate and Energy Pact. ILVO's ELK was given three tasks: pooling all available knowledge on climate at ILVO, monitoring international research and orienting new ILVO research towards the climate challenge.

30 research experts

The subject of climate was particularly 'hot' in 2019. ELK received an increasing number of requests for advice and research from policy makers, stakeholders and the press. A full-time coordinator was hired in 2019 and a number of specialists were recruited to address the themes of water, life cycle analysis (LCA), enteric emissions and soil organic matter. This brings the total number of ILVO researchers working on climate to 30.

Research, advice and communication

Over the past 3 years, ILVO's ELK has been involved in round table discussions and working groups of the Department of Agriculture and Fisheries, development of an automatic system to calculate a drought indicator, advice and research on methane emissions, carbon storage and grassland management. ELK also did preparatory work for the Covenant on Enteric Cattle Emissions, organized a well-attended climate seminar in 2018 and participated in publications, external seminars, workshops and lectures. Finally, the researchers were even awarded a number of important competitive climate research projects.

contact: els.lemeire@ilvo.vlaanderen.be

Living Lab 'Agroecology and Organic Farming'

A space to meet and experiment

In 2018, at the request of the sector, ILVO committed to set up a living lab for agroecology and organic farming. This living lab functions as a meeting place for researchers, farmers, policy makers, chain actors and other stakeholders to work together on organic farming and agroecology. The living lab is also an experimental space for tackling issues in the field from a systemic perspective. This means both activities focused on research, service provision and communication can be given a place in the living lab.

Co-creation and system approach central

The focus of activities and issues at the living lab are determined during co-creative workshops that involve the relevant actors. Some of the activities that were initiated in 2019 are: the drafting of a vision text and website, creating a presentation to make the concept of agroecology more accessible to the general public, and the start-up of a system exercise to deeply examine a question from the field.

Coordinated by ILVO

ILVO's coordination of the living lab illustrates our commitment to focus more on agroecology and organic agriculture as a fully-fledged development path towards more sustainable agriculture in Flanders.

contact: jo.bijttebier@ilvo.vlaanderen.be

Living lab 'Agri-food Technology'

Start-up in close cooperation with existing platforms

ILVO makes the 'co-creation' of innovative technological solutions a reality. Creating solutions for the agri-food sector is a priority. That is why the ILVO Living Lab 'Agri-food Technology' was developed in 2019, in close collaboration with the Digital Innovation Hub for Smart Digital Farming, the Food Pilot and the Flanders' Food innovation platform.

Focus on co-creation and demand-driven innovation

The focus of this living lab is on co-creation and on promoting collaboration between different actors in the agri-food chain, with the aim of creating, evaluating and demonstrating sustainable, technological (data-driven) solutions. The approach is strongly demand-driven. Through close interaction with practicing companies, we can capture questions and challenges from the field. These form the starting point for new co-creation trajectories. User-driven innovation is central, which means that the living lab does not develop technology 'for' but 'together with' the end users.

With and for various actors

End users can be farmers, agricultural contractors and food companies. By involving them, their knowledge is also valorized and the practical uptake of the innovation is guaranteed. Finally, by working closely together with technology companies, government, sector organizations, research and practice centers, etc., challenges are approached from different points of view. This guarantees an efficient approach with attention to the (added) value for each partner.

Active dissemination of knowledge

The strong link with the sector means that the living lab's core tasks include dissemination of knowledge through network events, demonstrations and workshops, as well as answering concrete questions and providing tailored advice.

contact: simon.cool@ilvo.vlaanderen.be
jurgen.vangeyte@vlaanderen.be

Marine Living Lab: A sea of opportunities

Many partners

The ILVO Research Group on Fisheries and Marine Affairs has a decades-long tradition of cooperation with the broader fishing industry and other marine sectors: commercial fishing vessels, fish auction and processing, wind energy, sand and dredging industries, technology companies that develop and supply equipment and materials for use at sea and companies that rely on marine raw materials and organisms, and certainly various (government) institutions responsible for the protection of the marine environment and marine ecosystem services. It is logical to refer to that existing ecosystem as a "Marine Living Lab".

Wide range of expertise and infrastructure

ILVO has a great deal of scientific expertise on fisheries, the marine environment, sustainability, marine production, marine sampling, marine biotechnology and the blue economy in general. In addition, it has a wide range of laboratories, aquaculture facilities, experimental areas and (in-house developed) equipment and has access to research vessels and equipment.

contact: sofie.vandendriessche@ilvo.vlaanderen.be

Plant Living Lab: from soil to product

Sustainable innovative technology

The new ILVO Plant Living Lab aims to respond to the needs and demands of the agri-food sector and horticulture. The focus is on the use of sustainable, innovative technologies to optimize the efficiency of crop production in Flanders while also reducing its environmental impact. Plant Living Lab aims to bring partners together to facilitate co-creative, innovative research and knowledge sharing. Together with stakeholders, we develop solutions in an open innovation platform, where know-how and tacit knowledge are combined to make innovation even more effective.

Unique infrastructure and expertise

Plant Living Lab has a unique research infrastructure and a wide range of expertise. Topics include soil life, soil management, composting technology and cultivation substrates, experimental field operations, data mining, innovative cultivation, breeding techniques and seed technology, molecular biology research, plant physiology research, plant health with a focus on biotic and abiotic stress, phytosanitary quality control and quarantine organisms.

contact: livinglabplant@ilvo.vlaanderen.be

Operational resources

From an administrative point of view, ILVO consists of the two entities that reinforce each other in a remarkable way: the ILVO-VO (the Internally Independent Agency of the Flemish Government - without legal personality) and the ILVO-EV (Own Capital). These legally separate entities each have separate budgets, staff and administrative bodies. Whereas ILVO-VO largely works through the basic subsidy of the Flemish Government, ILVO-EV acquires resources in a flexible way through competitive research at home and abroad, companies and paying services.

In the first years of ILVO, the ratio of VO to EV was about the same. During the last five years, the EV/VO balance sheet has been approximately 2/3 - 1/3. In 2019 ILVO's basic subsidy will account for 30% of ILVO's total operating resources.

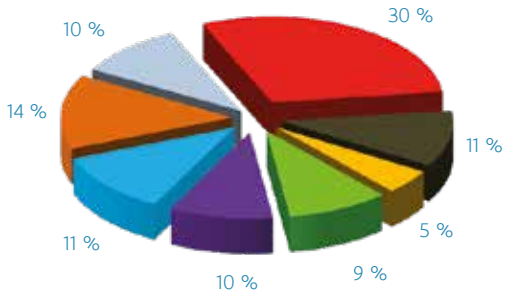
Basic grant Policy Area L&V	30 %

Structural financing: 30%

Grant L&V	11 %
Flemish Government	5 %
VLAIO	9 %
Federal Government	10 %
EU	11 %
Private sector	14 %
Business Unit	10 %

Project-based financing: 70%
(assignments and competitive research)

Distribution of operational resources ILVO 2019



ILVO in the European research landscape

33.5% of project proposals awarded

ILVO confirms its place at the forefront of European agriculture, fisheries and food research. When the European Research Agency (REA) made an overview of the approved 1-step proposals, ILVO ranked 2nd in research on societal challenges such as food security, sustainable agriculture, bio-economy and marine research (Societal Challenge, SC2). Under this Societal Challenge ILVO participates in 3 major European collaborative projects, where both the Member States and the Commission pool resources: the Era-Net ICT enabled Agri-Food Systems (€ 15M), the Era-Net Food Systems and Climate Change (€ 15M) and the EYP Soil (€ 80M). In 2019 no less than 18 Horizon2020 and Interreg projects were completed, representing a net income of € 4.7M. With a success rate of 33.5%, ILVO scores well above the European average of 12%.

Participation in new programs

ILVO is characterized by entry into other programs as well. ILVO is now also present in the SPACE program and the Climate program (SC5), which uses satellite data (GEOSS, Copernicus); the Bioeconomy program in collaboration with industry (BBI JU) and the safety program (SC7) concerning health and pathogens. The Marie Curie RISE program provides training for our researchers with international partners. Through our participation in Interreg Europe, we now participate in all Interreg programs applicable to our region.
This trend is continuing during the preparations for 2020. Much attention is being paid to the Digital Program and the preparation of the next Horizon Europe framework program. For example, our experience in the field of "living labs" will be taken into account when preparing Partnerships for Agro-Ecology and Safe and Sustainable Food Systems for People, Planet & Climate.

contact: cathy.plasman@ilvo.vlaanderen.be

Memorandum of Understanding with James Hutton Institute – Scotland

In early November 2019, an ILVO delegation paid a return visit to the James Hutton Institute in Aberdeen and Dundee. This was sealed with the promise to intensify their collaboration in terms of content.

"The James Hutton Institute is very similar to ILVO, in terms of specialties and size. It combines strengths in crop, soil and land use and environmental research, and makes an important contribution to understanding key global issues, such as food, energy and environmental security, and developing and promoting effective technological and management solutions to these challenges."

The Scottish research center has an extensive international network. It employs over 500 scientists and support staff, making it one of the largest research centers in the UK and the first of its kind in Europe. The Institute is one of the Scottish Executive's major research providers in environmental, crop and food science and has an important role to play in the Scottish knowledge economy.

contact: bjorn.posse@ilvo.vlaanderen.be

Milcobel and ILVO work together to reduce CO_2 emissions from dairy cattle

Dairy cooperative Milcobel and ILVO are joining forces to make the dairy sector more sustainable. Collaborating in the research to reduce greenhouse gas emissions front this sector, they aim to achieve the mandatory 19 percent reduction in methane gas imposed by the Flemish government by 2030. The cooperation was signed on 6 September 2019 on a dairy farm in Merchtem.

contact: bjorn.posse@ilvo.vlaanderen.be

ILVO commits to more transparency on animal testing

Some 20 Belgian research centers and companies, including ILVO, have signed a transparency agreement on animal testing. Together they commit to communicating more openly about scientific experiments on animals.

The agreement contains four commitments:

- Creating more clarity about how, when and why animals are used in research
- better communication with the media and the public, including on the implementation of the alternatives and the reduction or refinement of animal testing
- giving the general public the opportunity to become acquainted with animal research and the regulations that apply to it, for example through open-laboratory days
- report annually on the impact of our communication and share experiences

contact: greet.riebbels@ilvo.vlaanderen.be

The network of networks. EURAKNOS aspires to become the foundation of a European knowledge platform for agriculture, horticulture and forestry

The European Horizon 2020 project EURAKNOS aims to maximize the use of practical knowledge in agriculture, horticulture and forestry by setting up an open knowledge database. All this knowledge will be linked and made easily accessible to the end user, farmer, grower and forester.

At the moment there are 29 thematic networks, each with its own website with information about various themes for several sectors in agriculture, horticulture and forestry. EURAKNOS, initiated by Agrolink Flanders, wishes to maximize the use of practical knowledge by setting up an open knowledge database that will connect all this knowledge and make it easily accessible to the end user, farmer, grower and forester. The project will also address the needs of the end user and the possibility to establish a European knowledge platform that will connect all practical knowledge resulting from European, regional and national research projects.

contact: annerose.gustin@agrolink-vlaanderen.be

Welcome to Belgium - ILVO

Belgium is known for its highly productive agriculture.
This video introduces Belgium and its agricultural production
and producers.

https://www.youtube.com/watch?v=9I5rF2e4lQs

4:22

Research coordination

Sustainable Development Objectives at the heart of ILVO

The SDGs or Sustainable Development Goals are the 17 goals for sustainable development set out by the United Nations. They are a global call to work together towards a sustainable society. As early as 2018, ILVO joined forces with CIFAL, a UN training center. Incorporating the SDG philosophy into an organization is not an easy exercise: it is not so much about how ILVO can contribute to the SDGs from its current operations, but rather about how ILVO can adapt its operations to help achieve the ambitious SDG goals.

In 2019 the bottom-up 'wishes for ILVO' action was launched to gather ideas or suggestions that could make our internal operations more sustainable. The response was great - so great that, in addition to the task force, eight working groups were put together to translate all these wishes and suggestions into concrete actions in the short or longer term. Actions on mobility, personnel policy, purchasing policy, waste and recycling, biodiversity, welfare and health, infrastructure, energy, and more.

The next step in the SDG process is to determine the ambition level of the organization. This level of ambition is necessary in order to roll out actions within a clear framework. At the end of 2019, this question was still on the table with a plan to address it in 2020.

Open Science

2019 was an exciting year in the field of research and research policy.
The governmental coalition agreement folded ILVO into the broad Policy Area of 'Economy, Innovation, Work, Social Economy and Agriculture', and several policy documents defined interesting objectives. The future has yet to show what opportunities this will entail. The context in which ILVO carries out its research is also constantly changing.

The research community is becoming increasingly open, transnational and multidisciplinary. ILVO fully supports this movement towards a more Open Science approach and welcomes the establishment of the Flemish Open Science Board.

Central to the ILVO Research Vision is the development of a holistic view of complex societal problems. With this broad view it is possible to better determine what contribution ILVO can make to this complex whole, but it is also possible to look for complementary expertise at home and abroad. In 2019, ILVO signed a memorandum of understanding with the James Hutton Institute in Scotland. Discussion with several other parties is ongoing.

Integrity

The functioning of a research institute stands or falls with the integrity and correct behavior of all its employees. In 2019 ILVO therefore focused on the further development of its integrity policy. ILVO continued to build awareness raising initiatives, including a mandatory "dilemma training" for all employees. In 2019, no reports were brought before the Scientific Integrity Committee.

contact: bjorn.posse@ilvo.vlaanderen.be

Human Resources

Culture and values

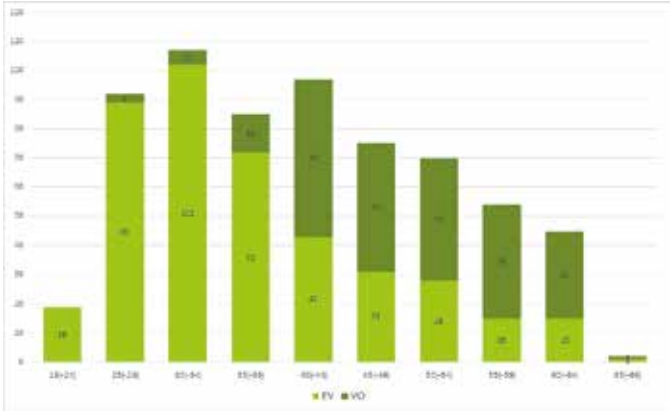
In recent years ILVO has worked hard on an open culture based on five basic values: Positivity, Proactivity, Professionalism, Working Together and Being an Example.

Our "values trajectory" continued in 2019. The aim of two "Values Days" in November, which attracted more than 200 participants, was to inspire each other and experience these values together because they really are a foundation for work at ILVO.

The result was 200 enthusiastic ambassadors for these values that are committed to making ILVO an even more pleasant place to work.

Growth of the Own Capital (EV), savings from the Flemish government (VO)

Due a large influx of staff, the total number of Own Capital (EV) employees rose to 415 in 2019. Remarkably, more than 50% of ILVO employees are under 35 years of age.



This keeps our organization young and dynamic. By combining these younger EV hires and the VO staff (an older population) we still have a healthy age pyramid.

This large influx also brings the requisite challenges, such as:

- Nearly constant recruiting and hiring of new employees, where we are increasingly seeing that our special ILVO culture really pays off as a unique selling proposition for prospective employees.
- Helping these employees integrate into our culture and values story happens, among others, via a warm welcome day, integrity training, "return" days after 6 months, and training courses in non-violent communciation.

As a result of the budget cuts, the number of staff members of the Flemish government continues to drop further.

Number of ILVO employees in 2019

	Employees			FTE		
	FG	OC	total	FG	OC	total
dec 2017	249	342	591	221.7	324.1	545.8
dec 2018	239	370	609	211.8	346.6	558.4
dec 2019	231	415	646	207.1	388.0	595.1

Active approach to illness

At 3.52%, ILVO's absenteeism rate for 2019 was much lower than the average for the Flemish government. The fact that a large proportion of our employees are young and highly educated certainly explains part of this.

Another part is prevention, which is mainly due to our open culture, our work on creating sustainable motivation and creating a safe and pleasant workplace.

Nevertheless, with this "active approach to illness", which was proposed to the ILVO Management Committee in December and will be further rolled out in 2020, we wish to minimize the negative consequences of absenteeism for the employee, for his or her colleagues, and for our organization.

Language policy at ILVO

"Wow...This is an excellent initiative! Congratulations to the team that came up with this. A modern and bilateral insight for an international research institute. That's it." - A French-speaking ILVO employee

ILVO is a scientific institution of the Flemish government. This creates some (linguistic) tension because Dutch is the legal working language, while English is the working language of science.

ILVO is recruiting and hiring more and more non-Belgian employees. This means we can attract and preferably retain the most competent employees from all over the world, while also striving to be an example of how to deal positively with the growing cultural diversity in Flanders.

The Executive Council of 10 September 2019 therefore approved a new "Language Policy". Within this policy, ILVO explicitly states the aim of keeping its Dutch-speaking character, both inside and outside of ILVO. However, in practice, for colleagues who do not yet know Dutch and those who are still in a Dutch learning trajectory, certain texts and meetings are translated into English. In order to promote the productivity and the social fabric of all employees, ILVO organizes cultural exchange moments and internal consultation moments with both Flemish speaking and foreign colleagues. Learning the Dutch language is stimulated by organizing Dutch lessons at ILVO and by supporting colleagues who follow Dutch lessons outside ILVO.

Machine shed and compost storage unit

To support research into farm composting, the existing composting site was extended by building a covered storage area with separate compartments to store starting material and finished compost. During construction, extra attention was paid to water management. The concrete floor is impermeable to fluids and is equipped with a system to absorb sap losses, mostly from wet starting material, as required by law (Vlarem II). The roof separates this fluid from the rainwater. We can now store 50,000 liters of waste water and reuse it in the composting process for re-wetting the piles. In addition, the rainwater is collected separately and reused to irrigate crops. Any excess water goes to the ILVO infiltration ponds, where it can penetrate into the soil.

ILVO now has a full-fledged infrastructure to produce compost according to the state of the art and the law, i.e. to make ripe and biologically rich compost from organic waste streams. ILVO is licensed to work with all possible plant-based flows, as well as solid animal manure products, including those coming from manure digesters. From now on, while researching compost recipes and quality differences of compost, we can keep the starting materials separate even better than before. This is important in order to properly compose the mixtures and take measurements.

Together with the compost site, a new machine shed was also built. By contracting both buildings together and outsourcing them we optimized both the cost and the time to completion: both building projects were finished in less than 6 months.

The design of the buildings (done by BureauPartners) was special. For the machine shed, they departed from the classic layout and instead proposed an open structure where part of the walls were replaced by wind sails. In addition, the entire front has been fitted with rolling gates, so that no internal space is lost. The wind deflectors provide sufficient ventilation so that the vehicles can dry out but still keep the rain out. This means operational savings as well as optimization of use. Now more wheeled machinery can be stored close to the maintenance areas in a qualitative way. The shed's roof is also ready to be fitted with solar panels if later desired.

Installation of solar panels

Within the framework of the ILVO energy plan, we investigated which sites and roofs were eligible for the installation of solar panels. In 2019, photovoltaic panels were already installed on 2 sites, for a capacity of 112 kWp on the Plant Sciences P39 site – which has a large electricity consumption due to the greenhouses - and 128 kWp at the Technology and Food Science site.

Replacement of heating systems and improved ventilation

The Animal Science site (DIER92) includes experimental poultry housing. Due to the absence of a gas pipeline, all the stables have been heated with obsolete oil-fired boilers. The heating systems are now systematically replaced by condensation gas boilers. In 2019, houses 13 and 14 were dealt with. In anticipation of a gas pipeline across the entire site, liquid gas combustion plants have now been installed, which can be switched to natural gas at a later stage.

In house 10, a new ventilation system was installed with a control by a climate computer. The broiler chickens now get ventilation and heating based on their age.

Insulation works

Every year, several buildings get insulated at ILVO, partly thanks to the support of the energy efficiency plan of the Flemish government. Three roofs were insulated in 2019; work has begun to insulate the roof and facades of 2 chicken houses. In total this represents more than 4000 m^2 of roof insulation and 870 m^2 of facade insulation.

Wastewater and electrical installations are the main focus for Environment and Welfare

The ILVO sites of the Food Pilot and the Experimental Farm discharge their waste water into the surface water, which means ILVO must purify the waste water at these sites before discharging it. Through the environmental permit, standards have been imposed to ensure that the surface water is not subjected to additional pollution as a result of our discharge. At the Food Pilot, the responsibility to comply with these standards goes hand in hand with major investments. The ever increasing success of the Food Pilot in the food industry stimulates us to continue to invest in the performance of the wastewater treatment plant. This aerobic treatment also treats the waste water from the sanitary installations of this site. Via the municipality of Merelbeke, an Individual Treatment of Waste Water (IBA) has been provided at the Experimental Farm, so that we discharge only clear (clean) waste water there as well. All other ILVO sites discharge their wastewater via an Aquafin wastewater collector to a sewage treatment plant. We pay an annual contribution to the Flemish Environmental Society (VMM) for this as a function of the estimated pollution load of the waste water to be treated.

Bringing our electrical installations all up to code remains a priority to ensure the safety of ILVO employees. The installations were almost all inspected in 2019 and the results clearly show that the required progress has been made. Work will continue to bring all of our electrical installations completely in order.

ILVO and VLIZ build the InnovOcean Campus

Under the name "InnovOcean Campus", ILVO and the Flemish Institute for the Sea (VLIZ) and its project partners are already dreaming of moving into their new communal complex in Ostend.

The competent ministers Philippe Muyters and Koen Van den Heuvel signed the agreement on 8 July in Brussels. Both Flemish institutions faced a housing challenge. Sharing a building can create a logical synergy.

The 7-storey building also contains a technical floor (8000 m2 floor space). The inauguration of the InnovOcean Campus is planned for the spring of 2022.

contact: evy.devlieghere@ilvo.vlaanderen.be

External events

- Participation in Agriflanders Trade Show
- DISARM consortium
- Reminder class on pig farming: "Fokkerij in 2019"

JANUARY 2019

- GO! Explore Job expo
- Job expo BECE ICGent

FEBRUARY 2019

- Collaboration with Brouwerij Huyghe about growing local malting barely
- ILVO Fisheries at VLIZ Marine Science Day
- Seminary: this is my field. Can varieties and crops cope with the future?
- Kickoff of GEANS project
- The other chicken (with Inagro)
- Wireworms – VLAIO

MARCH 2019

- Job expo KBK Leuven

- Pig and Poultry Information Centers see https://www.varkensloket.be/ILVO-onderzoeksresultaten2019 – series of articles published in trade press

APRIL 2019

- Job expo UGent

- Goodfood VDI conference on Smart Farming
- Phytophar debate
- Debate on scaling-up and depavement in Merksplas
- H2020 EU FarmDemo event

MAY 2019

JUNE 2019

- Memorandum Of Understandig (MOU) with Peru

JULY 2019

- Contest: Loveliest Farm Pasture

- How to farm with (too) little water
- Kickoff of ValgOrize project
- Fertilizer spreaders (Geel)
- Pig Information Center: organization of 4th international workshop on tail biting
- Diagnostic Centre for Plants becomes European Reference Lab for pathogenic bacteria and nematodes

AUGUST 2019

- EAAP - The European Federation for Animal Science Congress in Ghent; ILVO coordinates
- Head of Toxicology and Pharmacology KU Leuven Jan Tytgat visits ILVO Technology and Food Science Unit
- Concluding event for Gomeros project

SEPTEMBER 2019

- Participation in Potato Europe Trade Show – Tournai
- Euragri trade show
- Participation at International Machinery Days – Oudenaarde
- Start of Soy Project

OCTOBER 2019

- Concluding event on re-use of farms
- Opening of the new compost site
- Aquavlan: Aquaculture
- Digestate - Vlaco
- MOU with Milcobel

- Participation in Flanders Open House Day
- Open House for schools
- Launch of DjustConnect data-sharing platform
- Participation in Biotech Day
- Co-organization of Microbiology Congress BSFM
- Food Pilot workshop on mixers

- Concluding event Agroforestry project
- Lunch box lecture: is there a future for the countryside?
- Debate on pulse fishing

- Belpork with Pig Information Center: round table on alternatives to castration
- Milcobel: youth for climate
- Kick-off seminar and workshops for ERA-Net SusCrop projects
- Pig Information Center and Dutch embassy: seminar on high-quality rearing of pigs (250 participants)
- Concluding event P'Orchard project
- Contact day on Meat at the Food Pilot

NOVEMBER 2019

- Job expo VLK – Ghent

- MOU with James Hutton Institute
- Contact day for Fruit and Veg at Food Pilot
- Limiting emissions from barns
- Fish Welfare Symposium
- Mid-term project seminar for ERA-Net Susfood2 and Flanders' Food Inspiration day
- Class on feeding cattle www.rundveeloket.be/agenda/cursus_rundveevoeding2019

DECEMBER 2019

- Participation in Agribex Trade Show – Brussels
- BICEpS Colloquium

Internal events

JANUARY 2019

Happy New Year!

ILVO sensibilization campaign on the SDGs at ILVO

FEBRUARY 2019

Agri-Culture evening:
"What did we earn today?"
Moving documentary about work and life on the farm

MARCH 2019

Research day
(O-dag)

- Climate change?
- GDPR and impact on research?
- Agriculture 4.0
- Profitability
- Pig, Poultry and Cattle Information Centers
- Communication plan
- Open Science at ILVO?
- Welfare of farm animals
- Service provision
- Antibiotics
- Air in animal housing

Meet@eat
Gene-editing, especially Crispr-Cas at the center of a fiery societal debate

APRIL 2019

Kom op tegen Kanker

Charitable (cancer) actions:

- Spaghetti lunch
- Quiz
- Breakfast
- Sale of bike-racing outfits
- Sandwich lunch
- Wine sale
- Bake sale

MAY 2019

ILVO family jogging for big and small at Plant Sciences fields

Personnel party for ILVOers and partners

JUNE 2019

De 1000 kilometer van Kom op tegen Kanker

Technology and Food Science meet each other: knowledge exchange across domains

Plant Sciences meet up: knowledge exchange across domains

JULY 2019

AUGUST 2019

SEPTEMBER 2019

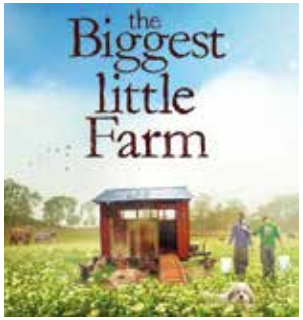
Workshop on Q-GIS for non-GISsers

Research day (O-dag)

- Open space (for farming): a lost cause?
- End of your career? Examples of sharing your knowledge
- 70,000 cows gone due to methane
- Contract writing for beginners
- Make your own agricultural policy plan for Flanders
- Catch farmers' eyes and ears during demonstrations
- Exotic edible tubers, now online!
- Twitter for absolute beginners
- The barn of the future?
- Social media posts with your smartphone: photo and film
- Health and healing via nutrition

OCTOBER 2019

"Return" day for new staff



AgriCulture evening: FILM "the biggest little farm"

NOVEMBER 2019

Meet@eat
Ergonomic work habits

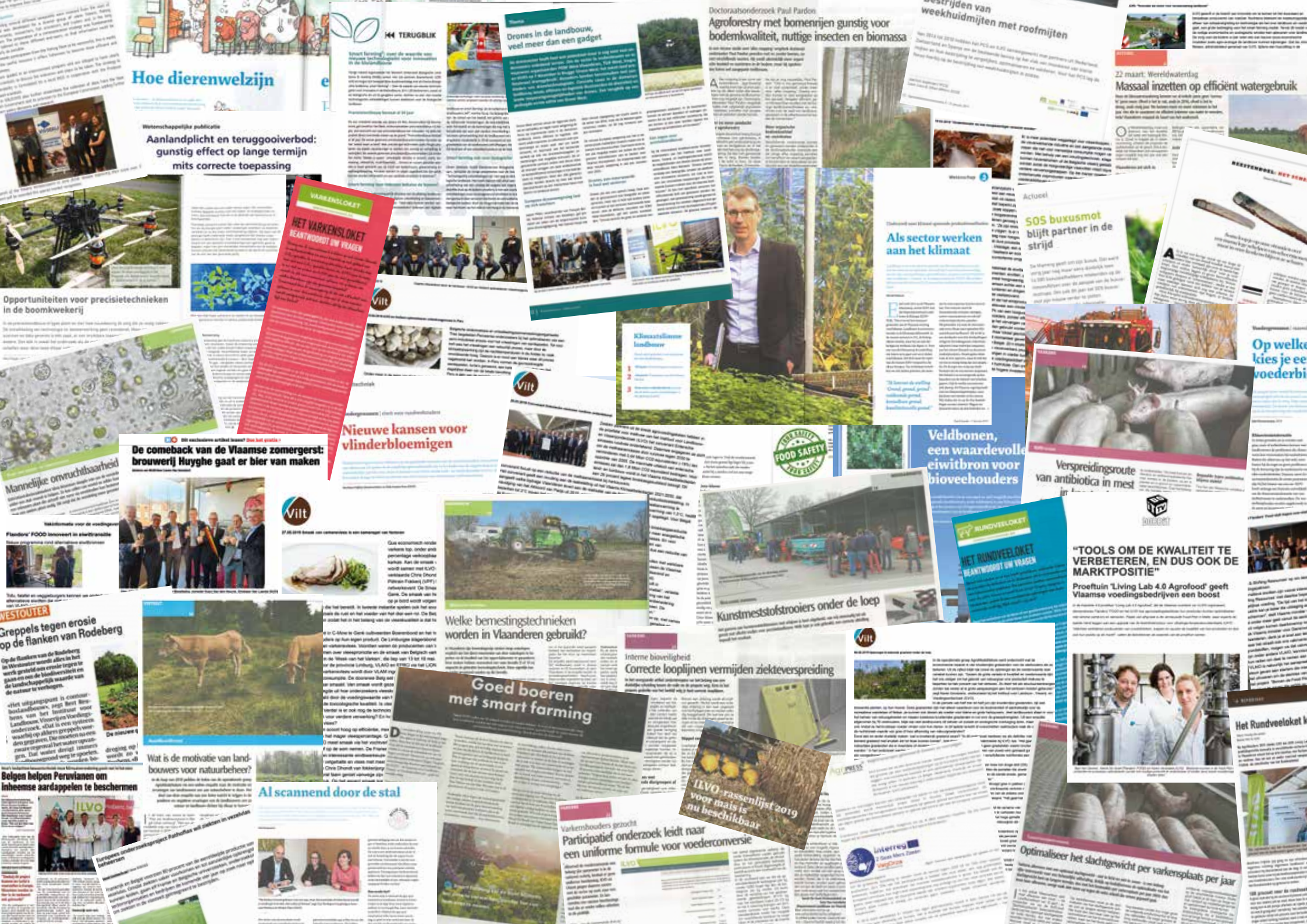
Values Day for ILVO staff

- Proactivity
- Positivity
- Working together
- Being an example
- Professionalism

DECEMBER 2019

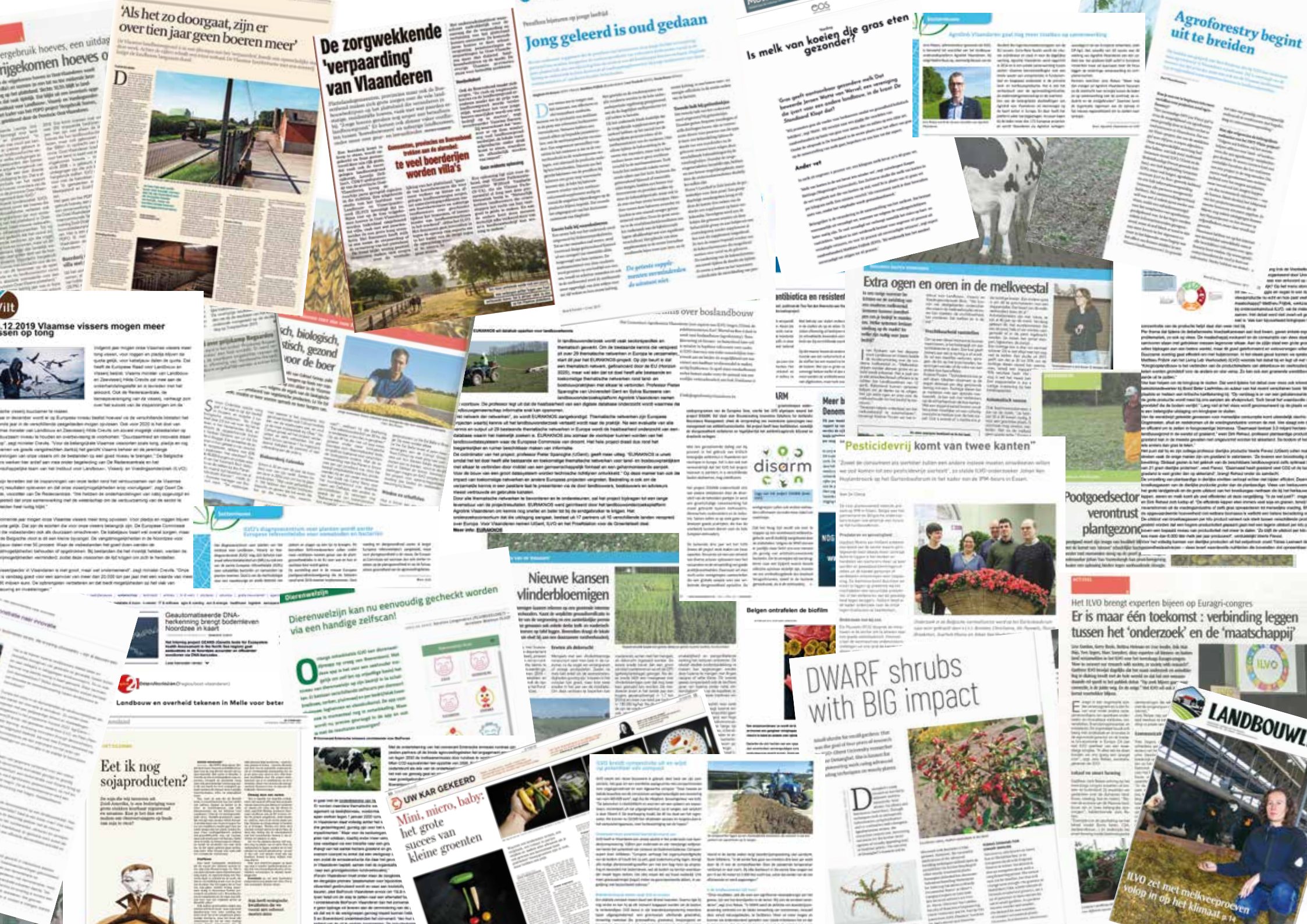
ILVO shows kindness by participating in charitable end-of-year actions

- Selling candy
- Sewing children's clothing
- Marathon with a heart


Hoe dierenwelzijn
Aanlandplicht en teruggooiverbod: gunstig effect op lange termijn mits correcte toepassing
Drones in de landbouw, veel meer dan een gadget
Agroforestry met bomenrijen gunstig voor bodemkwaliteit, nuttige insecten en biomassa
Bestrijden van weekhuidmijten met roofmijten
22 maart: Wereldwaterdag
Massaal inzetten op efficiënt watergebruik
Opportuniteiten voor precisietechnieken in de boomkwekerij
HET VARKENSLOKET BEANTWOORDT UW VRAGEN
Als sector werken aan het klimaat
SOS buxusmot blijft partner in de strijd
Mannelijke onvruchtbaarheid
De comeback van de Vlaamse zomergerst: brouwerij Huyghe gaat er bier van maken
Nieuwe kansen voor vlinderbloemigen
Veldbonen, een waardevolle eiwitbron voor bioveehouders
Verspreidingsroute van antibiotica in mest
Op welke kies je een voederbi
Flanders' FOOD innoveert in alle transitie
Welke bemestingstechnieken worden in Vlaanderen gebruikt?
Kunstmeststofstrooiers onder de loep
HET RUNDVEELOKET BEANTWOORDT UW VRAGEN
"TOOLS OM DE KWALITEIT TE VERBETEREN, EN DUS OOK DE MARKTPOSITIE"
Proeftuin 'Living Lab 4.0 Agrofood' geeft Vlaamse voedingsbedrijven een boost
Greppels tegen erosie op de flanken van Rodeberg
Wat is de motivatie van landbouwers voor natuurbeheer?
Goed boeren met smart farming
Correcte looplijnen vermijden ziekteverspreiding
ILVO-rassenlijst 2019 voor maïs is nu beschikbaar
Belgen helpen Peruvianen om inheemse aardappelen te beschermen
Al scannend door de stal
Varkenshouders gezocht
Participatief onderzoek leidt naar een uniforme formule voor voederconversie
Optimaliseer het slachtgewicht per varkensplaats per jaar
Het Rundveelokket k


Rundvee- en Pluimveeloket gelanceerd
Ruim 1 miljoen euro energiebesparende investeringen aan ILVO gebouwen
PAS: eind goed, al goed?
ILVO
Demonstratie getrokken spuittoestellen zet diverse systemen op een rijtje
Project van ILVO, Aveve, Boerenbond, CRV, DGV en Milcobel
Vlaamse boeren delen data met DjustConnect
Zomerse Werktuigendagen lokken duizenden bezoekers
Hou je grasland vrij van onkruid
Staartbijten tegengaan met tool Varkensloket
Aanpassing aan wijzigend klimaat onontkoombaar
Nieuw digitaal platform laat boeren gegevens uitwisselen
methaanreductie
"Boeren moeten onze hoeves gewoon niet meer hebben"
'Als je wilt overleven, moet je innoveren'
Vleessector op een kruispunt
Overeenkomst Rodeland ondertekend
Landbouw Klimaatverandering
Welke uitdagingen voor de landbouw?
"Gedragen landbouwbeleid verricht wonderen"
De milieueffecten van offshore
Belgische deel van de Noordzee:
monitoring, onderzoek e
Aquacultuur in stroomversnelling
24.10.2019 Welke toekomst is e
aquacultuur in Vlaanderen weggelegd?
Dossier Agroforestry
09.12.2019 CO2-uitstoot landbouw
lager tegen 2030
Hoeves verdwijnen, villa's verschijnen
13.12.2019 Hoe koeien minder methaan
boeren?
Stand van zaken


Binnenkort goedkoper en sneller veredelen?
Geloof in de kracht van innovatie
19.11.2019 Boer ruimt veld: project zoekt sleutel voor omharding
19.12.2019 Doorbraak voor aquacultuur van grijze garnalen
Gloednieuwe proefstal in Merelbeke om duurzame kippenkweek te bestuderen
Delen van data met boer aan het stuur
Is een vleessector in volle verandering positief of negatief voor de varkenshouder?
Chickenstress onderzoekt triggers
Die arme koe, een miskende
Eerste hulp bij hittestress
ILVO-tool Slachtdoordacht
Ontdek soja met ILVO en Arvesta
Hoogwaardige toepassingen
Eindbeerlijn bepaalt groeiprestaties, karkas- en vleeskwaliteit
Voederconversie en groei bij keuze van de beer
Actief werken aan meer melk
ONGEWENSTE VIS
Over ontsnapping, bijvangst, overleving en de aanlandplicht
Dossier Organische stof is alfa en omega
Het gras is niet altijd groener aan de overkant
De visie van ILVO...
Lieve Herman
Pensflora al bij
rond de geboorte


'Als het zo doorgaat, zijn er over tien jaar geen boeren meer'
De zorgwekkende 'verpaarding' van Vlaanderen
Jong geleerd is oud gedaan
Is melk van koeien die gras eten gezonder?
Agroforestry begint uit te breiden
Extra ogen en oren in de melkveestal
Pesticidevrij komt van twee kanten"
Pootgoedsector verontrust plantgezond
Nieuwe kansen vlinderbloemigen
Dierenwelzijn kan nu eenvoudig gecheckt worden via een handige zelfscan!
Geautomatiseerde DNA-herkenning brengt bodemleven Noordzee in kaart
Landbouw en overheid tekenen in Melle voor beter
Eet ik nog sojaproducten?
UW KAR GEKEERD
Mini, micro, baby: het grote succes van kleine groenten
DWARF shrubs with BIG impact
Er is maar één toekomst : verbinding leggen tussen het 'onderzoek' en de 'maatschappij'
LANDBOUWL
ILVO zet met melkveeproeven volop in op het klimaat

ILVO – Management

Burg. Van Gansberghelaan 92
9820 Merelbeke - Belgium
T +32 9 272 25 00

ilvo@ilvo.vlaanderen.be
www.ilvo.vlaanderen.be

Technology & Food Science

Brusselsesteenweg 370
9090 Melle - Belgium
T +32 9 272 30 00

Burg. Van Gansberghelaan 115, box 1
9820 Merelbeke - Belgium
T +32 9 272 28 00

tv@ilvo.vlaanderen.be
www.ilvo.vlaanderen.be

Animal Sciences

Scheldeweg 68
9090 Melle - Belgium
T +32 9 272 26 00

Ankerstraat 1
8400 Oostende - Belgium
T +32 59 56 98 75

dier@ilvo.vlaanderen.be
www.ilvo.vlaanderen.be

Social Sciences

Burg. Van Gansberghelaan 115, box 2
9820 Merelbeke - Belgium
T +32 9 272 23 40

lm@ilvo.vlaanderen.be
www.ilvo.vlaanderen.be

Plant Sciences

Caritasstraat 39
9090 Melle - Belgium
T +32 9 272 29 00

Burg. Van Gansberghelaan 96
9820 Merelbeke - Belgium
T +32 9 272 24 00

Burg. Van Gansberghelaan 109
9820 Merelbeke - Belgium
T +32 9 272 27 00

Plant@ilvo.vlaanderen.be
www.ilvo.vlaanderen.be

ILVO
Flanders Research Institute for Agriculture, Fisheries and Food
Burg. Van Gansberghelaan 92
9820 Merelbeke België

T +32 9 272 25 00

ilvo@ilvo.vlaanderen.be
www.ilvo.vlaanderen.be