Vlaanderen
is data in de landbouw

Annual report 2018

ILVO
Flanders Research Institute for Agriculture, Fisheries and Food

www.ilvo.vlaanderen.be

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Dear Reader,

Since the end of 2018, we have temporarily changed the 'O' in our logo to match the colorful circle of the Sustainable Development Goals of the United Nations. In so doing, we emphasize our commitment to achieve these Sustainable Development Goals in our activities. We will not only take these goals into account in our research, but we also wish to become an example of a sustainable organization. We have therefore surveyed our entire staff to generate ideas to get us started on this trajectory.

2018 was a year of investing in energy savings and other climate investments at ILVO. A series of new investments will follow in 2019 as well, drawing on the energy subsidies won by participating in a project call from the Flemish Energy Company (VEB).

2018 was a very successful year for ILVO in terms of both resources and staff. Despite the permanent reduction in the number of tenured government employees at ILVO due to Flemish budget cuts, ILVO has been able to maintain and even grow its workforce. In 2018, our human resources department welcomed no fewer than 71 new hires, bringing the total to 609 staff members at the beginning of 2019. I am particularly proud to say that our people report being very happy to work here. The biennial staff survey clearly revealed this with employee satisfaction rates of more than 90%.

ILVO participates in the social debate. Many of our people engage in debates and public discussions, are invited to participate in study days and give their interpretation of the ILVO message on radio or television.

I have also been able to contribute to the debate through a number of interviews and opinion papers in newspapers and trade journals, where I have been able to clarify that ILVO stands for a two-track policy: on the one hand, agriculture with a direct link with the consumer (short chain, CSA-agriculture, organic agriculture, food subscriptions, etc.) and on the other hand, farms that embrace technological innovation (smart farming) to make it more sustainable. Both models are explicitly given a place in our research.

I have also called for more attention to be paid to our agricultural soils through the slogan 'Land, land, land'. We must work on the availability and affordability of our agricultural land, and above all on the quality of agricultural soils. This requires urgent attention, if nothing else because a healthy soil is also a climate friendly soil.

As far as climate is concerned, we continue to use climate research more than ever through our Center of Expertise for Agriculture and Climate. Reduction of methane emissions from cattle, breeding of drought-resistant plants, a protein transition and the development of climate-adaptive strategies are the spearheads of this research. The urgency of the climate problem is an incentive for us to make additional efforts in 2019 in this area. The ILVO employees will do their utmost to present useful sustainable climate solutions.

Joris Relaes

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Mission & Vision

ILVO Mission and Vision

ILVO is an independent scientific research institute and service organization of Flanders' Government that works to promote sustainable agriculture, fisheries and agri-food in Flanders, Belgium, Europe and the world.

ILVO aims to explore new and existing pathways of optimization and sustainability in a proactive, objective and honest way for the actors in the agricultural-fisheries and agri-food chain and for the broader rural environment. ILVO is based on frequent dialogue with policy, stakeholders and society and strives to play an exemplary role in its work.

The ILVO vision document, "Towards 2020 and Beyond" states the organization's benchmarks and ambitions. ILVO has committed to sustainability as a basis for day-to-day work as well as its research and services.

The Sustainable Development Goals (SDGs) of the United Nations have become ILVO's compass in all areas of work. An internal leadership group has designed an SDG trajectory that ranges from very concrete actions to a reformulation of the ILVO vision and mission, with a more sustainable ILVO in mind. To support this process, ILVO became a partner of CIFAL Flanders and thus joined a network of other public companies, research institutes and industries that are committed to making the SDGs a reality.




bedankt
thanks






ILVO

FOOD PILOT




ILVO


Research and specialized service provision in 2018

Healthy Soil and Crops

Societally Supported Animal Production

Exploitation Of Marine Production

Profitable Production Systems and Added Value Creation

Healthy Food

Rural Development In Urbanized Flanders

Bio-Economy

Climate Mitigation and Adaptation

Precise and Innovative Technology

Healthy soil and crops

Can they take the heat?

In 2018, ILVO launched a so-called "soil passport" - a kind of medical file for each field - as a new tool to manage agricultural fields more sustainably. The aim is to use an integrated dataset for sustainable and climate-friendly soil management. Some agricultural soils in Flanders could indeed use a bit more attention. The soil passport, and the corresponding substantiated management recommendations, can help with this in the long run.

New horizons have opened up in soil research based on the use of genomics techniques that can generate more insight into the variety of soil organisms. This becomes particularly interesting when we can also support the beneficial fungi and bacteria populations by applying certain natural components. One promising pathway is chitin, a substance found among others in shrimp peelings.

Looking back on 2018 is of course impossible without referring to the long dry summer. This year, 'healthy soils and crops' literally meant crops that either coped well with the heat or were able to recover quickly after the heat. The researchers working on drought stress and breeding for drought resistance in grasses and soy could almost literally feel the hot breath of the market in their necks.

Good news, by the way: ILVO's first grass and clover varieties with increased drought resistance have now been included on the variety list.

Isabel Roldàn-Ruiz
Scientific Director, Plant Sciences Unit

RESEARCH

Soil passport as a tool to manage agricultural fields more sustainably

The idea of the soil passport is to bundle all soil-related information in an easily-consulted form. By linking it with crop information and the history of the field, interesting insights come to light.

Soil is the basis of agricultural production. We therefore have every reason to keep our soils in top condition. Many different data sources are currently available to tell us about how the crop and the soil are faring. Classical soil analyses come to mind, as well as soil scans, harvest data generated by the machinery, and drone or satellite data. Being better informed will lead to better soil management, which in turn will result in better yields.

The ILVO fields are becoming a test site for the Flemish agricultural sector.

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Nitrogen effects of green manure cuts removed from one field and redistributed as a base fertilization on another field

In recent years, ILVO, Inagro, PCG and Ghent University have examined the effect of green manure cuts (i.e., fresh or silage grass-clover) on the crop yield in open-air and sheltered crops (potatoes, tomato and paprika, spinach and bok choy). They evaluated how the depth on which the green manure is applied affects the speed of breakdown in the tillage layer and thus its nitrogen effect.

The usually relatively limited nitrogen effect of this green manure biomass indicates that it will contribute effectively to the organic matter buildup and thus to the capacity of the soil to provide nitrogen. It can therefore be decided that green manure biomass can be an alternative to farmyard manure, with the added benefit of nitrogen input via biological nitrogen fixation without adding any extra phosphorus. This can be important in the context of the restricted standards for phosphorus.

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Epitrix: the beetle in the potato stack

There is only a limited risk of introduction of the exotic, damaging flea beetles *Epitrix cucumeris* and *Epitrix* papa from infested areas in Portugal and Spain. This is reflected in the research results of ILVO, UGent, CRA-W and PCA.

In the project DEPITRIM, introduction and establishment risk maps were made and recommendations were formulated for potato traders and the FASFC for how to handle non-native *Epitrix* species after detection.

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Fertilization: more options than you might think

Through a demonstration project, Inagro, ILVO and PCLT wish to demonstrate various techniques and measures around well-considered fertilization, and to raise awareness among farmers and field workers. For farmers, it is often not entirely clear which techniques and approaches are available in the context of fertilization and better water quality.

The bottom line of the project is to demonstrate existing techniques that are not yet commonly used in agriculture and horticulture, such as row and strip fertilization during sowing or planting, sectional fertilization, or site-specific fertilization during hoeing. Simple maintenance of the buffer strip is also highlighted. Besides demonstrations, the project partners will also produce publications and informational sessions.

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No-till farming…okay, but how?

For years, ILVO has been working on strategies to reduce tilling. In organic cultivation, the project SOILVEG took place in nine European countries. In that project, the roller crimper was the tested method to destroy ground cover without plowing.

Eliminating soil tillage and applying the roller crimper can provide benefits in terms of useful biodiversity, climate mitigation potential, increase of organic matter in the soil and reduction of fuel consumption. Unfortunately, its use still resulted in undersized yields.

In Flanders, ILVO and Inagro tests performed with white cabbage. The marketable yield was disappointing. More research is needed to see how the roller crimper can still be utilized without affecting yield.

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IN THE SPOTLIGHT

Are insecticides in agriculture a necessary evil?

From Knack 30/05/2018
The populations of useful insects is crashing, and along with it populations of insectivorous birds. Insecticides are said to be the main cause. But can you do agriculture without using those substances? And if not: can it be different - and better?

Kristiaan Van Laecke (ILVO):
" ...[It is] unrealistic that our agriculture will be completely free of insecticides, if you want to achieve high food production on the most fertile soils in the world, together with a growing world population. But the use of insecticides can be greatly streamlined. If you look carefully at pest insects and the crops they live in, you can sometimes come up with efficient solutions without having to use insecticides. For instance, ILVO studies the composting of infected plant material and fruit waste into a full-fledged compost free from pest insects. The heat of the compost heap kills the eggs, larvae and pupae of some harmful fruit or vegetable pests."

Flanders Research Institute for Agriculture, Fisheries and Food
10 September 2018
Wim Wesemael (ILVO): "Because nematodes are microscopically small, they are easy to miss."
From 9 to 13 September more than 400 nematologists from 54 countries will share their research in Ghent for the 33rd symposium of the European association of nematologists. They are experts in nematodes (tiny worms), the most common multi-celled organism on our planet.
http://www.vilt.be/nematologen-uit-meer-dan-50-landen-verza...

ILVO @ILVOvlaanderen – 20 Sept 2018
Gerda Cnops of ILVO talks today about quinoa at the conclusion to Food for the Future: a sustainable, durable, and highly nutritious crop = a superfood for Flanders? Re-read @EosTrace about quinoa:

Eos Tracé: Quinoa
Quinoa, a 'superfood'? Yes and no. Not in the sense of working wonders if you eat it regularly. For instance, it contains about...
Eostrace.be

IN THE SPOTLIGHT

Korean visit

The Korean Rural Development Administration, during a visit to the ILVO "plant doctors" at the Diagnostic Centre for Plants (DCP), found the technical advice and support of ILVO to the government, and the direct service to growers and individuals more than interesting. *"Your role in import and export files and the speed at which batches of vegetables are examined to decide whether or not to quarantine or release them, is exemplary."*

In 2018, ILVO again received 13 foreign (non-EU) delegations in search of knowledge exchange and cooperation.

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Healthy soil and crops: Onion leaf miner not yet under control

Hans Casteels (ILVO): "Since 2012, Flemish leek cultivation has been plagued by the onion leaf miner, *Phytomyza gymnostoma*. An integrated control strategy is needed. PCG, ILVO, Inagro and PSKW have started an investigation into the biology of this fly, toward monitoring methodology, morphological and molecular recognition diagnosis, natural enemies, and possible control via field cultivation techniques and efficient control with selective pesticides."

NEW

Soil compaction: prevention and remediation

ILVO, Inagro, the Soil Service of Belgium and UGent have joined forces to study prevention and remediation of soil compaction in agriculture. Through field trials and collaboration with farmers, contractors, equipment manufacturers and tire manufacturers, they are seeking efficient and feasible solutions.

Specifically, tests are being carried out regarding mechanical innovation, crop rotation and timing of field work. Existing and new knowledge about soil compaction is disseminated through a website (www.bodemverdichting.be), newsletters, study days, demonstrations, articles in the trade press and further expansion of the existing Terranimo© tool.

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Soil hygiene in potato production: heating residual soils for qualitative reintroduction on the farm

Flanders' FOOD and ILVO are developing, together with the Belgian Soil Service and UGent, a method of using heat to kill nematodes in residual soil on potato processing farms. Such efficient 'cleaning' is a requirement to reintroduce quality residual soil on the field or at the grower.

Today the only options are storage (i.e. piling up soil around the factories); flooding soil over large areas; or reusing the soil for non-agricultural means. Such solutions are technically (spatially and environmentally) difficult in Flanders. However, previous research has revealed that it is also possible to kill the quarantine nematodes in (residual) soil via (residual) heat, and that path is now being investigated further.

The ultimate goal is the blueprint of a pilot installation that can be used semi-industrially by a potato processing plant for research purposes. The economic costs/benefits of such an installation are being thoroughly analyzed. In the case of a positive result, the sector can develop a prototype (pilot line) for demonstration and validation.

Contact: nicole.viaene@ilvo.vlaanderen.be

Microbiology in ornamental cultivation

In the four-year Vlaio-LA project BI-O-PTIMAL-at-WORK, ILVO is working on sustainable designer substrates for various horticultural products.

The aim is to find the right peat replacements, soil improvers and suitable mixtures of beneficial micro-organisms. 'In this way we can reduce (fossil) peat and farm manure use, and allow the growers to produce more environmentally-friendly and quality products with less residues. The intensive and open cooperation throughout the value chain is important. This cooperation is a must because the new substrate ingredients really have to be tailored to a specific ornamental crop, both in terms of product itself and product information. We survey growers for their experience with micro-organisms and take that information to the producers of new substrates. It is a global approach that covers aspects of substrate quality, soil quality and nutrient efficiency, biocontrol and crop management.

The sustainability requirements in ornamental cultivation are becoming increasingly stringent internationally. This project offers proactive answers to these requirements.

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NEW

European organic vegetable greenhouses with more agro-ecological practices

Greenhouse horticulture is a very intensive cultivation system that can also produce crops outside the growing season and in any type of climate. In the newly launched three-year CORE Organic co-fund ERA-NET project 'Greenresilient', eight countries are looking for a more agro-ecological approach to organic greenhouse horticulture.

The emphasis varies by region: In the Mediterranean, they aim for reduced use of plant protection products, e.g. less use of copper for controlling fungi. Our climate zone (northwest Europe) focuses on energy-efficient systems to keep producing even under conditions of low outdoor temperatures and low natural light.

ILVO and PCG are Flemish partners. ILVO studies the aspects of soil fertility, nutrient management and functional biodiversity in the new cultivation systems. PCG is one of five experimental sites where innovations are being tested and evaluated.

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Thematic network for nitrogen and phosphorus

Telling farmers about technologies, products and practices for re-use of nitrogen and phosphorus is the main aim of the European project NUTRIMAN. This approach encourages the circular economy and guarantees efficient use by farmers, both economically and environmentally.

NUTRIMAN is a European Horizon 2020 project with 14 European partners from the agricultural, technology and research sector, where Belgium is represented by ILVO, UGent, PCS, Vlaco and Inagro. The consortium focuses on centralizing knowledge via a network and web-based platform and organizing demonstration projects.

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7
2
7

Societally supported animal production

Research in livestock farming makes a dramatic shift

Ten years ago, the main themes in animal research were quality of the finished products and feed efficiency. That has changed remarkably. Today, ILVO often presents results on environmental and climate impacts, resilient and well-thought-out business management, sensors and data systems, animal welfare, use of veterinary medicines and taste. New methodologies and approaches include modeling (e.g. emission flows), genomics (bacterial populations in the gut) and multi-factor research (in decision-making tools around disease control).

Farmers, suppliers and contractors in the pig, poultry and cattle sectors are increasingly interested in research done in Belgium and abroad.

This is reflected in the statistics of the Pig Information Center. During the last six years, more than 500 specialized questions have been received, which were answered on the basis of scientific knowledge via www.varkensloket.be.

In the meantime, there is also a Poultry Information Center and a Cattle Information Center. The three livestock information centers have the broad task of picking up on the needs in farming practice and converting them where needed into research questions. The aim is to keep Flemish livestock production in its leading position within Europe, as a forerunner in the field of technical results and sustainability efforts. These information centers in turn rely on other stakeholders such as fellow research institutes and extension research centers.

Bart Sonck
Unit Head, Animal Sciences Unit

RESEARCH

Decision tree for best method of euthanasia

ILVO has established a decision tree to encourage poultry farmers and veterinarians to use the most appropriate method of euthanasia for ill or weak animals selected during the daily inspection rounds.

The decision tree uses the following criteria: a rapid and sufficient loss of consciousness, handling stress, ease of use and cost-efficiency. Although there are several methods that induce loss of consciousness somewhat faster than the technique most used in practice (manual cervical dislocation), no alternative methods for poultry < 3 kg, for example, have scored better on all criteria. Manual cervical dislocation may only be performed on a maximum of 70 animals per person per day, however. If a person has to kill more animals, or if the animals are heavier than 3 kg, more expensive methods such as a non-penetrating captive bolt instrument device or administration of foam nitrogen gas are recommended.

The study results are made known to the sector through educational materials and informational sessions. A survey has revealed that methods other than cervical dislocation are hardly known.

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MoniCow takes an important step towards more efficient monitoring of dairy cattle

After three years of research, the partners in the imec. icon project MoniCow have made a prototype of a complete monitoring solution for dairy farmers. The innovation lies in its ability to follow up on several indicators of fertility and health with a limited number of sensors (ear tag + collar) and it also continually updates the data. This reduces the risk of a missed heat or calving. According to the researchers, this can represent an average savings of 200 euros per cow per year for the dairy farmer, when deducting the reduced costs for veterinarians and other costs, suboptimal yields and the time requirements. Also interesting is the accurate location determination (accurate up to 30 cm) of the cows in the stable and the inductive charging system of the sensors, which permanently solves the problem of empty batteries.

The partners ILVO, Imec-UGent, KULeuven, Delaval, NXP Semiconductors Belgium, Multicap, Metagam and Snap Tonic hereby meet the sector's demands for smarter, more integrated, more user-friendly and energy-efficient tools.

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Belgian double-muscled cows and PAS: Slightly less protein in feed gives up to 50% less ammonia

For the first time, ILVO has generated hard figures for beef cattle based on the principle that protein digestion in the rumen strongly influences the amount of ammonia emitted. When beef cattle are fed 2% less crude protein, their ammonia emissions decrease by as much as 40%. No negative effects on growth were identified in these extensive comparative feed tests. Specifically, the difference between a high-protein ration (14 to 15.7% crude protein) and a low-protein ration (11.5 to 12.7% crude protein) was compared when fed to Belgian double-muscled heifers.

ILVO aimed in this study to present possible new measures for the Ammonia Action Plan (PAS) for meat cattle, because grazing is currently the only measure on the PAS list for this group. The results were announced on 1 February at a press conference in the presence of Minister for Agriculture Schauvliege and chair of the largest farmer's association (Boerenbond), Sonja De Becker.

In the specially-built PAS research barn at ILVO, ILVO also investigated whether the emissions from the manure could be reduced by changes to barn management. Neither more frequent cleaning, nor more frequent bedding changes had an effect.

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Antibiotic resistance in pigs: detection methods developed

Awareness is increasing that human and animal health depends to a large extent on the microbial community in the digestive system, the intestinal microbiome. By means of new DNA sequencing technologies called metagenomics, the composition of such a microbiome can be mapped. Furthermore, it can also be investigated whether certain external factors lead to shifts in this microbiome.

ILVO-UGent researcher Thijs de Mulder investigates whether low antibiotic doses that can be present due to accidental antiobiotic residues in feed, influence the intestinal microbiome of pigs. He uses classical methods of culturing bacteria as well as metagenomics. This showed that using classical plating techniques, shifts in the ratio of sensitive and resistant bacteria were visible, but this was not demonstrable with metagenomics. His study therefore shows that metagenomics and classical methods do not necessarily lead to the same conclusions. Both techniques have their advantages and disadvantages, and are still both needed when performing such investigations.

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Intensive livestock breeding and health of local residents

On January 15, 2018, ILVO presented a scientific literature study on the possible impact of livestock farming on the health of local residents during a symposium in the province of West Flanders. A significant proportion of the theoretically possible effects of intensive livestock farming on the health of local residents is not yet substantiated by research results.

Particulate matter remains the most known health risk. From stables, particulate matter as well as ammonia can escape. In the open air – far from the stables – a chemical reaction of the ammonia with chemical compounds originating from industry and traffic can occur. Then a secondary particulate matter is created that can be harmful for everyone, not just for people living close to livestock farms.

Possible transfer by air of the bacteria, viruses, fungi and parasites that may be present in the livestock, and of any medicinal products used in the stables, are not described in the literature as an existing or important risk.
The study exposes a number of knowledge gaps, including around ammonia and endotoxins.

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IN THE SPOTLIGHT

Study afternoon on young stock rearing: from embryo to lactating heifer

Matthieu Frijlink (ILVO Cattle Information Center): "In October, many dairy farmers, farm workers, researchers, students and others came to the first study afternoon on rearing young stock: 'From embryo to lactating heifer'. Several aspects were discussed at this seminar: The influence of growth and development during gestation on later production and health, colostrum quality and absorption of antibodies, the ideal teat regime, comparison of various rations in terms of growth, cost price and feed efficiency."

Healthy, happy and natural? Animal welfare evolves:

"Big data, precision lifestock farming, innovative indicators: worldwide, many new tools are being launched," says animal welfare researcher Frank Tuyttens (ILVO) at the le-Net study day on 13 December 2018

Stray currents in the dairy farm

Cows that act skittish or stressed but with no apparent cause could be suffering from stray currents (electrical 'leaks') in the barn For the first time, an official measurement protocol has been developed to detect and eliminate this invisible stress factor.

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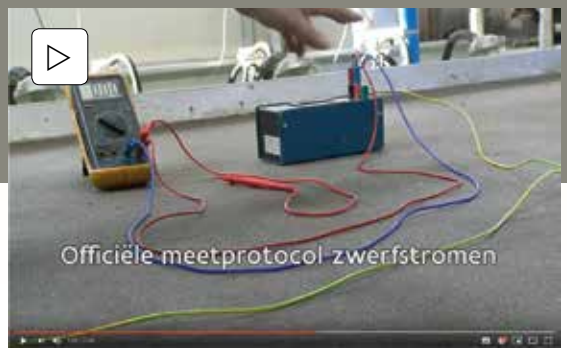

Ensiling of mixed forages of faba beans and grains as feed for organic laying hens

ILVO, together with Inagro and HoGent will try to maximize the use of regional protein sources to use in the feed of organically raised laying hens.

Marta Lourenço:
"We are going to assess the digestibility, performances and egg quality when feeding these silages to the laying hens."

IN THE SPOTLIGHT

Demo of Pig and Cattle Information Centers

On 2 October 2018, the Pig and Cattle Information Centers joined a number of partners to present the demo afternoon on 'Biosafety and milk hygiene'. The accompanying catalogue 'Demo Biosafety & Milk hygiene' offers an overview of the participating products and appliances, information sheets and articles.

www.varkensloket.be/bioveiligheid

Research in the animal sector: European super-congress is coming to Flanders

Exactly 70 years after the European Federation for Animal Science (EAAP) was founded in Paris, the organization will bring its annual international congress to Ghent on 26 - 30 August 2019. This honor has not been given to Belgium since 1977. ILVO has taken on the role of local organizer and host for this multi-day annual congress. A big challenge!

The aim of EAAP is to disseminate, stimulate and streamline the research – public and private – on farm animals.

Sam De Campeneere (ILVO): "Because Belgium is one of the 35 country members of EAAP, all Belgian interested parties can register for free as an individual member at EAAP (see http://www.eaap.org/eaap-form/)."

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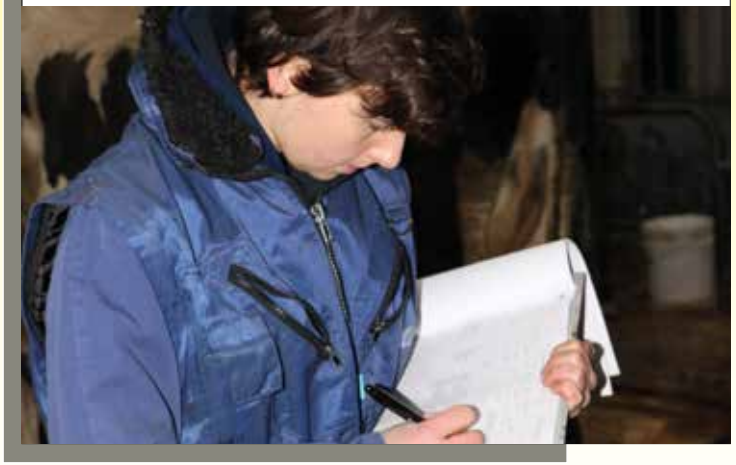
Flanders Research Institute for Agriculture, Fisheries and Food
26 june 2018

The ILVO cattle farm is the first Flemish farm with official status "BVD-free farm with serological surveillance". BVD (Bovine viral diarrhea) is a contagious disease in cattle caused by a virus. The national mandatory program to eradicate this disease in Belgium started in 2015, but ILVO had already started a voluntary program in 2008. For 10 years, all of the ILVO farm surveys have been negative and there is no virus circulation on ILVO. The mainstays of this result? Flawless administrative tracking by the cattle experts, smooth cooperation with the ILVO animal caretakers and veterinarians, and strict security measures when receiving visitors, suppliers and cattle dealers. A big congrats to ALL the experts and animal caretakers!!



NEW

From manure to humans? Antibiotic residues, antibiotic resistant bacteria, antibiotic resistance genes and potential exposure for humans

Transfer of antibiotic resistance through meat consumption is a well-known route, but the route via the environment may also be an important source of exposure for humans. In Belgium, a country with intensive livestock farming coupled with a high level of antibiotic use and intensive arable farming, there is still little data on this possible risk.

Within the project AMRESMAN, experiments are being carried out by inoculating residues in fertilized soil on which leeks are grown. Based on this, the risk of human exposure to antibiotic resistance genes and residues is assessed through the consumption of these vegetables.

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Chicken with chestnut tannins?

What mechanisms are behind the beneficial effects of tannins on poultry health and production? And how can we optimize the use of chestnut tannins? ILVO, UGent and the company Sanluc International N.V. are performing tests with chestnut tannins (Tanno-SAN®) for laying hens and broiler chickens.

ILVO is currently studying these tannins, natural compounds present in many plants, which have been attributed anti-oxidative and antimicrobial properties. The study includes small-scale tests in both laying hens and broiler chickens which will be used to assess digestion, intestinal health, anti-oxidative properties and the influence of these tannins on egg and meat quality.

Once these tests have given us more insight into the beneficial properties of these tannins, the trials will be scaled up to test different feed strategies to optimize production and animal health. The ultimate goal of the study is to provide more insight into how chestnut tannins can affect animal health and the production of meat and eggs and how this additive can be applied in the worldwide poultry sector.

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NEW

A perfectly-tracked heifer calf becomes a fitter cow

On the average dairy farm in Flanders two costs are most important: feed is the main one, together with rearing of young stock to replace older cows.

In dairy farming, theoretically a young heifer is fit, mature and has had a first calving at 24 months. In practice, this deadline is often not met. Every extra month that the young stock needs to become a productive cow, is 'an avoidable cost'.

Researchers from ILVO, Inagro and Hooibeekhoeve have therefore started the VLAIO trajectory 'JongLeven'. The aim: improved rearing of heifer calves. "By comparing different regimes and rations during the rearing period to performance in terms of first calving, milk production, rumen functioning and long-term health of the adult cow, we will be able to draw conclusions on an optimized lifelong production," says researcher Sabrina Curial of ILVO.

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Tackling ammonia emissions at the source

Poultry farms often use end-of-pipe techniques to reduce ammonia emissions to the environment. The Project KUIKEMIS reverses these roles and tries to reduce ammonia emission with a source-based approach.

Ammonia production can be reduced at the source by either reducing nitrogen excretion or by ensuring that the chickens produce drier manure.

The project will develop new strategies with focus on feed, design and ventilation. Best practices will be tested at 8 commercial farms. It is important that these adjustments do not negatively impact animal performance, and that they are both economically feasible for and supported by the entire sector.

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Extending the laying cycle - is it feasible?

The LEGLANGER project investigates whether laying hens can remain productive until an age of 100 weeks, without artificial molting and in a responsible and sustainable way. This would increase both sustainability and profitability.

Problems such as reduced egg shell and bone quality, animal health and animal welfare need attention. ILVO examines the specific nutritional needs of older laying hens, in particular how the feed composition influences the health and well-being of the hens and on this feed composition affects egg shell and bone quality. ILVO is surveying sixty commercial laying hens farms to follow up feather condition, bone and egg quality and the presence of the red poultry mite. An on-line decision tool will be created to help the poultry farmer to determine when it is economically important to change flocks due to a severe drop in production.

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Calories

Exploitation Of Marine Production

Nuance through research and transparent communication

Is the Brexit going to come, and which shocks are in store for the Belgian fisheries? What's going on with the landing obligation (discard ban), which went into effect in early 2019? How can boat owners use the fish auction to indicate the sustainability efforts being made, and what does the Valduvis score mean exactly? What kind of disturbances do which types of beam trawlers cause on which type of seabed and sediment, in which marine species? What about the effects of electric pulse fishing? Can mariculture with shellfish and seaweed become an ecological and economically feasible story over the long term in the Belgian North Sea?

The expertise of the marine ILVO researchers is again in high demand from the sector and from society.

To unlock correct information on fishing quotas for consumers and interested marine enthusiasts, ILVO will henceforth, together with VLIZ, create a series of summary infographics of fish stocks that are important for the Belgian fishing fleet. At a glance and per species, three indicators are used:

- How scientists estimate the state of the fish stock,
- How large the Belgian quotas are,
- How large the effective Belgian catches were in the past year.

Belgian fishermen capture more than fifty species of fish and shellfish in no fewer than ten different fishing areas. The data are contained in specialized European databases. But unless you search thoroughly by country, it is almost impossible to get a correct image per country.

Hans Polet
Scientific Director, Fisheries

RESEARCH

Two thousand recreational fishermen account for 1% of fish caught

An estimated estimated 2000 recreational fishermen landed 213 tons of fishery products from the Belgian part of the North Sea last year. This amount represents only 1% of the total commercial and recreational catches. Taken together, the sector is good for a direct expenditure of five million euros.

For the first time, the recreational sea fishing industry off the Belgian coast has been mapped. Research by the Flemish Institute for the Sea (VLIZ) and ILVO, by working closely with the fishermen themselves, has been fishing for information about the size, catches and economic value of the Belgian recreational fisheries sector

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Living between wind turbines: mapping environmental impacts

Until now, no reef effects or effects from closing the area to fishing have been observed in the sandy zones between wind turbines, based on the recent monitoring results of fish and invertebrates in two wind farms. The species that were living there before the construction of the wind farms still dominate the soft sediments.

It is striking, however, that mussels and anemones, which are known to grow on the foundations of the turbines, have become more numerous in the surrounding sediments of one of the wind farms than in the reference zone outside this wind farm. However, a detailed follow-up is needed to check whether this is a one-off finding or a real wind farm effect. It is therefore still too early to conclude that there is a direct 'reef effect' or an indirect effect of having closed the area to fishing.

In addition to the follow-up of already operational wind farms, the reference conditions in new concession areas were also described, both for invertebrates and for fish communities. Based on these data, the effects of newly built wind farms on these communities will be evaluated in the future.

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Study of side effects of electric fishing for shrimp delivers reassuring results

The pulses (miniscule electric stimulations) used in the shrimp fisheries cause no deformities in fish eggs and larvae. The eggs and larvae develop normally and in ILVO experiments there is only very small amount of extra losses measured in the young life stages.

With regard to 'electric fishing', society remains quite cautious. Stories about an alleged biological impact on certain marine species are also circulating. An ILVO-UGent doctoral study therefore looked for confirmation/denial of possible negative side effects using a wide range of experiments.

Apart from the effects on the first stages of life of fish, doctoral student Marieke Desender also investigated whether the pulses can influence the predatory behavior of skate and shark species using their typical electrosensitive organ. "The tested dogfish appeared to be totally unaffected by the pulses during their foraging behavior."

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The North Sea is warmer and more acidic than in the 1970's

Scientists have managed not only to save old analog datasets about the Belgian part of the North Sea, but also to combine them with more recent measurement results. That has brought several interesting insights to light. What became clear: a decrease in the concentrations of nutrients in the sea, an increase in the seawater temperature, a shift in the composition of the phytoplankton in the sea with clear growth in toxic species, and since 1985, the seawater has also become more acidic.

The 4DEMON Project, carried out by scientists associated with RBINS, UGent, VLIZ, ILVO and ULiège, ran from 2013 to 2018. The goal was to make those older datasets as well as the new ones more accessible. According to the scientists, making this old measurement data usable was a truly tough job, but thanks to the 4DEMON project, Belgium now has a unique series of data from the early '70s to the present about the acidity, the presence of marine nutrients, the concentrations of heavy metals and other pollutants, and the water temperature.

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NEW

Protecting by-catch in mixed fisheries?

Now that the European landing obligation is in force, the question arises how best to protect by-catch species in mixed fisheries. The New EU project PROBYFISH examines which management measures can help to answer this question.

The results of the project should form a framework in which it is possible to evaluate whether proposals for regional fisheries management are in accordance with the objectives of the Common Fisheries Policy. In other words, the researchers examine whether the planned measures actually permit the sustainable exploitation and protection of all fish stocks, including those of by-catch species.

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Guidelines, restrictions and measures for fishing at a glance: the online platform GEOVIS

Where will we still be able to fish in the future? Which fishing grounds are being lost through the urbanization of the North Sea? And what are we doing to protect the sole spawning grounds? These questions are at the heart of the GEOVIS project, where a platform is being created to give the sector insight into the increasing spatial organization of marine activities at sea.

This geographic platform offers the possibility to group useful information into one medium and will include several modules. First is mapping the Natura 2000 areas and the possible spatial restrictions for fishing. The economic importance of Belgian fishing grounds in and around these marine protected areas is also determined. A special focus is given to mapping of spawning grounds of sole and the efforts the sector is doing to protect them. Additional content of the maps and further elaboration will be done in close consultation with policymakers and the sector, and will be organized through the project's steering committee and knowledge committee.

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NEW

Predicting and improving survival of discards

What species of fish have a reasonable chance of survival after discarding and under what circumstances? Through modeling, ILVO wants to make an initial assessment of the chances of survival of different species of fish. Based on data from the models, it can then be decided whether to explore a possible exception to the European landing obligation.

ILVO has performed more traditional survival research on plaice. This method is very time-consuming and labor-intensive and is thus expensive. However, submission of the scientific justification for requesting an exemption measure is expected soon, and research is urgently needed for different species caught using different fishing techniques in different fishing areas. Therefore, in the project "Modeling Survival", ILVO will develop a Bayesian network model in order to make a first estimation whether some species are a bottleneck or whether they are likely to survive. This will enable an examination of whether they are eligible for the exemption rule and whether more extensive survival research could be useful.

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Reducing by-catches and improving survival: technical innovations combined

To refine and combine existing and new technical innovations in fishing with a view to less by-catch and better survival, that is the goal of the project COMBITUIG. Research and intensive cooperation with the sector should facilitate the introduction of the landing obligation.

This landing obligation is a major challenge for the Belgian fisheries sector, as it is a highly mixed fishery. To better assist the sector, the ILVO and the ship owners are developing and refining technical innovations for fishing gears. These should reduce the catch of choke species and other by-catch the Belgian trawl fisheries, as well as improve survival of discards.

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IN THE SPOTLIGHT

ILVO wins prizes at ICES Annual Science Conference

In late September 2018, ILVO was well represented at the ICES Annual Science Conference in Hamburg, the "high mass" of marine research. With five presentations, two posters, two 'Best Poster' awards and first prize for the 'Science Tools' competition, ILVO research got top scores.

ILVO @ILVOvlaanderen – 26 June 2018
Seaweed was just harvested from a sea-farm on the Belgian coast for the first time. But what does that kind of installation look like? Watch the video about Value@Sea, a project by ILVO, @sioenindustries, @colruytgroup, Lobster Fish NV, @ugent and #Brevisco.

Value@Sea: Near-shore aquaculture of seaweed, mussels and oysters
Value@Sea examines the possibilities of a combined cultivation of different species on one site. Is this an economic and ecological success story?
Youtube.com

Top 10 for fishermen

1. Annual delivery of current scientific basic data on the fish stocks.
2. Participation in and reporting from international working groups, including on the Brexit.
3. Annual contribution to the fleet report, in order to secure fleet capacity and quotas.
4. Determination of the chance of survival after discarding of commercial fish with quotas.
5. Fish sales with a sustainability assessment.
6. Fisheries-technical studies at the service of the fisheries sector.
7. Innovative processing pathways for shrimp.
8. A realistic look at electric pulse fishing.
9. All fisheries regulations on one digital map.
10. Pollution monitoring.

ILVO research performed in Ostend is almost as diverse as the Belgian fishing sector itself. The common denominator is that the fisheries sector depends on it. In a sea that will be used more intensively in the 21st century, this type of research is needed to safeguard a place for our fishermen.

From Ship Owners Newsletter, November 2018

IN THE SPOTLIGHT

Flanders Research Institute for Agriculture, Fisheries and Food
21 September 2018
The first hanging-culture mussels from Project North Sea Aquaculture have been harvested and tasted! North Sea Aquaculture is a research project consisting of two consortia of research institutes and companies. Ten partners, together with UGent and ILVO, have since 2017 been investigating the possibilities for innovative breeding techniques for shellfish and seaweed, efficient use of space in the Belgian North Sea and the development of a market for new marine regional products.
https://kanaalz.knack.be/.../windmo.../video-normal-1199439.html

Flanders Research Institute for Agriculture, Fisheries and Food
14 December 2018
The ILVO research on fisheries and marine ecology flows internationally through @International Council for the Exploration of the Sea. From now on, all Belgian researchers in ICES form a network called Biceps, together with VLIZ, UGent, KU Leuven, Institute of Nature and Forest-INBO, Museum of Natural Sciences-Muséum des Sciences naturelles, Université de Liège #ICESBelgium

ILVO @ILVOvlaanderen – 29 jun. 2018
To what extent do plastics appear in the marine environment and do they get into our food from there? To what extent are they also in milk and water, candy, meat and other foods? Chemist Bavo De Witte follows the research #microplastics on http://www.vilt.be/overal-microplastics---bavo-de-witte-expert-chemische-vervuiling-en-microplat ...


La Ratte du Touquet

Profitable Production Systems and Added Value Creation

Seeds for the future

With ILVO's own seed production unit and chain monitoring, ILVO guarantees delivery of high quality basic seed. The past few years have always been excellent, but 2018 surpassed all expectations with an absolute record. Normally we deliver an average of 120 tons, while in 2018 it was 212 tons. No less than 90 tons had to be cleaned immediately from the new harvest in order to meet the demand.

This big demand was not only due to drought, but also to the fact that we offer our products to many companies all over Europe (and other countries across the globe), and especially to the strong placement of our seed on the list of recommended varieties. ILVO now boasts three new excellent varieties of perennial ryegrass on the Dutch variety list that world-class breeding companies are eyeing eagerly. At the end of 2018, the 29th edition of the list of recommended varieties was proposed.

In line with tradition, but certainly not as a given, many varieties have been taken up on the list again: ryegrasses, a turnip and a new double-resistant fodder radish. And after six years of breeding research, we have registered two soy varieties for the first time in Belgium. A new wave of innovation is sure to follow in 2019.

Kristiaan Van Laecke
Unit Head, Plant Sciences Unit

RESEARCH

Veterinarian and animal-based measurement systems

The economic added value of an animal-based measuring system can be increased by including an economic factor already at the technical development stage. Veterinary advice can also make a positive difference. A model of animal health in which a farmer pays for coaching is still difficult in Flanders today, according to PhD research on the role of data and advice (Cristina Rojo Gimeno (ILVO-UGent)).

Two cases were examined using models and a longitudinal field study: the reduction of antibiotic use in pig farming and the use of biomarkers for subclinical rumen acidification in dairy cows. During interviews, the veterinarians and livestock farmers reported on the possibility of, and their willingness to, adapt their traditional business model and actually pay for advice.

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Agroforestry with tree rows favorable for soil quality, beneficial insects and biomass yield

A new study has been published about the quantitative effects of 'alley cropping', a form of agroforestry in which rows of trees are planted in the field so that all operations with ordinary agricultural machinery are still possible. Doctoral researcher Paul Pardon compared fields with mature poplars and walnut trees, plots with younger trees and plots without trees. The beneficial impact on soil quality and on the presence of beneficial insects is significant, as are the higher concentrations of organic soil carbon and nutrients such as total nitrogen, potassium, sodium, magnesium and calcium.

The decline in crop yield near the tree rows has also been mapped. In the 30-meter zone of the mature (tallest) trees, one-quarter fewer potatoes and maize were harvested. When calculating the yields over the years, including the harvested wood, a net higher quantity of biomass is achieved, depending on the specific tree and crop choice.

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Launch of 'Visserij Verduurzaamt' (a sustainability trajectory), a recognition of efforts to increase the sustainability of Belgian commercial fishing

The Flemish fisheries have worked hard over the last few years to become more sustainable and thus launched the 'Visserij Verduurzaamt' campaign on 11 June 2018, in recognition of the Belgian fishing boat owners' efforts to increase fishing sustainability.

Based on 11 indicators, ILVO developed the Valduvis tool to express these sustainability efforts in numbers. Moreover, via Valduvis, short for 'valorization of sustainably caught fish', each vessel can be monitored individually. Ship owners involved in the project commit to work on an improvement program. On the basis of individual scores on the various indicators, and under the scientific guidance of ILVO, ship owners and fishermen find out how they can improve their overall score. This requires additional efforts, but in this way every vessel and the fleet as a whole will become more sustainable. The aim is to increase the minimum score to be attained within three years. The sector will therefore continue to take further steps in the field of sustainability in the future.

An icon on the auction clock in the fish auctions will show whether or not the fish that is sold there comes from a vessel with a sufficient 'Visserij Verduurzaamt' score.

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Belgian endive barometer gives insight into company figures of chicory growers

The National Experimental Garden for Belgian Endive, Inagro's Belgian endive department, Boerenbond Consult and ILVO have joined to set up the 'Belgian endive barometer' as a tool to support growers in strategic and operational decisions and managing their economic returns. Together with the Belgian endive producers and other well-known consultants in the sector, the researchers and advisors of these centers analyzed financial-economic figures and designed a financial-economic barometer for Belgian endive cultivation. The tool consists of a diagnostic tool (Endife 1.0), a decision tool (Endife 2.0), and an investment tool (Endife 3.0). These are available online and can be used to evaluate and adjust the profitability of these farms.

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Route Planner for Dairy Cattle

Growth is a challenge for land-poor intensive dairy farms. To obtain sufficient forage, they have to look for alternatives, such as seasonal field leasing, more efficient forage production or purchase, or obtaining by-products. Which choice is the best? What is the effect of a change in the proportion of grass or maize in the ration? Or is it an option to outsource young stock-rearing?

To help dairy farmers in their decision-making process, Inagro, Hooibeekhoeve, Boerenbond and ILVO developed the tool 'Route Planner for Dairy Cattle'. With this calculation tool, different scenarios can be worked out in order to achieve economic profitability. The simulations through the tool can open up new ways of thinking and can form the basis for a sophisticated future strategy.

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NEW

The 'Consumer Reports' of pig sperm

After a year of data collection on a number of closed pig farms with commercial sires, ILVO has finished a computer tool that functions as a kind of Consumer Reports for boar sperm. Pig farmers can freely consult the tool. They discover quickly and interactively which possible sires score well on characteristics that are most important to their farm. This generates more transparency, independence and quality when choosing a sire.

On https://testwerking.ilvo.be, the performance of the offspring of different boars from different KI-centers can be compared based on a number of stall and piglet parameters. Daily growth, feed conversion and carcass quality parameters can also be consulted. The system is unique in Europe. Boerenbond, ABS, IVB and FEBEV support the research behind the testing tool.

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A new concept chicken:
Marketing of an alternative broiler concept resulting from a bottom-up approach

In the beginning of 2018 the demonstration project 'A new concept chicken' started. Inagro, ILVO, UGent, the Experimental Poultry Center and the 'Landsbond' demonstrate how an alternative broiler concept resulting from a bottom-up approach can be brought to market in Flanders. This new broiler is not as an alternative to the existing Flemish standard chicken nor an organic chicken, but it aims to be a broadening of the Flemish market to include a type of broiler that is now often imported from abroad. Prior research showed that the consumer is prepared to pay an additional fee for a broiler whose production has attention to animal welfare, the environment and taste. Flanders can also grow such a chicken locally. Throughout the project aspects such as management, animal health, chain development, business economics and marketing will be evaluated as well.

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NEW

Resilience in agriculture: ILVO and KULeuven are Flemish partners in large 2020 project

'When working to strengthen the resilience in agriculture, betting on the stability of the farm is not enough. The concepts of flexibility and transition also deserve attention.' This is the starting point of the 16 research centers in 11 European countries involved in the Horizon 2020-research project SURE-Farm (in full "Towards Sustainable and Resilient EU FARMING Systems"). The resilience of the agricultural sector is an important objective of the Common Agricultural Policy (CAP). The challenges are only increasing in recent years.

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Research and service platform for intestinal health in pigs

The research project BIGDARM is the start of a new Belgian multidisciplinary platform for research into intestinal health in pigs. The aim is to study more closely the deeper mechanisms in function of the performance and health of pigs. Both the ILVO research and the services provided to companies can be given a new dimension in this way. The intestinal microbiome is a central actor in many issues of agricultural and nutritional research, but especially in antibiotic use and resistance.

The platform bundles a multidisciplinary pool of knowledge in collaboration with Gembloux Agro-Bio Tech, consisting of (digestive) physiology, immunology, metagenomics of the intestinal microbiome, (animal and bacterial) metabolomics and animal epigenetics, combined with the classic animal performance characteristics. The platform focuses in a pilot project on the questions:

1. How does the diet of a mother animal (with a reduced crude protein content) affect the intestine and the performance of the piglets in the longer term (up to slaughter age)? What role does the intestinal microbiome play in this?
2. To what extent does a mismatch occur when piglets are given a diet rich in proteins at a later age? What role does the intestinal microbiome play in this?

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Toward healthier hops

Which types of fungi of the *Verticillium* group occur in hop plants and in the soils on which they grow, and are they mild or lethal to the plants? And how can we detect the fungi and avoid contamination? These are the main questions within VERTIHOP, a two-year project by ILVO and Inagro.
Researchers will find out which *Verticillium* species are in hops in Belgium and in case of *V. nonalfalfae,* whether this is an innocuous or lethal form. In addition, researchers also aim to determine how the disease enters a field of hop and how to quickly detect latent presence, both in the plant and in the soil of potential new fields.

This research can provide a solid basis for hop policy, in particular for formulating recommendations for phytosanitary measures. In addition, ILVO and Inagro aim to offer a screening test for planting material and soil that can be used directly by the government and growers.

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IN THE SPOTLIGHT

200 m² extra space for innovation in Flemish agri-foodindustry

On top of the existing 1,800 m2 pilot plant, the Food Pilot in Melle added another 200 m2 of flexible demo space in November 2018. The equipment park was also expanded, among others with new emulsifying technology. The Food Pilot was officially opened seven years ago by ILVO and Flanders' FOOD as a pilot factory and analysis center for the Flemish agri-food industry. Companies large and small can find advice and guidance tailored to their innovation trajectory, a wide range of lab analyses and pilot tests on semi-industrial equipment.

Manager of the Food Pilot, Kathleen Coudijzer (ILVO): *"With the extra emulsifying techniques (a high shear vacuum mixer, a colloid-mill and a M4E emulgation machine), almost all preparation techniques for emulsions such as sauces, dairy and meat products are now available at the pilot plant.*

Organic soy burgers: A new chain with fairly-shared risk

A farmer, a worker and a retailer are working together as pioneers, together with ILVO and Inagro, to produce organic Belgian soy for human nutrition. In October 2018, at ILVO, at Inagro and at farmer S. Colembie from Kruishoutem (now Kruisem), locally grown organic soy was harvested. Johan Van Waes (ILVO): "The soy plants have done particularly well during this hot, dry summer. The accompanying research revolved around variety choice, sowing and harvest time and the effect of nitrogen-oxidizing bacteria."

The Bruges producer *'La vie est belle'* is now processing 2.5 tons of soybeans into soy burgers and two types of soy-based spreads. The Colruyt Group is the engine behind this new chain. They have committed to make the story feasible for all the players, and to put the products on the shelves of Bio-Planet in the first half of 2019.

ILVO @ILVOvlaanderen – Oct. 17 2018
Local Organic #soja on route to new food chain in Flanders, with @colruytgroup and @LVEBveggie. ILVO and @InagroBeitem support cultivation with research. Excellent harvest results on own organic test fields: 3 ton/ha! Read the press release: https://bit.ly/2OvLuSP

IN THE SPOTLIGHT

ILVO exhibits FOOD and AGROTECHNICAL INNOVATIONS at the SUPERNOVA Technology Festival

During the Supernova Technology Festival we served 6000 cups of healthy juices, transformed the smallest participants into junior lab technicians and brought the tractor of the future into the city.

12th EU-VCU Seminar Ghent, Belgium

From 26 to 28 June, the variety research group of ILVO, together with the colleagues of CRA-W Gembloux, organized the annual EU-VCU Seminar with participants from 17 European countries. Sharing knowledge around variety research and future challenges defined the agenda.

ILVO List of Recommended Varieties, 2018

The ILVO Variety Catalogue is now completely digital and can be consulted via https://www.ilvo.vlaanderen.be/rassenlijst/. Per crop, the website gives the most relevant cultivation information, the variety list and the list of growers and representatives. For the 2018 edition, ten new silage maize varieties and five new grain maize varieties were added.

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Flanders Research Institute for Agriculture, Fisheries and Food
20 February 2018
Which new azalea crossings are allowed to go through to the market and which are not? On 19 Feb, Home actor and KOTKanker Ambassador Bart van Aevermaet, agricultural ambassador and Miss Farmer Mieke Verniest, and ILVO colleague Bake-Off Flanders TV presence Annemie Van Exter formed the 'Citizen Jury' for the azalea breeding. The professional jury of real growers found their advice very enlightening. Everything was recorded for the TV series ' tour provincial' of Plattelandstv


APV
AN SPX BRAND
ILVO
FOOD PILOT

The triangle of the agri-food chain, environment and health

There is an increasing societal demand for knowledge about the environmental and health impact of agriculture. At ILVO, this is reflected in an intensification of some of our existing research lines and in new research themes.

The following topics are becoming more prominent in 2018 on the ILVO research agenda: the relationship between livestock and health, new protein sources, emissions, LCA analyses, the ecological footprint of food products, the research on antibiotics in the environment (surface water, manure, ...), the fundamental processes of intestinal health and the start of an exploration using minipigs as a model for human digestion.

Governmental authorities are requesting more data about the problems of residue and resistance. For example, there was the question of the activity level of drug residues and genes with antibiotic resistance that via the feces of a farm animal, end up in fertilizer and on agricultural soil. A doctoral study on this has been completed, and a federally-funded project (AMRESMAN) has been launched, in which the risk of transfer to edible crops is being studied. In another study, commissioned by the Flemish Agency for the Environment (VMM), ILVO has investigated residues and resistance in surface water and groundwater.

In the scientific literature study on livestock farming and its potential health effects for local residents, ILVO revealed several knowledge gaps regarding the problem of particulate matter (PM). Such as: How high are the total PM concentrations, primary and secondary, in the immediate vicinity of the farms, and what is the possible synergistic effect with ammonia or with other agents? The livestock-health literature study has also produced fascinating debates with environmental NGOs and with a Dutch research group.

Lieve Herman
Unit Head, Technology and Food Science Unit

RESEARCH

Ensuring food safety

Within the analytical techniques for food safety and quality in 2018, ILVO presents a series of technological investments and new know-how. ILVO has invested in multi-residue tests, rapid tests for validation with more than 100 components in a single run, optimization of detection methods for allergens and GMOs, and on next generation sequencing in the context of microbiological food safety.

This answers a real demand from the market.

- For allergen detection, the food companies regularly ask for a lateral flow test. The default Food Pilot test is such a dipstick test. For example, if the extruders are used to make several test products in succession, the researchers must be sure that no residual traces are left between batches.
- The first line-screening for GMOs has been optimized. With analysis of a limited number of markers, a shorter lead time can be guaranteed. Based on a company's specific request, ILVO can choose the right service and analyses and apply them in a flexible way.
- For screening of veterinary medicines in food products, ILVO is now a 'teacher-supervisor' for other screening labs worldwide. Since ILVO has been recognized by the French control organism AFNOR, specialized validation assignments now come to ILVO.

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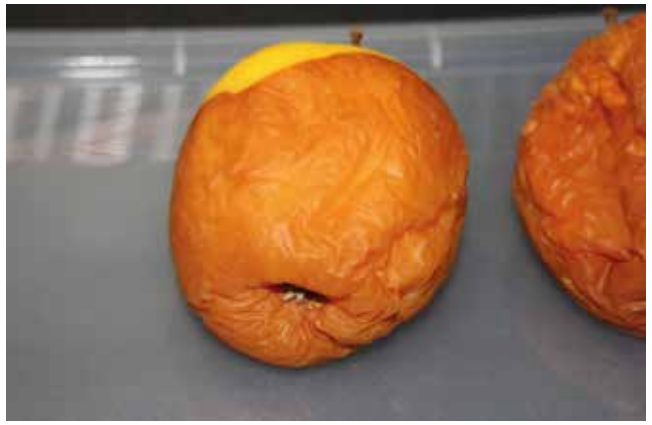

One rotten apple... The fungus *Penicillium expansum* and the mycotoxin patulin in apples and derived products

Addition of vitamin C to cloudy apple juice increases the breakdown of the mycotoxin patulin, according to results of a newly completed project of ILVO and the French INRA.

Patulin, a toxic substance produced by fungi in apples and apple products, can endanger food safety. The research focused on the influence of external factors on the growth of the patulin-producing fungus *Penicillium expansum* and on the production of patulin. Further, the stability of patulin during processing and preservation of cloudy apple juice with or without addition of vitamin C was examined.

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Detecting spoilage enzymes in raw milk

The PROMILK project is a first step towards the development of a quick and simple method for detecting heat-resistant spoilage enzymes in raw milk. In refrigerated raw milk, prior to the processing process, *Pseudomonas* bacteria can develop that produce enzymes with negative effects on taste and stability of UHT products.

PROMILK delivered a simple procedure for sample preparation that can be applied on-farm. For detection, methodology via HRMS (high resolution mass spectrometry) was not sufficiently sensitive in naturally contaminated samples. Instead, a targeted LC-MS/MS method was developed but that method is not feasible for use on a dairy farm. In a sister project, MiMip, researchers are working to develop a Membrane Interface Probe or MIP-based method.

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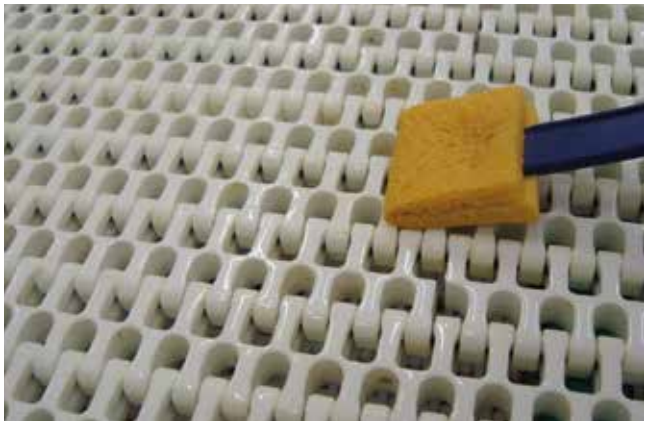

New biofilm research tools: sources of contamination can now be detected and tackled more quickly

Unwanted bacteria present in biofilms can be suppressed over time by placing harmless biofilm formers next to them. This is one of the innovative ideas generated by the ILVO-KU Leuven doctoral research of Sharon Maes. Biofilms are a dreaded source of contamination in, among others, food companies and animal housing: in the installations, water pipes and equipment, even after and despite thorough cleaning, 'layers' can form. These are groups of bacteria that stubbornly attach to the surface, forming a slime matrix. Over time, the growing bacteria can come loose again and thus spread their spoilage or pathogenic effects to animals, food products and ultimately to humans.

Sharon Maes has also successfully developed a chemical-microbial sampling method to control hygiene. The chemical side detects the possible matrix components, while the microbial analysis tells which species, including any unwanted bacteria, are present in the biofilm.

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Honey research worldwide

In 2018, a consumer organization in Hong Kong, comparable to Consumer Reports, requested the ILVO Honey Lab to perform an extensive blind test of the quality and authenticity of honey.

The publication by the organization of the test results, including the determination of fraudulous honey, false labeling and antibiotic residues caused quite a stir in Hong Kong in the media and with the consumer.

Closer to home, certain wax honeycombs used in the hive caused the death of the bee brood. In that particular wax, fraudulent addition of stearic acid, a vegetable or animal fat was confirmed. Research at ILVO showed the negative effects of fraudulent addition of stearin on the survival of bee larvae.

In Europe, the EU Fraud Committee has now explicitly referred to the beeswax case and the expertise of ILVO in the field of authenticity research.

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NEW

Hybrid cold cuts: meat products with vegetable proteins

Ecologically sustainable meat products with a balanced, healthy protein profile – that is the goal of the international project MEATHYBRID. Vegetable proteins from pea, sunflower seeds and pumpkin seeds are screened for protein profile, solubility and mixability. The processing potential, taste and stability of meat/plant mixtures are also examined. The project should provide an answer to the questions:

1. What is the optimal composition of hybrid meats to obtain high consumer acceptance as well as a nutritionally optimal amino acid composition,
2. How should they be processed in order to obtain chemically and physically stable and high quality end products,
3. How possible unwanted flavors in these products can be minimized and
4. To what extent hybrid products can be a sustainable alternative to common meat products.

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Increased biosafety on broiler farms to reduce Campylobacter

Using simple biosecurity measures, the introduction of the *Campylobacter* bacteria in broiler litters can be reduced - that is the purpose of CAMPREVENT. An efficient but feasible (increased) biosafety protocol is drawn up for this purpose. In addition, the difference between the microbiota of *Campylobacter* free and *Campylobacter*-colonized broilers will be investigated. Research and measures should ultimately lead to a reduction in the number of human infections.

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Chic Cichorium: A new market for surplus biomass of Belgian endive, radicchio and endive

In the production and processing of the leafy vegetables Belgian endive, radicchio and endive and the industrial processing of chicory for the production of inulin, large organic surplus biomass are generated. Within the new project CichOpt, European partners wish to upgrade that biomass to food and beverage ingredients, as well as cosmetics and biomaterials.

Through breeding, selection and production, the project can offer new opportunities to producers of chicory, endive and radicchio. For example, the effects of climate change can be anticipated, and producers can diversify in terms of the number of varieties with different properties. Moreover, the waste streams that are now lost can be converted into products that generate additional revenue.

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FACCEJPI

IN THE SPOTLIGHT

Food Pilot Development pathways: Case by case

- Citrique Belge started way back in 1919 as a spin-off of KU Leuven with the purification of citric acid from molasses. In the meantime they sell pure citric acid in food and pharmaceutical companies worldwide. The company wishes to process its waste streams more and more into interesting high-quality co-products, with niche applications.
- R&D Director Lieve Lamberts: *"We are quickly moving from repetitive to innovative work. Our collaboration with the Food Pilot is indispensable, and not only because of their specific drying and extraction expertise."*
- The KarmaKarma oatmeal cups with dried fruit and nuts are an invention of entrepreneur Griet Da Mans. Her question was, what shelf life she could guarantee on the label? Based on specialist literature studies and challenge tests, ingredient per ingredient, the Food Pilot found the answer.
- Empro Europe processes animal by-products (such as chicken carcasses and feathers) into high-quality protein-rich semi-manufactured products suitable for pet food and aqua-feed. Ceder Alloo: *"Thanks to the tests at the Food Pilot in Melle and the expert advice about the available processing techniques (spray dryer, extrusion, fat extraction), we have been able to develop new products more quickly."*

Tailor-made advice for on-farm food processors

In light of the new KRATOS regulations (since March 2017) regarding the processing of primary agricultural products into food, 25 requests for advice have already been submitted and implemented. These applications came from on-farm processors who needed help developing a new recipe, improving a processing process, processing organic waste streams, etc. This guidance is provided by the Food Pilot. The applications range from pilot tests for the development of new products or optimization of existing production processes to analyses or calculations for labeling of existing products in terms of nutritional value, allergens or shelf life.

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Flanders Research Institute for Agriculture, Fisheries and Food has shared a video. September 21 2018

Authenticity is an important research area for ILVO. In the dairy lab they examine whether lactose free milk is actually lactose free and whether buffalo mozzarella really is made from buffalo milk.

Plattelandstv
September 20 2018 ·
Boerenstebuiten:
Authenticity is an important research area for ILVO. In the dairy lab they examine whether lactose free milk is actually lactose free...

Rural Development In Urbanized Flanders

Open space: From solution models to pilot projects

With the introduction of the idea of a Flemish "ban on concrete" and the concerns surrounding climate change, the theme of preserving open space was burning hot again this year. Within our research group we are continuing efforts to feed the societal debate with scientifically substantiated figures and facts. In addition, we are also looking for solution models. This year we have explored a number of foreign models and studied how we can translate them into a Flemish context. One example is the concept of agriculture or farm parks. They can be found across Europe in the outskirts of big cities, yet none appear in Flanders. In other work, ILVO examined what the French SAFER model for the purchase and sale of agricultural land could mean for Flanders.

Besides this conceptual work, we also stand with both feet rooted in agricultural practice. This year saw the completion of the five-year "pilot projects for a productive landscape". In various places in Flanders, innovation partnerships have emerged and agriculture and open space are being addressed in new ways. At ILVO, not only the quantity of open space is not only important, but also its quality. Together with a number of farmers in West Flanders, ILVO worked actively on issues of water quality. For the province of East Flanders, we made an inventory of the various forms of reuse of farm buildings, with the aim of creating higher-quality reconversions.

New in 2018 was that ILVO researched focused more intensively on the welfare of the farm families themselves. How are the farmers doing, not just the farms? We started with a large-scale survey of farmers and their families. Naturally ILVO continues to focus on exploring and studying alternative earning models. Examples are the study of opportunities for "saline farming" and short-chain marketing.

Elke Rogge
Scientific Director, Rural Development

RESEARCH

Farmers successfully work in groups to increase sustainability

The participation of farmers in a sustainability initiative can be driven by both voluntary motivation and the feeling of external or self-imposed pressure. From motivation theory, researchers know that the chances for a qualitative and persistent learning process increase with voluntary motivation, where people stand behind their decisions and experience freedom of choice. *"My research shows that you can influence farmers' motivation in collective sustainability initiatives by adding certain elements and characteristics to a sustainability initiative,"* says Laure Triste (ILVO-UGent) in her PhD. *"If you can simultaneously promote autonomy, competence and true interconnectedness, you have a high chance for success."*

In the cases studied, the balance between business-oriented and group activities also appears to be important. In addition, flexibility and organic growth must be provided. Imposing a plan or copying a successful initiative is thus not a good idea.

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Hedgerows, grass strips and extensive grassland management: mapping different functions

For the first time, an overview of the impact of hedgerows, grass strips or nature-oriented grassland management has been numerically assessed from a multifunctional perspective. The overall effect on crop yield, biodiversity as well as various regulatory ecosystem services has been quantified in the ILVO-UGent-VITO Doctorate of Laura Van Vooren.

Some effects are surprisingly strong. *"From this overall picture we can aim for win-wins between different objectives based on a stronger scientific basis. Trade-offs, such as too much yield loss in exchange for too little biodiversity gain, will be easier to avoid when using this kind of multifunctional methodology."*

The researchers involved have the ambition to translate the many results from this PhD and other related work into a calculation tool. This would allow a farmer, advisor or land manager to quantify the cost-benefit of greening measures and to make smarter decisions.

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Policy regarding urban ag: Ghent, Philadelphia and Warsaw

Initiatives for urban agriculture have a greater chance of success if there is structural support by the city or the municipality, and if there is a balance between the pursuit of economic feasibility and the enhancement of social equality in the city. Those are the conclusions of ILVO-UGent researcher Charlotte Prové after a comparative study on urban agriculture in Ghent, Philadelphia and Warsaw.

The model of food councils, which are common in the USA but new to Europe, can boost urban agriculture, but only if there is enthusiastic participation and a well-considered vision that suits the possibilities of the city in question.

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Five years of Pilot Projects for Productive Landscapes (PPPL): Alliances between agriculture, landscape and design

A productive landscape with sustainable food production requires investments in blue climate services, transformation advice for farmers, food directors who are given time and space to actively engage in open space and food projects, a framework for the re-use of agrarian buildings and also the use of urban space as productive space. Those are the conclusions presented in a manifesto after five years of Pilot Projects for Productive Landscapes.

In this process, ILVO, the Flemish Government Architect, Flanders Department of the Environment and the Flanders Department of Agriculture and Fisheries were looking for inspiring examples of innovative agriculture with added value for landscape and society.

The goal? Keep open space open, and give the farmer new perspectives as an important manager of the landscape. Five current spatial challenges were central: reuse of farms, water, jumping levels of scale, closing cycles and urban agricultural parks.

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IN THE SPOTLIGHT

The strengthening of functional agro-biodiversity in rural areas is the responsibility of many actors. In the citizen science project BEL-Landscape, we have partnered with 80 civilian-scientists from Melle, Merelbeke and the rural area to study how we can effectively improve biodiversity.

ILVO @ILVOvlaanderen – 10 Jan. 2018
Adopt a square-meter vegetable garden for science. Only in the observation area Lemberge-Gontrode-Lands-Gijsenzele. @KrisVerheyen @FbwUGent @ILVOvlaanderen Candidates for this Citizen Science project around BIODIVERSITY can sign up via http://www.BEL-landschap.be

Flanders Research Institute for Agriculture, Fisheries and Food
October 16 2018
Our current agricultural model is under pressure: we know less and less where our food comes from and under what conditions it was produced. Producer and consumer have lost sight of each other. Alternative food initiatives restore the connection between food and society, but will this be the agricultural model of the future? Marline Koopmans, in her UGent ILVO doctoral study, has examined what stimulates – and hinders – these initatives.

"Open space" as research theme is on the political agenda

In Flanders we lose about six hectares of open space per day. This is usually done at the expense of agricultural areas. We must call a halt to further loss of our open space. (...) There is a growing interest in food production from closer by. (...) And a growing interest in understanding the production process of our food. That is a challenge, but it also offers opportunities to make agriculture more visible in all its operational forms for the city dweller.

(Minister Joke Schauvlieghe, June 29, 2018, opening of the "rural areas weekend".)

NEW

Experimenting with agro-ecology

Flemish, Walloon and French researchers unite in the project TRANSAE. This project supports a group of pioneer farmers in their transition to agro-ecology. Knowledge and experience from experiments and analyses will be used to strengthen the management of the participating farmers as well as to reach a broader group of interested farmers.

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Unhealthy stress and the well-being of Flemish farmers is subject of research

ILVO has started a sensitive study about the well-being of agricultural families. The aim is to determine the extent to which there is long-term stress, what causes it and how it is handled. There is evidence that, compared to other occupational categories, farmers are more at risk from excessive mental pressure. Complaints in this sector remain under the radar for quite a long time, according to previous research. The sector organizations ABS, Boerenond, KVLV-Agra, VABS, Groene Kring and a number of mental health centers all heartily support the ILVO research initiative.

The researchers launched a call to the individual farmers/experts based on experience and their family members to participate in a (confidential) one-on-one conversation and/or a group conversation.

Lies Messely (ILVO): *"The intention is to map out the problem of stress in Flemish agriculture based on first-hand testimonials. We hope to be able to leverage this into well-substantiated, viable recommendations that will help improve resilience and a sense of well-being."*

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Water-Land-Scape:
Fourteen initiatives are taking shape

Teaming up to solve problems with water in rural areas is the intended purpose of Water-Land-Scape. The program team, including ILVO, selected 14 projects out of 40 submissions for further development as a land development project.

The selected initiatives will form the basis of a landscaping project, with a total budget of five million euros. The local coalitions of the selected initiatives are now working together with the program team to work out their proposal in concrete terms and to prepare for implementation. The Water-Land-Scape program runs until 2028.

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ILVO

In the service of chain road map, food waste and common sense

They speak to the imagination of the bio-economists: dandelions as a source of locally-produced rubber, marigolds to produce non-synthetic paints and disinfectant ointments, and plume grasses for bioplastics. These crops are indeed promising local cycles, but they are sometimes difficult to get started. As Flanders Research Institute for Agriculture, Fisheries and Food, it is also logical that special attention is paid to the valuable (re)allocation of surplus biomass. In the bio-economy this is definitely a question of large volumes.

In the Flemish agro-food chain, from harvest to consumption, an estimated 3,485,000 tons of food waste streams are generated on an annual basis. Compared to total production, food loss in the food industry is 'only' 1.5%, in agriculture 'only' 4%. Households are responsible for 5.9% food waste compared to their total food consumption. (Report: Flemish Chain Platform on Food Waste 2017)

In this chapter you will read about several promising pathways to help halt food waste. ILVO strives for cost efficiency and high nutritional added value. The Chain Road Map for Food Waste, a Flemish public/private cooperation, is holding us to the the goal to reduce food waste by 15% by 2020 compared to the figure from 2015. We are working hard to make this a reality.

Marc De Loose
Scientific Director, Technology & Food Science Unit

RESEARCH

ILVO harvests rubber-producing dandelion: a win-win for agriculture and industry?

Will Europe soon produce a high-quality rubber from the root of the rubber-producing dandelion? This is realistic, also in Flanders. Researchers at ILVO have succeeded in successfully scaling up the cultivation of the rubber-producing dandelion and, in cooperation with industry, to take steps towards the development of a local rubber production chain.

On Friday 30 November 2018, ILVO harvested a test field of two hectares in De Pinte of these special rubber-producing dandelions, with Flemish Minister of Agriculture Joke Schauvlieghe and the Dutch breeding company KeyGene in attendance.

Today, Europe is heavily dependent on imports of natural rubber from Asia. By 2040 Europe would like to fill 20% of the domestic demand itself. A looming shortage and volatile prices on the world market are feeding that ambition. Minister of Agriculture Joke Schauvlieghe: "In Flemish agriculture, there is interest in alternative crops with large sales potential. This dandelion can become a win-win."

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Cauliflower rice: Optimization in the frozen food industry

Cauliflower processing for in the frozen food industry generates large residual flows of leaves, florets, stalk and heart. Research within the project SUSKOOL, in collaboration with ILVO and the Food Pilot, showed that the cauliflower heart and flower buds were the two most relevant residual flows that can be collected in an efficient way. The research also showed that when using the heart and buds, the use of the cauliflower biomass could be improved by about 25%. This can, for example, be through "cauliflower rice", a product originating from a collaboration between farmers who were involved in the development process from the outset, product quality researchers (ILVO), equipment builders and processors to examine the flow of the product through the production line, packaging designers, and salespeople for retail and food service.

The 'SUSKOOL project' is the result of the unique collaboration between the cauliflower growers Tryvan and Flanders Green Farm bvba, equipment manufacturer Baekelandt, Greenyard Frozen, ILVO and Flanders' FOOD.

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New technologies: Less waste, better nutrition

To (re)evaluate innovative and existing technologies with the aim of sustainable, energy-efficient potato and vegetable products, that is the aim of the international project inPROVE.

The consumer wants vegetables and potatoes to be healthy and sustainable, and technology has a lot to offer on this front. For example, researchers are looking for new technological applications to kill bacteria, to valorize residual flows and to reduce energy use. ILVO is involved in research lines around optimized use of the microwave oven, development of an energy-saving toroid can for nutritive canned food products, and the application of supercritical CO_2 extraction when extracting specific components from potato and vegetable by-products.

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First test with Flemish seaweed: interesting taste and texture characteristics

Flemish sugarweed, a local seaweed species, seems to distinguish itself from sugarweed that is grown in other regions and seas. This is demonstrated by a culinary test with the first, as-test-grown seaweed plants from the research project Value@Sea. “The texture is firmer than what we pick for example on our Experimental Sea Farm in Norway. The textile cultivation mats on which the seaweed grows are laid there in sheltered fjords. I am not surprised that exactly the same varieties in the Belgian North Sea produce a more robust end product,” says Bert Groenendaal of the textile group Sioen Industries, partner in Value@Sea.

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IN THE SPOTLIGHT

ILVO @ILVOvlaanderen – Dec 13 2018
"Because the grass stops growing in October and is ideally harvested in March, the stalks dry during the winter months. That makes Miscanthus a more energy-efficient biomass than short-term coppice" says @MuylleHilde

SUSANOVA @SUSANOVA_BE
does Miscanthus also break through in Flanders? Plume grass is biomass for briquettes, bioplastics and even green fuel. (+) https://bit.ly/2QtBYAw

ILVO @ILVOvlaanderen – Oct 29 2018
What will we eat in 2030? Nutritionists are filtering the trends of the future. Insect burgers, seaweed powder, meat from a Petri dish... What seems bizarre or far-off today may be on our plate tomorrow. #Futurefood in 7 trends: https://bit.ly/2OWuCVt @SUSANOVA_BE

Vilt 12.01.2018
Eleven percent of Flemish horticulture gets wasted

In the entire Flemish horticulture sector generates an estimated 283,000 tons of food waste, 79% of which is food loss and 21% residual biomass. This represents 11% of the entire horticulture production. Important reasons for the high tonnage are the large production volume of vegetables and fruit in our country and the direct dependence on climatic circumstances. These were the conclusions from an analysis from ILVO.

NEW

Horti-BlueC starts: towards more sustainable and circular cultivation substrates for horticulture

Together with eight partners from neighboring countries, ILVO tackles an important pain point in the most common (greenhouse) horticulture. In the Interreg-BlueC project, we demonstrate how to upgrade local residual flows into sustainable cultivation substrates with disease-resistant and plant-strengthening effects, together with reducing the use of fertilizers, chemical plant protection products and non-renewable materials such as peat and rockwool. This allows the (greenhouse) horticulture to make serious environmental and climate gains, and to take important steps in closing cycles.

In July 2018, Horti-BlueC was launched. ILVO plays a coordinating role and will focus on the potential of biochar, chitin from shrimp peel info and plant fibers in new mixtures for growing substrates.

The focus of the project is not only to find solutions to these bottlenecks, but also to apply these solutions. Bart Vandecasteele (ILVO), project coordinator: "Horti-BlueC must offer stepping stones toward a successful transition to circular horticulture in practice."

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New vegetable raw materials for the food industry

In the four-year Flanders' Food project CropExplore, ILVO, KU Leuven and UGent are investigating how food companies can work faster with new sources of vegetable biomass, preferably locally-grown.

Classical obstacles to the introduction of sustainable innovations in the agro-food chain include not enough knowledge among farmers about the cultivation of and the market for the crop, and the processor's uncertainties about the potential of the new raw material. They have questions about the taste characteristics and about the nutritional and technical functionalities.

For primary production of new crops as well as how to process them, ILVO has expertise to share.

The first concrete cases that have presented themselves are mustard, quinoa, soy and pumpkin cultivation for seeds. The CropExplore steering committee is comprised of larger ingredient-companies as well as SME's. The project supports them in the ambition to enable a protein transition and to promote local production-to-consumption cycles.

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BioBoost is out of the starting blocks

Nine research partners from Belgium, the Netherlands and the United Kingdom put their heads together to find new applications in the bio-economy for the horticultural sector. In Flanders, ILVO, Inagro and Vives participate. The project, BioBoost, examines how growers can give a higher-value valorization of waste streams than in, for example, just by composting them.

ILVO offers expertise and its network regarding valorization of crop by-products in order to find solutions for surplus product and Class 2 tomatoes, as well as for zucchini, pepper and cucumber. This can be valorization as a processed food product or ingredient. The use of innovative processing technologies offers new possibilities.

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BioBoost
Accelerating biobased horticulture

Interreg
2 Seas Mers Zeeën

Interreg
2 Seas Mers Zeeën
Horti-BlueC

Climate Mitigation and Adaptation

Climate and agriculture/fisheries in the spotlight

This year, ILVO gave interviews on a wide range of subjects: microplastics, spatial planning, agro-ecology, carbon sequestration, methane emission, heat stress, drought resistance breeding, protein crops, climate-robust milk, seaweed, vitamin B12, advancing diseases and pests, the agricultural model of the future... In short, the climate – that is, the role played by the agriculture and fisheries sector and possible solutions in the pipeline - was the starting point.

The Centre of Expertise for Agriculture and Climate (ELK) has seen an important evolution. The most visible difference was to start combining the disciplines and skills of all of the ILVO research units. A good thing, because the challenges surrounding climate are of course very diverse.

In the agricultural and fisheries sector we work with natural, living organisms, which adapt more slowly or with much more difficulty. In 2018, ILVO has not only diagnosed or performed measurements of what is happening. Tangible solutions and advice for climate mitigation and adaptation have also been proposed. The same liter of milk can be produced with one-third less greenhouse gas emissions. Further, the recipes for more climate-responsive open spaces and a more resilient productive (agricultural) landscape were put down on paper. Finally, we understand – phenotypic and genotypically – better than before how a plant deals with drought and heat stress and that leads to more surefire breeding of drought-resistant crops.

Sam De Campeneere
Coordinator, ILVO Center of Expertise
for Agriculture and Climate
Scientific Director, Animal Husbandry

RESEARCH

Methane emissions from the Flemish dairy farms can be reduced by one-third

Today milk in Flanders can be produced in a dramatically more climate-friendly way, if the latest products and strategies generated from scientific research would be rolled out in practice. The ILVO team for Climate & Agriculture has managed to reduce methane emissions per liter of milk by at least one-third over the last four years, during a whole series of tests in the ILVO experimental dairy barn. That is a remarkable and result that sends a hopeful signal.

In recent years, ILVO has been very strongly committed to possible and viable climate measures for the agricultural sector. Methane is the main focus, as it is a greenhouse gas emitted by ruminants (cows, sheep, goats) during digestion for dairy farming. ILVO explored three concepts: changing the composition of the ration, the influence of the methane production by the rumen flora using additives and more climate-friendly farm management. 'In each of these strategies, climate gains have already been achieved. The combination has not yet been tested, but it is certainly realistic and follow-up research is planned,' says Sam De Campeneere, Coordinator ILVO Center of Expertise for Agriculture & Climate.

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SPEI -1 on 24 July 2017 in Flanders.
The threshold value -2 points to a highly unusual drought.

How dry is "dry"?

Since the drought of 2017, ILVO calculates the drought indicators SPEI-1 and SPEI-3 for the drought Working Group of the Coordinating Committee on Integrated Water Policy (CIW Drought). Per day, these indicators describe the difference in precipitation and evapotranspiration of the past month (SPEI-1) or of the past three months. These indicators, in combination with others, are used to estimate the current drought situation per river basin. Based on this information, the drought committee also formulates water-saving regulations.

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Transfood: making the food chain more sustainable

Our current food system, with its wide and varied supply of throughout the year in sufficient quantities at affordable prices, can be called efficient and successful. However, the edge seems to be in sight when looking in terms of production and consumption. ILVO investigated the environmental potential of three possible solutions to make the food system more sustainable:

- Eating differently, meaning with fewer animal products, more local and seasonal products and less food waste
- Increasing eco-efficiency through technological innovations, closing cycles and reducing food losses at the production and distribution level
- Applying agro-ecological principles, implementing multifunctional services and new food systems with minimum land use.

ILVO carried out the study TRANSFOOD on behalf of the Flemish Environmental Group (VMM).

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Transplantation of rumen flora

Different cows produce a different amount of methane, even when they receive the same feed. This may be due to differences in the microbiome in their digestive system. By analogy with the transplant of fecal intestinal flora in humans, the transfer of the rumen microbiome could possibly influence methane production. Therefore, in the context of climate research, ILVO has for the first time performed a trial in which the rumen microbiome was transferred from one cow to another.

"Unfortunately, the methane producers within the total population of micro-organisms present are stable in all cows. Other bacterial species did change after the flora transfer," says ILVO-UGent researcher Thijs De Mulder at the end of his PhD research. The results of this research will influence the direction of methane-reducing research strategies in dairy farming.

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Interreg
North Sea Region
SalFar
European Regional Development Fund
EUROPEAN UNION

SALFAR: Agriculture in a salty environment?

Coastal areas such as the West Flemish polder area are under pressure due to global warming. The rising sea level is leaking more salt water into the groundwater and persistent drought is depleting the supply of fresh water. The risk of salinization at the coast is increasing. In the Interreg Noordzee project SALFAR, ILVO helps to investigate how saline agriculture might be implemented. In Flanders, this project is carried out in collaboration with the Flemish Land Group and with support from the province of West Flanders. These include testing the salt tolerance of different crops. Which crops tolerate brackish water? How do crops taste when they take up more brackish water in their soil? And how far can cattle go when they have to graze 'salty' grass?

SALFAR brings together a multidisciplinary team with climate experts, policymakers, plant specialists, entrepreneurs, food producers, farmers and agricultural researchers. Carl Decaluwé, Governor of West Flanders: "We fully support the knowledge building and practical testing of saline farming in our region. SalFar can help us to build a long-term vision for sustainable and climate-adaptive agriculture."

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NEW

Protein-rich soy and clover crops and how they are prepped for the changing future

Within the Horizon 2020 project EUCLEG, breeding strategies for soy, pea, field bean, red clover and alfalfa are being developed. This is done in cooperation between 37 research institutes and companies of the EU and China. The ultimate goal is to reduce the dependence of Europe and China on protein imports. EUCLEG uses advanced molecular and phenotypic tools to develop varieties suitable for cultivation in various climates, with a high degree of disease and pest resistance, and which simultaneously match the needs of more the food and feed sector, in terms of protein yield and protein composition. In this project ILVO is mainly involved in the research on soy and red clover.

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Flanders and Limburg strengthen innovation power in greenhouse horticulture

Twelve Flemish and Dutch-Limburger companies and knowledge centers, including ILVO, have joined forces to further strengthen greenhouse horticulture. These are innovations around energy consumption, lower CO_2 emissions and efficient use of resources. The consortium has received a European subsidy and is intensively supported by the province of Limburg and the province of Antwerp. The trajectory runs until mid-2021.

Greenhouse horticulture in Flanders and Limburg is among the absolute top in Europe. In order to maintain that position, more cooperation between entrepreneurs and education is needed. This is why the initiators under the project name GLITCH (Greenhouse horticulture innovates through co-creation with low-carbon high-tech) that give practical support to joint and open innovations. The focus is on reducing CO_2 emissions and creating practical high-tech solutions.

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CarbonConnects - Wetter areas and carbon sequestration: soil carbon stocks play an important role in the fight against climate change

The Interreg NWE Project CarbonConnects aims to maintain or increase carbon stocks in peat soils or wet areas while looking for business cases for sustainable wet(land) agriculture.

ILVO helps to investigate the impact of elevated groundwater tables on carbon stocks in the soil and, together with the farmers and stakeholders involved, looks at the extent to which vegetation from these areas can be used on the farm. Examples are utilizing used straw bedding or use of biomass in farm compost to increase the carbon content of nearby fields. It also examines whether there are market opportunities for products from wet agriculture or through carbon credit systems.

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NEW

Irrigation project helps the farmer make choices in irrigation

Helping farmers irrigate more efficiently so that the available water is deployed as optimally as possible, that is the goal of "Irrigation 2.0". The water needs of various crops and the supply of alternative water sources will be visualized in a user-friendly and freely accessible online platform.

The project partners want to help growers to irrigate more efficiently by using remote sensing data, weather forecasts and crop growth models. Potato, spinach and cauliflower fields scattered throughout Flanders will be monitored intensively. In addition, the effect of irrigation with alternative water sources on crop yield and quality is investigated. The existing online platform watchITgrow is extended with extra functionalities so that the irrigation needs and the supply of alternative water sources with the right quality can be linked. The individual farmer will be able to freely consult this Flanders-wide platform so that he/she can determine when and how much should be irrigated on a specific field, and what alternative water sources are available in the area in the event of a water shortage.

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Carbon stocks in the soil

A correct estimation of the amount of carbon in Flemish soils is the goal for ILVO, INBO and UGent within the newly started project C-MON.

By designing a monitoring network and protocols and by providing support for operationalization, objective and statistically substantiated data will be available on the current carbon stock and its evolution in Flemish soils. Because the storage of carbon in the soil can make a major contribution to both climate mitigation and adaptation, correct data is indispensable. In addition, changes in soil carbon sequestration will also have to be reported at European level for LULUCF (Land Use, Land Use Change and Forestry).

Contact: tommy.dhose@ilvo.vlaanderen.be


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Precise and Innovative Technology

'The year of data in agriculture has ended. Long live the years of data in agri-food!'

The Flemish Government – policy makers as well as ILVO researchers – chose 2018 as the year of data in agriculture in order to work at a fast pace on digital developments, policy tools, legal clarity, communication and international collaborations in the research. Twenty-one events are listed at https://lv.vlaanderen.be/nl/voorlichting-info/publications-figures/agricultural_figures/data-de-agriculture. They are just a hint of what has actually been accomplished and what is in the works.

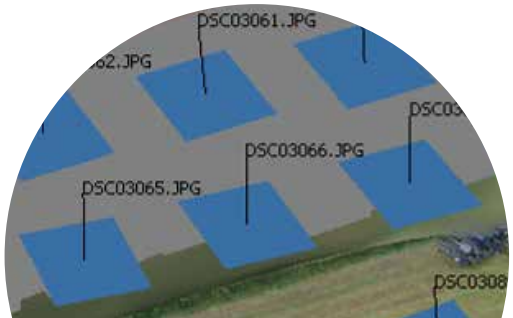
The newly created Living Lab for Precision Agri & Food is fast becoming a knowledge and contact point where startups, farmers, equipment builders and researchers come to convert their ideas into real applications.

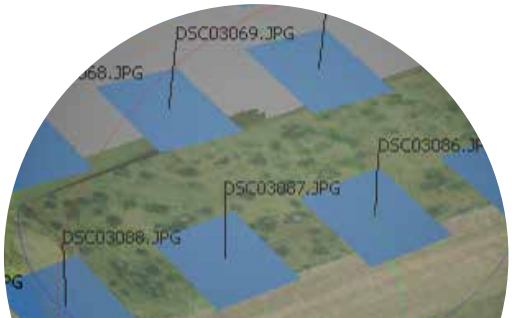
At the IBN 'Smart Digital Farming Network ' (https://www. smartdigitalfarming.be/) the companies are ready to go. This network has a European focus.

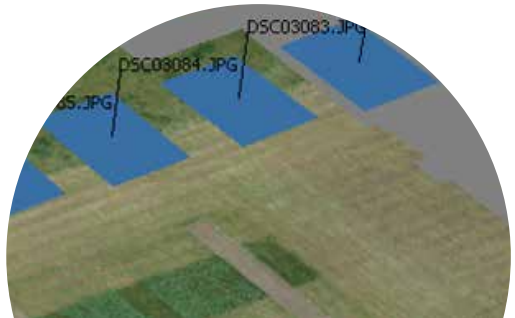
In the IoF2020 project, the use cases begin to deliver their first practical products.

In the Efro project Datahub for Agri-Food, ILVO is working with a number of Flemish partners to build a technical turntable to recognize, share and interpret large volumes of digital data into new knowledge with added value. The data customers get on-ramps to the data-highway, but they are the farmers who, as the owner of the data, will still hold the reins (access to their individual data).

Jürgen Vangeyte
Scientific Director,
Agricultural Engineering Research







RESEARCH

IoF2020-Project: Value creation from data in livestock

ILVO is working on two use cases of the European Research Project: Internet of Food and Farm 2020.

In pig farming, we are working on a clever data processing system that monitors the climate control in the stable, the consumption of water and feed and the growth of the pigs.

IoT technologies are also deployed in the dairy sector which allow a 24/7 registration of the animal's location, both inside and outside, which can contribute to a reliable registration of time spent in the pasture. The second use case is working in this area. The group is fully Flemish, with partners ILVO, Sensolus and Inagro. The use of data can provide a clear economic and time-saving advantage for the farmer.

'Data-driven decision-making is needed more than ever in terms of making agriculture more sustainable', say the involved farmers, researchers and companies.

Contact: jarissa.maselyne@ilvo.vlaanderen.be

Drones help select drought-resistant fodder crops

Drone technology can accelerate the breeding of persistent grassland. This is important, since the productivity of grassland suffers from intense droughts such as those from recent summers.

ILVO has been selecting for drought tolerance in fodder grasses for five years. The first better varieties come on the market within four years, but it will still be 15 years before the really good breeds come on the market.

Thanks to drones, more specifically new technologies that can objectively and automate the scoring of a crop, this process can be sped up. In an extensive experiment on perennial ryegrass (*Lolium perenne*), a scoring system based on drone images was elaborated, tested and refined in an iterative process. The result is a simple, inexpensive and accurate method that allows evaluation of hundreds of test fields in a short time span. The user-friendly set-up opens up perspectives for monitoring, such as for diseases and pests, crop yields and following up on ripening in function of breeding.

Contact: jonas.aper@ilvo.vlaanderen.be

High-tech breeding opens door for the development of compact ornamental shrubs

Compact shrubs for compact gardens, that was the goal of four years of research by ILVO-researcher Hanne Denaeghel. She performed pioneering work with the application of advanced breeding techniques for woody plants.

Her study focused on two rather unknown and largely unbred shrubs: *Escallonia* and *Sarcococca* (sweet box). Through techniques such as interspecific hybridization, polyploïdisatie and co-cultivation with rhizogene Agrobacterium strains, this researcher created new, interesting variations for the development of visually attractive and/or healthier plants.

The new variants will be evaluated, in cooperation with the growers of BestSelect, for their value as a cultivar or breeding material. The successful application of the advanced breeding techniques also opens up perspectives for further breeding in other woody ornamental plants.

Contact: katrijn.vanlaere@ilvo.vlaanderen.be

Rose genome: Understanding flower- and flowering characteristics

Barely a month after a first team of researchers unraveled the genome of the rose and linked genes to fragrance and color variation, a second team of scientists managed to do the same for thorn density and important flower and flowering characteristics. Now that the new reference genome is publicly available, the breeding of new rose cultivars will speed up.

ILVO was involved in this research and has a breeding program in garden roses.

Over more than 50 years we have brought some 80 cultivars on the market. For years we have been conducting research in support of breeding. In particular, disease resistance is important. The publication of this reference genome will also be used to identify disease resistance genes.

Contact: leen.leus@ilvo.vlaanderen.be

ILVO discovers unique fruit trees in Ghent

The City of Ghent has very old apple and pear trees in two historic parks. First, the Ghent biologists of the green service themselves made an educated guess based on visible characteristics.

For five apple and 30 pear trees, the question remained: which variety is it anyway, and is there a good reason to protect and maintain certain trees through vegetative propagation?

ILVO was instructed to solve the mystery. That worked for a number of question marks, but not for all of them. The technique used is called DNA fingerprinting. One Ghent apple tree turned out to be very special, as it was never described before in the Belgian DNA libraries for apple trees. A number of pear trees also seem to be quite rare.

Contact: sabine.vanglabeke@ilvo.vlaanderen.be

IN THE SPOTLIGHT

5 june 2018 - ILVO researcher Peter Rakers gives explanations on Smart Digital Farming during the Agro Food 4.0 event

Contact: peter.rakers@ilvo.vlaanderen.be
https://bit.ly/2Cg6cxN

ILVO @ILVOvlaanderen – Aug 13 2018
Read the ILVO opinion on CRISPr: Do you want to produce more vegetable food, for more diverse & health needs, with less ext. inputs, less landb space, in more extreme weather… Then you should give the breeders the all the tools.
https://bit.ly/2MJI2A2

Het is jammer om crispr in de plantenveredeling zo onbetaalbaar streng te reglementeren, vinden onderzoekers van ILVO.

JORIS RELAES, LIEVE HERMAN, KRISTIAAN VAN LAECKE, ISABEL ROLDÁN-RUIZ, JOHAN VAN HUYLENBROECK & MARC DE LOOSE

Onderzoekers van het Vlaamse Instituut voor Landbouw-, Visserij- en Voedingsonderzoek (ILVO).

"Heel jammer!" Dat was de afgelopen dagen een herhaalde reactie uit de onderzoeks- en landbouwwereld, op het arrest van het Europees Hof van Justitie over crispr of 'gene editing'. Plantenrassen ontwikkeld met een crispr-gewijzigde voorouder en alle ermee geproduceerde voeding en voeder vallen voortaan onder de bestaande loodzware en peperdure EU-procedure voor ggo-registratie.

Wij zijn als ILVO, het Vlaamse Instituut voor Landbouw-, Visserij- en Voedingsonderzoek, sterk betrokken. ILVO veredelt immers een aantal landbouwgewassen. Ziekteresistentie, droogteresistentie, klimaatrobuustheid, niet-allergeniciteit, verteerbaarheid, smaak, opbrengst, groeikracht, nutriëntengebruik ... zijn allemaal kenmerken die we met kennis van de genetica van het gewas en met een arsenaal aan veredelingstechnieken doelgericht proberen in te bouwen. Veredelen (bepaalde kenmerken in volgende generaties verbeteren) is altijd mikken op precieze, gewenste veranderingen in het DNA, en tegelijk de vele reeds aanwezige goede eigenschappen van de ouderlijnen behouden. De hand van de veredelaar is overigens lang zíet de enige bron van wijzigingen. DNA is nóét statisch. In elk levend wezen gebeuren er voortdurend 'mutaties'.

Wat gebeurt er nu crispr het ggo-statuut heeft?

Veredelen is altijd mikken op precieze, gewenste veranderingen in het DNA

1. Niet dat alle veredeling stilvalt of onmogelijk wordt. 'Gene editing' is één tool in onze gereedschapskist. Voor de meeste doelstellingen zijn er alternatieve wegen. Alleen zijn die minder precies en trefzeker en vergen ze meer tijd. Het is

IN THE SPOTLIGHT

ILVO-Demonstration Milk Taxis

Published on 8 October 2018

Meet four different milk taxis, seen on the ILVO "Stable Workers" demo day in September 2018. Demos of Milk mixer JFC, Holm & Laue Milk Taxi 4.0, Urban Milkshuttle and DeLaval CMM 200.

Internet of Things in agriculture: Flemings at stakeholder meeting in Almeria (Spain)

At ILVO's invitation, representatives from the Flemish agri-food sectors on 1 March 2018, traveled to the European stakeholder meeting of the European Horizon 2020-Innovation Project IoF2020. They responded positively to the stories and questions they heard there. IoF stands for Internet of Food and Farm.

More than 70 partners from 14 European countries collaborate in this project on innovative systems for smarter data mining and use of agricultural data to increase the sustainability and efficiency of the sectors. In these applications of big data, it is intended that multiple links in the chain experience a clear ecological, economic, social or societal added value.

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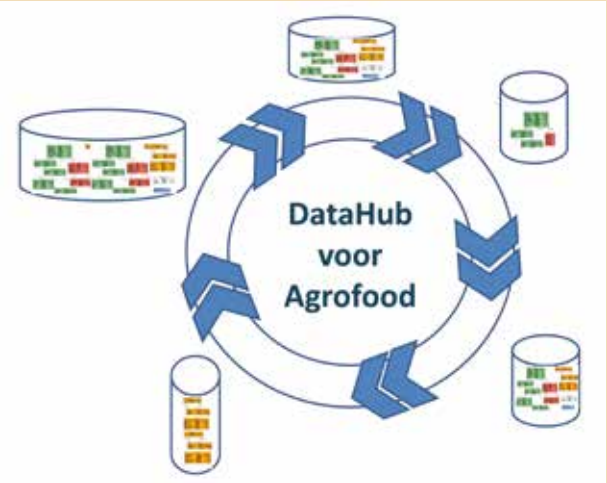
NEW

'DataHub for Agri-Food' starts with an eye for transparency, data privacy & -ownership. Farmer gets central role

ILVO will develop a 'DataHub for Agri-Food ' in the next three years, together with the Innovative Companies network for Smart Digital Farming (SDF) and with six farms and agricultural organisations (AVEVE, Boer Bond, CRV, DGZ, Innovation Support, Milcobel). The Hub makes it possible to exchange and connect data. The project pays a lot of attention to safety, respect for data privacy and preservation of data-ownership. ERDF (European Regional Development Fund) gives almost half a million euros in aid. The starting shot was given on April 3, 2018.

Contact: stephanie.vanweyenberg@ilvo.vlaanderen.be



Healthy apples, grapes and carrots

More than 15 European partners, including ILVO, will be working on the Horizon 2020 project OPTIMA to develop environmentally friendly, sustainable plant protection strategies and application equipment for three typical European crop types: orchards, vineyards and organic agriculture.

Three sample crops are used: apples, grapes and carrots. The project focuses on: (1) optimizing forecasting models around relevant plant diseases and developing advanced early disease detection methods, (2) Evaluating and screening biological and synthetic plant protection products and assessing the resistance mechanisms of plants and pathogens for successful disease control, (3) improving and developing innovative precision spraying technologies, (4) combining, testing and evaluating the proposed IPM elements (Integrated Pest Management) under field conditions and (5) mapping of health, environmental and socio-economic impacts, as well as the risks of the proposed IPM systems.

The role of ILVO in the OPTIMA consortium is to develop and improve smart sprayers together with a Spanish and Italian equipment manufacturer so that they can lift precision agriculture to an even higher level.

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www.optima-h2020.eu

NEW

Spray drone tested on Flemish test field

Are there possibilities in Flanders to apply plant protection products through a spray drone?

In different places in the world they are already deployed, but they are not yet allowed in Belgium. In 2018, the first tests in Flanders have been carried out. The researchers want to find out if it makes sense to also spray crops using drones. This is possible for local treatment in a field with an emerging pest or for difficult to reach places.

Contact: koen.mertens@ilvo.vlaanderen.be

Innovative spraying techniques for plant protection products

Making innovative spraying techniques known to farmers and announcing farmers' needs to product developers, that is the purpose of the newly launched Project INNOSETA. Through an online database, surveys, local workshops and international events, the gap is being closed between technology developers and their end users.

The project encourages the exchange of ideas and information between industry, universities, research centers and the agricultural sector to ensure that innovative spraying technologies are making their way into daily practice.

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www.innoseta.eu

IN THE SPOTLIGHT

On the road to a new balance between agriculture and climate

ILVO organized a well-attended seminar on Agriculture and Climate. The ILVO-Expertise Centre for Agriculture and Climate (ILVO-ELK) also launched a website on climate-smart agriculture and climate Research, where all knowledge and ongoing research projects are bundled. There is a lot of potential to make our agriculture more climate-friendly and climate-proof in the short term.

Contact: veerle.vanlinden@ilvo.vlaanderen.be

In the "About Food" TV program, Sam De Campeneere talks about methane emissions from dairy cattle

Climate-Adaption: Towards a climate-proof spatial design

Agricultural land is the key to a climate-resistant Flanders. To buffer climate impacts, the current spatial policy is based on nature. But in spatially fragmented Flanders, the agricultural lands – which cover half of the surface – will have to be used in a smart way when developing climate-proof spaces.

Jeroen De Wagemaker, ILVO climate expert, during a lecture in WTC Brussels on 23 May 2018

IN THE SPOTLIGHT

Flanders Research Institute for Agriculture, Fisheries and Food
21 September 2018
"The extreme drought conditions of the past year resulted in an increased interest in agroforestry. "The annual leaf fall and root growth gradually increase the soil organic carbon content. This will benefit soil fertility and the water holding capacity", says researcher Bert Reubens."
http://www.vilt.be/aanvragen-van-subsidie-boslandbouw-kan-tot-21-september

Green grass in Merelbeke

This was treated in detail during "The World Today" on Radio 1.

Zo wordt gras resistent gemaakt tegen grote droogte zoals nu

De aanhoudende droogte treft ook de veesector, omdat het gras waarmee het vee deze winter moet worden gevoederd helemaal uitdroogt. Aan het Instituut voor Landbouw- en Visserijonderzoek (ILVO) wordt intussen gras ontwikkeld dat resistent is tegen lange droogteperiodes.

"We zijn daar nu toch al ruim 10 jaar mee bezig", zegt Greet Ruttens van het ILVO in "De wereld vandaag" op Radio 1. "Veredelen is een trage bezigheid, maar sinds vorig jaar staan onze eerste droogteresistente grassen op de Europese rassenlijst." Concreet wil dat zeggen dat ze aangeboden worden aan de markt.

7 well-filled icons on the ELK website

The Expertise Centre for Agriculture and Climate (ELK) reveals ongoing and past research and the scientific insights on climate mitigation and adaptation at https://www.ilvo.vlaanderen.be/expertisecentrumlandbouwenklimaat/NL/Onderzoek/Klimaatslimmelandbouw/
Each of the following chapters will be further developed in the course of 2018 and the following years:

- Climate-smart agriculture
- Soil
- Livestock production
- Energy
- Landscape
- Marine environment
- Plant production

Management 2018

Resources and Organization

From Research Vision to Systems Thinking and Living Labs

Sustainable Development Goals @ ILVO

Human Resources

Communication

Facility Management

Environment and Welfare - Safety First

Management

Resources and Organization

Administratively, ILVO is still made up of the two entities that reinforce each other in a remarkable way: the IVA 'ILVO-VO' (the Internal Independent Agency of the Flemish Government without corporate personality) and 'ILVO-EV' (the ILVO Own Capital fund). These legally separate entities each have a separate budget, a workforce and governing bodies. Where the ILVO-VO financial resources come mostly via the basic grant, the Own Capital ILVO-EV acquires flexible means through competitive research at home and abroad, research for companies, and paid service provision.

In the first years of ILVO the ratio of VO and EV was approximately equal. For the last four years, the EV/VO balance sheet shifted to approximately 2/3-1/3. Again in 2018, the basic subsidy to ILVO represents 36% of ILVO's total operational budget.

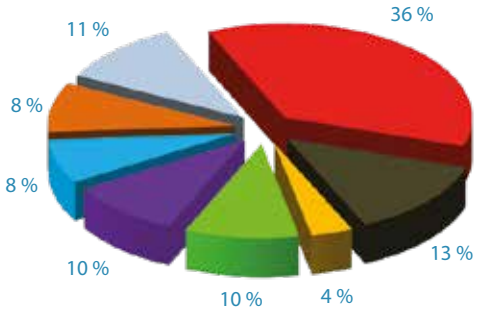
23 new European Research projects awarded

Like a good wine year, 2018 was a European year for ILVO. No fewer than 23 new European research Projects (Horizon 2020, INTERREG, LIFE, EFSA, etc.) were launched, including four consortiums under our leadership (DISARM, Horti-BlueC, ValgOrize and Geans). This momentum is infectious. At the date of publication of this annual report, no fewer than 45 new European project proposals are being prepared. With a success rate above 50%, ILVO scores well above the European average, which is only 12%. The result is due in part to the researchers and the strategy of building a strong EU department. IT provides advice and supports coordination.

The 23 new projects represent a total of 7.5 million euros in net income. These amounts are not yet reflected in the pie chart on this page. The projects only become visible in the balance sheet after payments start.

Basic grant Policy Area L&V	36 %
→ *Structural financing*	36 %
Grant L&V	13 %
Flemish Government	4 %
VLAIO	10 %
Federal Government	10 %
EU	8 %
Private Sector	8 %
Business Unit	11 %
→ *Project-based financing (assignments and competitive research)*	64 %

Distribution of operational resources ILVO 2018



From research vision to systems thinking and living labs

Research vision operationalized

The ILVO Vision document launched in 2017 was given concrete interpretation in 2018. We want to keep our eyes wide open and engage in open dialogue on complex technical or societal problems, with an eye for a participatory, sustainable approach. The ILVO Advisory Commitee - with amended composition following the renewal of the mandates - praised the approach and the roll-out of the ILVO Vision. The implementation of system analyses opens up new perspectives to frame and orient our research even more than before.

An important tool to realize the research vision in practice is to develop "living labs", an accessible, dynamic ecosystem in which agro-food companies, fisheries, policy and sector organizations can meet, inspire and facilitate each other. In 2018, a number of existing living labs were further developed and some new ones were established.

The Food Pilot as living lab: more than on course

Services provided in the Food Pilot always build on a company's wish or concern, such as new process technologies, products, recipes or troubleshooting. In a conversation with our expert food technologists, the question is thoroughly analyzed. Pathways to possible solutions are provided. Next come advisory actions, and possibly pilot tests or nutritional analyses to provide an informed recommendation. In 2018, 155 technology recommendations were provided, 473 pilot tests performed and 22,600 nutritional analyses were done for more than 300 companies.

The number of pilot tests increased in 2018 by 18% to 473. The tests were conducted by 110 different clients, representing 66 companies from the food industry, 36 collective projects with research centers and companies, and 8 farms. There was a large increase in the share of SMEs (from 40% to 56%) and in the number of foreign companies (from 14% to 35%).

Systems thinking in practice

Systems thinking is no longer a theory at ILVO. In 2018, more than 60 researchers were trained and there were at least five major, crucial exercises. The interest of fellow research institutes has been formulated several times. In 2019, ILVO will continue to roll out the trajectory of systems thinking.

In practice, it goes like this, says Fleur Marchand (ILVO): *"You bring together very diverse researchers, from multiple disciplines and backgrounds. You bring a theme or a potential research project to the table. You ask one of the ILVO-trained systems thinkers to guide the conversation. Through targeted questions you search for the essential elements of your theme or project, you zoom in and out, you make links, … You are also looking for the less obvious stakeholders, the social relevance… sparks start to fly. Debates arise. Insights and understanding of different visions start to show up. The blank table-sized paper in the middle becomes a drawing full of arrows, circles, crosses, exclamation marks…*

Almost every day, we feel the added value of bringing people together in such system exercises, both within an existing team and in looser collaborative efforts. It stimulates the process of working together and exchanging ideas in a structured and constructive way. It creates a basis for constructive dreaming and planning while respecting a diversity of perspectives."

Management

Sustainable Development Goals @ ILVO

ILVO also continues to promote the sustainability of its own work and research. To lend even more weight to these ambitions, ILVO stepped into a trajectory with CIFAL Flanders to work intensively on the Sustainable Development Goals of the United Nations (SDGs). In 2018, the first initiatives were launched by ILVO's SDG Task Force: Workshops and meetings were organized that resulted in a number of instruments and focus points that will get worked on in 2019. Just before the end of the year, a broad survey of ideas for all ILVO employees around the further sustainability of the organization and its activities was organized under the heading 'Wishes for ILVO'.

Work-related travel…by bike

The most visible changes are often those that are easiest to realize: A number of extra work-bikes (including electric bikes) were purchased. Roughly 2000 km were biked during work-work relocations that were previously done by car. Charging poles for electric vehicles have been installed and workshops organized around stress and employee health and well-being were organized.

Human Resources

Employee satisfaction survey results

Every two years, the Flemish government surveys its employees and managers. The poll of 2018 yielded a brilliant result for ILVO: an average score of 4.5 out of 5 in terms of overall satisfaction. ILVO management has sincerely expressed its pride in the ILVO employees.

Well-being – stress and burnout prevention

ILVO organized an info session (via Better Minds at Work) for all staff to strengthen personal resilience and prevent excess stress and burnout. With the bestselling "Mental Capital" underpinning the workshop, we learned that strengthening our brains makes us more resistant to the stressful challenges of this time. Since 2018, ILVO also has an internal certified stress and burnout coach.

HR-Event VWI's

On 25 January, "Over Impact!", the 3rd HR event of the Flemish Scientific Institutes, took place. Speakers such as Saskia Van Villamor (Ericsson Benelux), Elke Geran (Better Minds at Work) and Jesse Segers (Antwerp Management School) inspired guided tours and leadership. Together with their presentations, participants also got the perspective of a top manager, a psychologist and others.

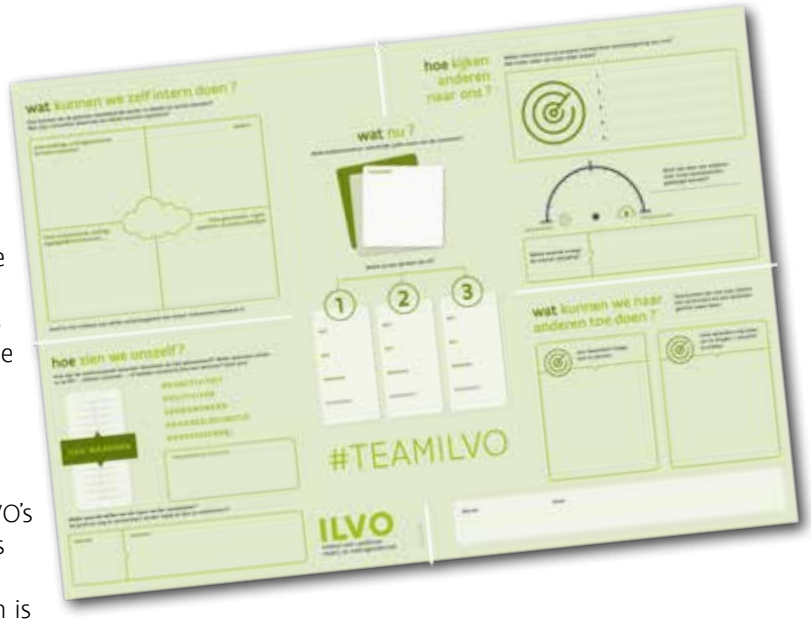
Culture and values

The five ILVO values (Positive, Proactive, Professional, Collaborative and Exemplary) are the cornerstones of our culture of open dialogue. Sometimes we need to chat about the "how" of our work. As a structured support for such conversations, many teams started in 2018 with a dialogue canvas: #TEAMILVO. This exercise will continue in 2019.

Integrity

As part of a professionalization pathway for ILVO's integrity contact points, the integrity policy was made more explicit and more structured. New there is an overarching "Integrity Hotline", which is also available to external stakeholders.

In addition to the Commission for Scientific Integrity, a Committee on General Integrity has been established.



Personnel figures

Due to budget cuts from the Flemish government, the number of VO staff dropped from 249 to 239. The Own Capital (ILVO EV) staff numbers increased from 342 to 370, partly due to the success of the competitive projects. As a result, the total number of staff members rose above 600.

Number of ILVO employees in 2018

	Employees			FTE		
	FG	OC	total	FG	OC	total
Dec 2016	252	340	592	226.2	322.3	548.5
Dec 2017	249	342	591	221.7	324.1	545.8
Dec 2018	239	370	609	211.8	346.6	558.4

Management

Communication

Eighty-something press releases, sixty spontaneous questions from print and TV journalists, dozens of events, seminars with panel discussions, symposia, debates. ILVO continues to devote a great deal of attention to publicizing its scientific research and services.

A renewed communication plan lists the basic principles of the communication department: the team works according to journalistic code of ethics: truthful, transparent, intelligible and of course non-commercial.

ILVO's own bilingual newsletter now follows a steady bi-monthly periodicity, and of course adheres to the new GDPR rules for subscriptions and mailings.

The living labs at the Food Pilot and for Animal Husbandry also regularly send newsletters to their own stakeholders, with an increasing number of interested followers.

The year of the trade shows

Sometimes at our own stand, sometimes bundling our expertise with others: in 2018 ILVO was an oft-seen exhibitor at agricultural, fisheries and science-oriented fairs and public events. There were several job fairs, Interpom-firsts in Kortrijk, and the brand new fairs PIT in Ghent and Supernova in Antwerp.

Personal contact with stakeholders, potential new employees and the general public were central. ILVO demonstrated its expertise around drought, processing of residual flows, precision farming and much more.

Thanks to stimulating demo material, yummy samples and enthusiastic ILVO employees, trade fair visitors could get to know the research and services of ILVO. The visitors in search of more depth and interaction got their fill during the information and study opportunities that ILVO always tries to provide during such trade shows. During Interpom for example, there was a lunch symposium "Potatoes in Flanders: A knowledge-driven story".

Agriculture Day

During the Agriculture Day on September 16, 2018, ILVO took its visitors into the world of sensors and tractors, test stables and fields, clever soil management, chickens that lay longer, climate-friendly milk, how and why to ensile the stalks of Brussels sprouts, animal welfare, crop protection... The visitors could experience what is possible in our agro-food chain in the near future. While adult visitors listened to the stories of experts, the children could enjoy themselves on the bouncy castle or in the crafts corner.

Facility Management

New pilot hall at the Food Pilot

As part of the FoodInnoTech project, 40% supported by European ERDF grants, the top floor of the Food Pilot building was renovated and redesigned as a multifunctional and flexible pilot equipment hall. The floor and walls were renovated to meet the HACCP standards and technical improvements were done to make it possible to install different equipment in different locations.

Much attention was given to energy efficiency in this rebuilding: the roof was insulated, LED lighting installed, ventilation with heat recuperation, and the steel windows with single-pane glass were replaced by new aluminum frames with sun protection for HR(++) glass and external sun shades. These investments are no luxury in a space where the appliances produce a lot of heat.

In addition, the electrical installation was thoroughly updated, which increases the reliability and workability and allows a direct 400V connection. The system is more economical due to the removal of several transformers the choice of low-energy appliances.

At the Brusselsesteenweg 370 site in Melle, the environmental construction work has also entered its final phase. These extensive works include the decoupling of rain- and wastewater, updating the water purification system, and ensuring all rainwater is infiltrated. The parking lot was renewed with permeable materials and a freight elevator was installed. New plantings and a new, larger bicycle shed will come next.

Replacing asbestos roofs

The asbestos corrugated plates on the ILVO cattle barns are being systematically removed and replaced, with the correct safety measures always kept in mind. In 2018, the asbestos roof was removed from an existing cattle stable and replaced by fiber cement. At the same time, the windows were replaced by space boarding - wooden plating that provides sufficient ventilation for the cattle.

Environment and Employee Health – Safety First

Infrastructure

In 2018, the electrical installations were thoroughly analyzed and updated, with an eye toward personal safety and the continuity of scientific research. The cooperation with three external partners ensures a sound result and will thus be continued.

Risk analysis and training

In 2018, risk analyses were started for the agricultural engineering workshop, the Food Pilot, for activities aboard research vessels and for the ILVO dairy farm. For start-up projects, researchers can now also indicate in the research database whether there are specific risks associated with the implementation of the research activities. These risks can then be addressed proactively.

ILVO also invested in a basic fire extinguisher training with a brief theoretical explanation of fire types and a hands-on training with fire extinguishers.

LUCHTEMISSIE ONDER DE LOEP

Een heleboel ontwikkelingen in de varkenshouderij zorgden ervoor dat in 2013 het BLES-project van start ging: een grootschalig onderzoek naar het beheersen van luchtemissies in stalsystemen. Vandaag is het project afgerond en overlopen we met ILVO-onderzoeker Eva Brusselman de grote lijnen. → Nele Kempeneers

10 Pulskorvisserij: "Kind niet met badwater weggooien"

Nieuw roosgenoom biedt inzicht in diversiteit en belangrijke bloem- en bloeikenmerken

Er is opnieuw een belangrijke stap gezet in het genetisch onderzoek
een maand nádat een eerste team van onderzoekers het genoom van
en genen kon koppelen aan geur- en kleurvariatie, slaagde een tweed
pers erin hetzelfde te doen voor doorodensiteit en belangrijke bloem-

Tweeduizend recreatieve zeevissers landen één procent van alle vis aan

05.01.2018 ILVO faciliteert objectieve evaluatie varkensgenetica

Stedelijk beleid rond stadslandbouw maakt het verschil

Eeuwenoude appelbomen en pereiaars in Gent geven hun geheimen prijs

Appelbomen op de Dijlokasite (stad Gent).

Milieu

Landbouw moet helpen in strijd tegen klimaatwijziging

Onderzoeker Jeroen De Waegemaeker roept op om ruimte vlak in te zetten

EERSTE OPLOSSINGEN VOOR VLEESVE HOUDERIJ IN ZICHT

ILVO lanceert nieuwe dienstverlening rond depositie kunstmestkorrels

Studie naar gezondheidsimpact veehouderij stelt gerust

BOERENBOND

ILVO coördineert onafhankelijke testwerking

STALLUCHT SLIM OMLEIDEN, KA

Hittestress

Voorkom hittestress bij uw kippen!

ILVO-onder ammoniak vleesvee b perspectie

VOEDERGEWASSEN

NIEUWE MAÏSRASSEN OP DE RA

ILVO speelt in op behoeften varkenshouders

Activiteitsmeters kopen of niet?

VIJFSTAPPENPLAN BIJ HET OPZETTEN VAN PROEVEN OP JE BEDRIJF

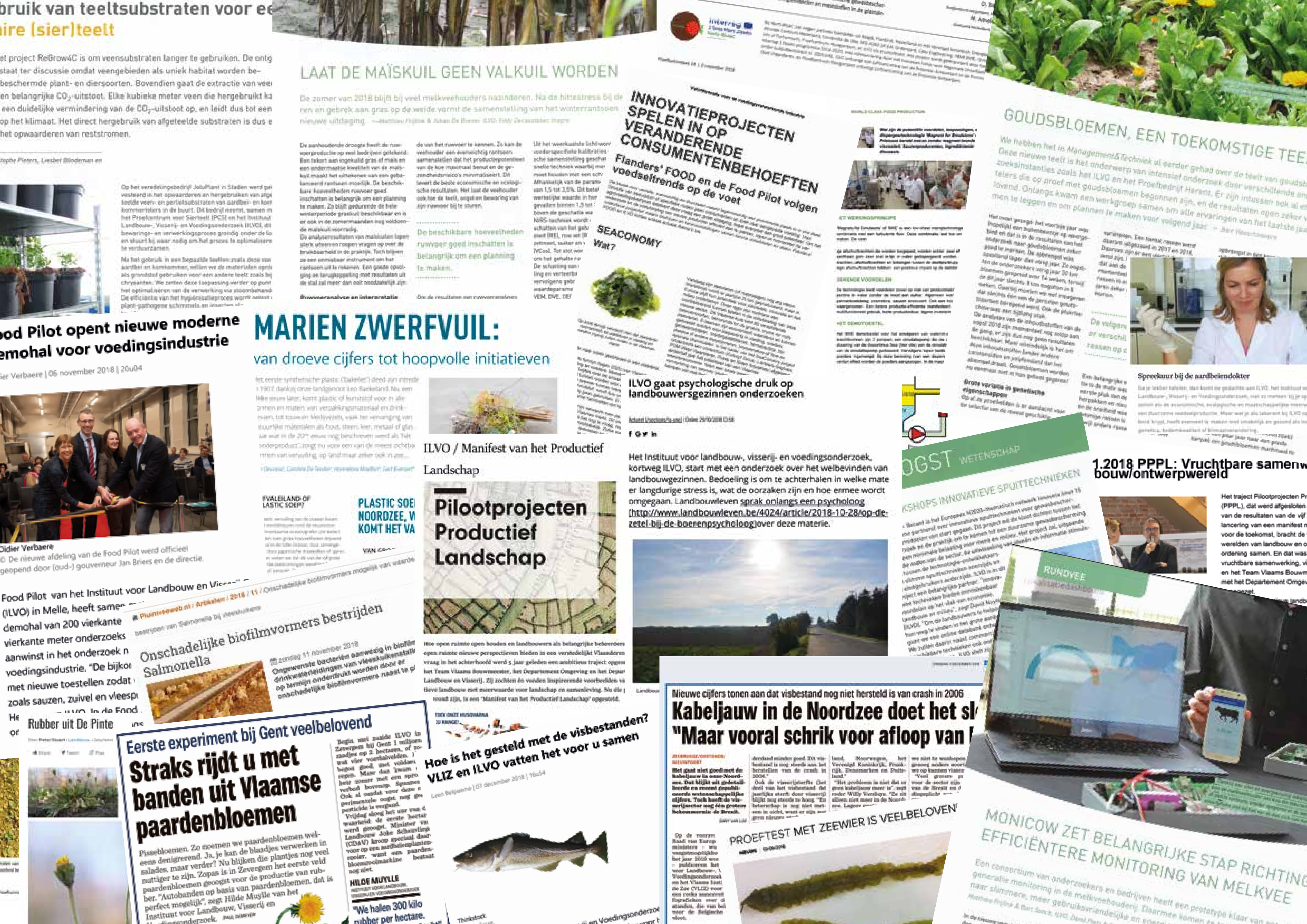
Bodempaspoort nieuwe tool om landbouwpercelen

Wetenschappers vergelijken moestuintjes: waar kweek je de lekkerste aardbeien?

ILVO COÖRDINEERT TESTWERKING VOOR EINDBEREN

JUIST STROOIBEELD VAN MESTSTOF-STROOIERS
DOOR DE OGEN VAN... KOEN WILLEKENS (ILVO)
EROSIE VOORKOMEN AAN DE BRON
BUXUSMOT beheersen? Wat is de beste aanpak? En waar is de informatie?
Energiebesparing EXE-kas veelbelovend
God spelen in grassenveredeling
Vilt
07.05.2018 Impact garnalen-pulsvisserij lijkt beperkt
24.05.2018 UGent en ILVO kunnen fruitvlieg biologisch bestrijden
VEETEELT
ILVO start nieuw VLAIO-onderzoeksproject 'JongLeven'
Van ideaal opgevolgd vaarske... fittere, productievere en effici...
ILVO
rikolto
Studiedag buigt zich over potentieel van soja voor mens en dier
VARKENS
duurzamer te managen
ETEN WE PIÉTRAIN VANDAAG?
Reeks: heden en verleden van de Piétrain
emis
Vlaanderen
Methaanemissie bij runderen: kan een transplantatie van pensflora de emissie verminderen?
Datahub voor agrofood binnenkort van start
Burgerjury beoordeelt voor het eerst ... in de serres van ILVO
Landbouwleven sprak met Alex De Vliegher (ILVO)
"Gras blijft het belangrijkste eiwitgewa... op het bedrijf"
Automatische detectiesystemen voor kreupelheid bij runderen in kaart
'Wat we weggooien krijgen we terug op ons bord'


Binnenkort rozen zonder doornen dankzij Gentse onderzoekers?
Als de dijken breken: redden wormen, mosselen en zeewier onze kust bij 1.000-jarige storm?
Roller crimper nog niet rijp voor biologische groenteteelt
17.12.2018 De Belgische visserij in een oogopslag
SMART FARMING IN DE RUNDVE
En de stadsboer, hij ploegde voort
STADSLANDBOUW ZOEKT PLAATS NAAST KRIMPENDE PLATTELAND
Eerste proefvlucht met spuitdrone
Thema: Bodem en bemesting
Teelt van erwt weinig erosiegevoeli
Stalknechten bij het verstrekken van melk aan de kalveren
Het optimaliseren van melkverstrekking aan kalveren
Machinedemo: stalknechten op het rundveebedrijf
HOU JE GRASMAT EN SPUITLOKAAL GESLOTEN
Crispr is echt geen hocus pocus
Maïs en zijn minions: hoe microscopisch bodemleven landbouwgewassen helpt groeien
GROENTEN
WITLOOFBAROMETER GEEFT BETER INZICHT IN JE BOEKHOUDING
Een steak met lijm? Nee, bedankt
Vergelijkende studie wijst uit
Steun stad of gemeente verhoogt kansen stadslandbouw
SLIMMER BOEREN MET CIJFERS
BINNENLAND
LANDBOUW
Koeien krijgen systeem met tracker om aan te tonen hoe 'groen' hun melk is
Minder op stal, meer in de wei (en dat zal gps moeten bewijzen)
Veredelen is altijd mikken op precieze, gewenste veranderingen in het DNA
susanova


bruik van teeltsubstraten voor ee
ire (sier)teelt
LAAT DE MAÏSKUIL GEEN VALKUIL WORDEN
De zomer van 2018 blijft bij veel melkveehouders nazinderen. Na de hittestress bij de ren en gebrek aan gras op de weide vormt de samenstelling van het winterrantsoen nieuwe uitdaging.
De beschikbare hoeveelheden ruwvoer goed inschatten is belangrijk om een planning te maken.
INNOVATIEPROJECTEN SPELEN IN OP VERANDERENDE CONSUMENTENBEHOEFTEN
Flanders' FOOD en de Food Pilot volgen voedseltrends op de voet
SEACONOMY
Wat?
GOUDSBLOEMEN, EEN TOEKOMSTIGE TEE
Spreekuur bij de aardbeiendokter
ood Pilot opent nieuwe moderne
emohal voor voedingsindustrie
ier Verbaere | 06 november 2018 | 20u04
Didier Verbaere
© De nieuwe afdeling van de Food Pilot werd officieel geopend door (oud-) gouverneur Jan Briers en de directie.
Food Pilot van het Instituut voor Landbouw en Visserij
(ILVO) in Melle, heeft samen
demohal van 200 vierkante
vierkante meter onderzoeks
aanwinst in het onderzoek n
voedingsindustrie. "De bijkor
met nieuwe toestellen zodat
zoals sauzen, zuivel en vleesp
MARIEN ZWERFVUIL:
van droeve cijfers tot hoopvolle initiatieven
PLASTIC SOE
NOORDZEE, V
KOMT HET VA
ILVO / Manifest van het Productief Landschap
Pilootprojecten Productief Landschap
ILVO gaat psychologische druk op landbouwersgezinnen onderzoeken
Het Instituut voor landbouw-, visserij- en voedingsonderzoek, kortweg ILVO, start met een onderzoek over het welbevinden van landbouwgezinnen. Bedoeling is om te achterhalen in welke mate er langdurige stress is, wat de oorzaken zijn en hoe ermee wordt omgegaan. Landbouwleven sprak onlangs een psycholoog (http://www.landbouwleven.be/4024/article/2018-10-28/op-de-zetel-bij-de-boerenpsycholoog)over deze materie.
OGST WETENSCHAP
KSHOPS INNOVATIEVE SPUITTECHNIEKEN
1.2018 PPPL: Vruchtbare samenw
bouw/ontwerpwereld
RUNDVEE
Onschadelijke biofilmvormers bestrijden Salmonella
Rubber uit De Pinte
Eerste experiment bij Gent veelbelovend
Straks rijdt u met banden uit Vlaamse paardenbloemen
HILDE MUYLLE
"We halen 300 kilo rubber per hectare"
Hoe is het gesteld met de visbestanden? VLIZ en ILVO vatten het voor u samen
Nieuwe cijfers tonen aan dat visbestand nog niet hersteld is van crash in 2006
Kabeljauw in de Noordzee doet het sl
"Maar vooral schrik voor afloop van
PROEFTEST MET ZEEWIER IS VEELBELOVEN
MONICOW ZET BELANGRIJKE STAP RICHTING EFFICIËNTERE MONITORING VAN MELKVEE


Living Lab at the Food Pilot
Living Lab for Precision Agri & Food
Food Safety Authenticity & Quality
Agri-Food Technology
Food Processing
Living Lab for Animal Husbandry
Technology and Food Science
Better Crops
Animal Husbandry
Plant Sciences
ILVO
Animal Sciences
Production Guarantee
Fisheries and Aquatic Production
Cropping Systems
Social Sciences
Aquatic Environment and Quality
Living Lab for Agro-ecology and Organic
Rural Development
Farm and Sector Development

Own Capital (OC) Management Council

Members from ILVO

- Joris Relaes,
  Administrator-General, Chair
- Kristiaan Van Laecke, Secretary
  Unit Head
- Bart Sonck,
  Unit Head
- Lieve Herman,
  Unit Head
- Greet Riebbels
  Communication Advisor
- Katrien De Bruyn
  financial Coordinator

Leading representative from the Department of Agriculture and Fisheries, Secretary General:
Patricia De Clercq

Representative of the Flemish Minister of Science and Technology:
Wim Winderickx

Representative of SALV (Strategic Advisory Council for Agriculture and Fisheries):
Georges Van Keerberghen

Representative of financial inspection:
Eric De Prycker, Inspector-General

External guest member of the Department of Agriculture and Fisheries:
Els Mestach, advisor

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