ILVO

Institute for Agricultural and Fisheries Research

Annual Report 2009

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Dear reader,

The staff of ILVO are pleased and more than a little proud to present this annual report for 2009. In this report, we present not only our scientific results but also our efforts to make the agricultural and fisheries sectors more competitive. We do this to ensure sufficient supplies of safe and healthy food while keeping the ecosystem in mind as documented in our vision statement "ILVO2020". We work to accomplish these goals in close communication with policy makers, administration and all our stakeholders. Collaboration with colleagues from universities, university colleges, research centres and other research institutions makes it possible to accomplish these goals in practice.

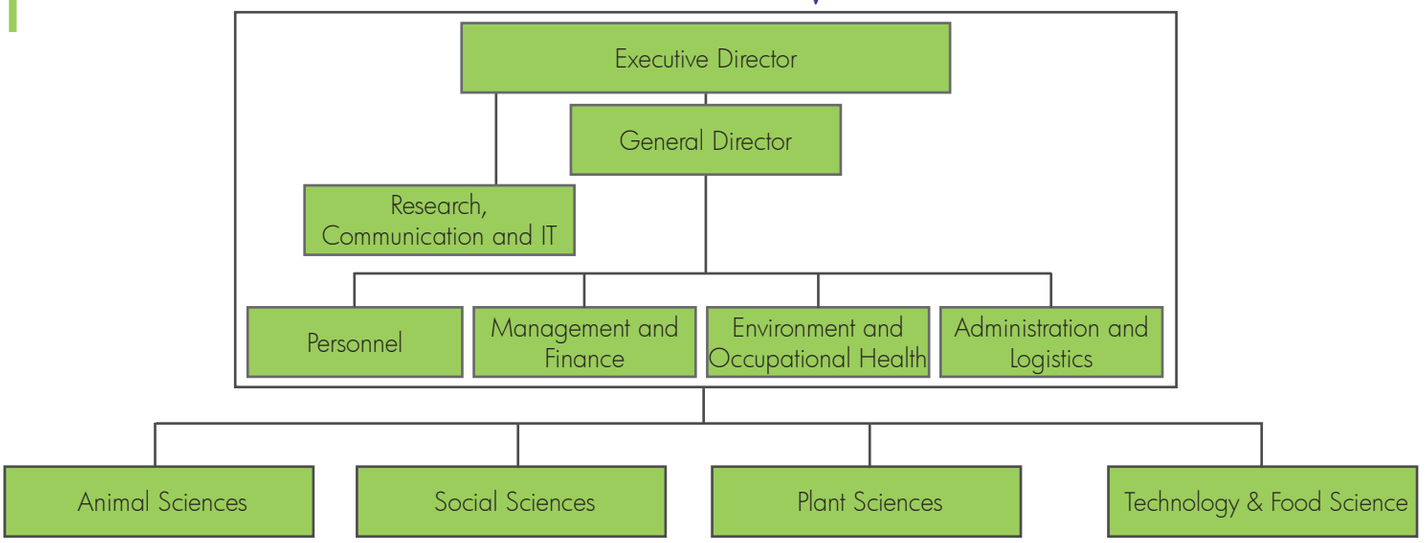
We took great steps in updating our infrastructure this year. The finishing touches are being done on several renovated laboratories, our new experimental glasshouse is under construction, the updating and modernising of the pilot factory continues, and the plans for dairy- and pig housing have already been drawn up.

Our objective and independent scientific output, popularising efforts and technical contributions are all increasing. The added value is greatly appreciated by our clients, policy makers and the sector, both nationally and internationally.

This annual report gives a birds-eye view of our organisation, our scientific activities, policy-supportive and academic research, services and output. It does not describe each and every activity, but rather highlights the drive and passion that ILVO's researchers bring to their everyday work. The selected research results illustrate our efforts to support policy decisions and to make the sector more competitive and more sustainable. ILVO is still young, but it has already gained prominence in agricultural and fisheries research. I am also very pleased with the ongoing effort, support and trust shown by ILVO's staff and the members of the control, management and advice organs. They all deserve my sincere thanks and congratulations for their contribution to our success.

Enjoy your reading,

Erik Van Bockstaele
Executive Director



Functional Animal Nutrition
Animal Husbandry and Animal Health
Fisheries

Integration
Open space
Transition

Growth and Development
Applied Genetics and Breeding
Crop and Environment
Crop Protection

Agricultural Engineering
Food Safety
Product Quality and Innovation

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- Daniël De Brabander, Scientific Director
- Lieve Herman, Head of the Unit
- Cathy Plasman Head of the Unit

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Jules Van Liefferinge, Secretary General

Representative of the Flemish Minister of Science and Technology:
Kathleen D'Hondt

Representative of the Flemish Council for Agriculture and Horticulture:
Georges Van Keerberghen

Representative of financial inspection:
Kurt De Bruyne, Inspector General (until 10/09)
Daniël Ketels, (since 10/09)

Expert from the Agriculture and Fisheries policy area (upon invitation):
Hector Willocx, ALV project leader

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Peter Bossier, Ghent University, Animal Production group
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Veerle Fievez, Ghent University, Animal Production group
Kathy Steppe, Ghent University, Applied Ecology & Environmental Biology group
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Nadine Buys, K.U.Leuven, Biosystems department, Gene Technology section
Kathleen Marchal, K.U.Leuven, Microbial and Molecular Systems department
Chris Michiels, K.U.Leuven, Microbial and Molecular Systems department
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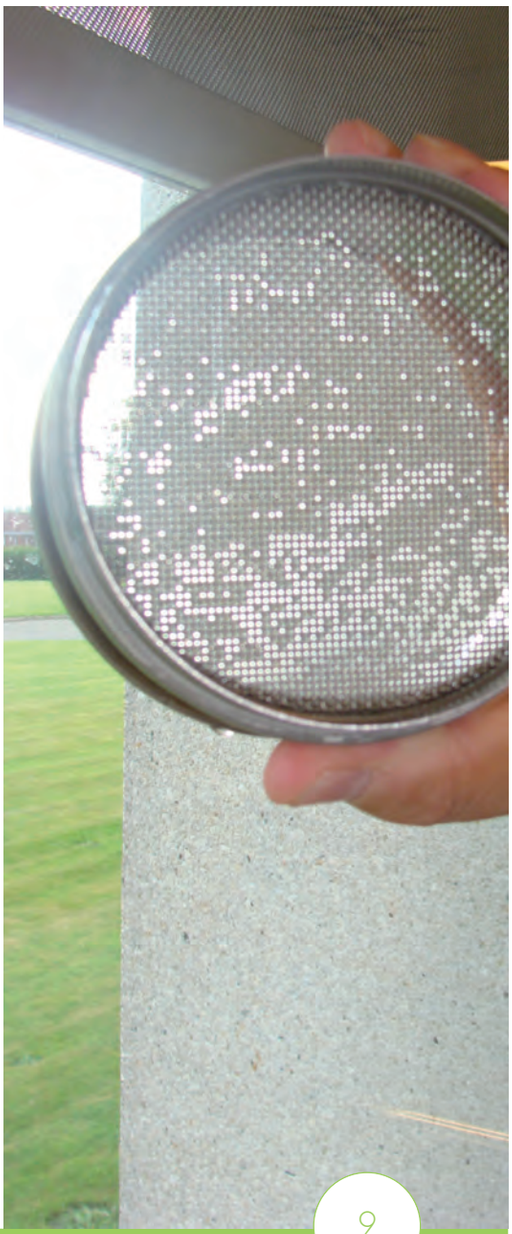


1 Mission and activities

1.1 Management and Administration

ILVO's Mission

ILVO's mission is to perform and coordinate scientific research which supports policy making and to provide related services with an eye toward economically, ecologically and socially sustainable agriculture and fisheries.

Based on scientific discipline, ILVO will build the necessary knowledge for improving products and production methods, for monitoring the quality and safety of end products, and for improving policy instruments as a basis for the development of the sector and rural policy. ILVO will communicate with the authorities, the various sectors and society at regular intervals.

The administration's task is to coordinate and provide support services. This department is responsible for personnel services, management control and accountancy, and occupational health and the environment, plus coordination of research, communication and ICT.

1.2 Social Sciences

Our mission is to present and clarify the social choices concerning sustainable and competitive Flemish agriculture from a scientific basis. This mission is accomplished through three major lines of research:

- farm and sector sustainability, with the integration of economic, ecological and social aspects;
- transition processes, with emphasis on systems innovations;
- use of the scarce open space by agriculture and other stakeholders.

Our research focuses on indicators and assessment tools for sustainability, such as the monitoring tool for integrated farm sustainability (MOTIFS); farm management; economic-ecologic win-win for animal husbandry; sustainable value analysis; tradable permits; farm level risk; knowledge acquisition on qualitative research; systems innovations, with cases in glasshouse horticulture, pig fattening, organic farming, fair trade, regional identity and high quality use of open space, with land value assessment, integration of agricultural buildings and spatial transformations in rural areas.

In 2009, we deepened and broadened a number of sustainability indicators for the farm level: entrepreneurship, standard of living, soil quality, etc. We studied learning processes through using MOTIFS in dairy farmers' discussion groups (Melkveecafé). We finalised the Pigs2Win project, a decision-support tool to improve economic and environmental performance of pig farms. We conducted an explorative study on the volatility of farm income. In addition to our quantitative research, we built a sound knowledge base in qualitative research, e.g., by CoPKO. This was used to study the contribution of multifunctional agriculture to regional competitiveness and identity, among others. Both qualitative and quantitative research were used to analyse the scientific soundness of the land value assessment tool, a decision support tool for planning of agricultural area. The land value assessment tool and Melkveecafé are both fine examples of research requested by policy makers and carried out in cooperation with them.

More information:
www.ilvo.vlaanderen.be/social sciences

1.3 Animal Sciences

The mission of the Animal Sciences Unit is to conduct high-quality research and service provision towards our authorities and the sector. The aims are a sustainable animal husbandry (cattle, pigs and small husbandry), a sustainable exploitation of living marine resources, the protection of the continental as well as the marine environment, the improvement of animal welfare and the provision of high-quality and safe animal products.

Research into nutrition physiology should closely match the supply of nutrients with the animal requirements and simultaneously reduce the excretion of minerals into the environment. Through functional animal nutrition *sensu stricto* we try not only to increase the health value of animal products but also to improve animal health.

Animal husbandry systems are studied in a broad perspective. To make animal production more socially acceptable, methods and strategies to evaluate and improve animal welfare are developed. To cope with the threats evolving from climate change we are looking to measure and reduce methane emission on animal level. In collaboration with the Flemish government and the sector the application of several alternatives for chirurgical castration without anaesthesia are evaluated on farms.

Research in fisheries starts from (1) the close relationship between exploitation, the quality of the aquatic habitat and its living resources (2) the request of a global management plan for the authorities, the fish industry and the society. The core tasks are situated among the ecology and quality of the aquatic habitat and the food chain, the environment, fisheries biology, aquaculture on land as well as in sea, fisheries techniques and product quality and technology. Research is driven from an ecosystem perspective and focuses on important parts of the food chain.

The Animal Sciences Unit provides services and advice through the Reference lab ANIMALAB (a lab for research in animal nutrition and the nutritional value of animal products, the quality of fish and shell-fish, the analysis of pollutants, the fat of fish products and biological environmental research), through several technological advisory services (Preventagri, ADVIS, CIVIS, and others) and through contract trials for the agro-industry.

More information:
www.ilvo.vlaanderen.be/animalsciences

1.4 Plant Sciences

The research activities of the Plant Sciences Unit are grouped into five research areas:

- Applied Genetics and Breeding
- Crop Husbandry and Environment
- Crop Protection
- Growth and Development
- Business Unit and Service Centre

Applied Genetics and Breeding's main research themes are (1) the development of efficient pollination and selection strategies, (2) the creation of cultivars for sustainable agriculture and horticulture, (3) the use of DNA-marker assisted breeding techniques for quantitative and qualitative characteristics and (4) the marker-based analysis of genetic diversity and identity.

Crop Husbandry and Environment performs scientific research on the behaviour of agricultural and horticultural crops under different growth conditions. The aim is to improve the yield and quality in a sustainable way (i.e., with respect for man, animal and environment). Emphasis is placed on (1) crop husbandry research on grasses, fodder crops and ornamentals, (2) evaluation of the value for cultivation and use, distinctness, stability and homogeneity of new varieties, and (3) chemical and physical research on plants and soil.

In Crop Protection, research into acarology, bacteriology, entomology, mycology, and nematology focuses on (1) improved identification of plant pathogens, (2) better knowledge of the plant/pathogen relationship, and (3) development of alternatives to the chemical control of pathogens in various cropping systems.

Growth and Development's mission is to better understand the fundamental processes in the growth and development of plants, and to translate this knowledge into instruments that improve crops. This research focuses on the physiological processes and molecular mechanisms at the basis of growth, development, and the interaction of plants with the biotic and abiotic environment.

The Business Unit is responsible for producing high-quality starting material for the agricultural and horticultural sector. Services related to crop protection are provided by the Flemish Diagnostic Centre for Plants. These services support sustainable plant production in Flanders. Qualitative analysis of forage crops and soil are carried out in the reference laboratory of plant and soil.

Main research topics in 2009

Crop protection

- Quarantine diseases and pests
- The biotic environment in relation to plant growth and plant health
- Methods for diagnosis and detection of plant pathogens
- Control of diseases and pests

Growth and development

- Morphological and molecular characterisation of architectural characteristics in perennial ryegrass and red clover
- Genetic control of reproductive characteristics in crops
- Cell wall composition of grasses
- Development of screening methods for the evaluation of stress tolerance based on physiological processes

Crop husbandry and environment

- Improving the production methods of arable and forage crops
- Sustainable soil management (soil food web, soil diversity, N-efficiency of forage crops, biochar, compost, and others)
- Sustainable agriculture and rural development in a European context
- Damage by geese to agricultural crops

Applied genetics and breeding

- Breeding of agricultural and horticultural crops
- Improving disease and pest resistance and quality aspects in plants
- *In vitro* breeding techniques and interspecific hybridisation
- Development and use of cytometric and cytogenetic techniques
- Development and application of DNA markers and gene expression in plants, e.g. regulation of flowering in azalea

Services in 2009:

- Technological advice on applied biotechnology for the ornamental sector (Sietinet)
- Collection and maintenance of the genetic patrimony of fodder crops, open field vegetables and horticultural crops
- Development of cultivars, production and delivery of starting material
- Genetic characterisation of plant material and plant varieties by means of ploidy analysis and molecular markers
- Characterisation of shape and colour of plant material by means of image analysis
- Diagnostic Centre for Plants (DCP)
- National reference laboratory for plant diseases
- Reference laboratory for quality and composition of plants and soil
- Variety testing; seed testing; descriptive and recommended variety lists

More information:
www.ilvo.vlaanderen.be/plantsciences

1.5 Technology & Food Science

Technology and Food Science's research focuses on the following areas: Product Quality and Innovation, Food Safety, and Agricultural Engineering. Product quality and innovation focuses on product authenticity (including allergens and GMOs), plus improving the quality of functional foods and enhancing them in order to improve the market position of the Flemish producer. The research on food safety aims to improve the microbiological and chemical safety of foods in order to better protect consumers. Central to our research is contamination or contamination sources of residues, pathogens and spoilage organisms. We use several (risk) modelling scenarios in our research. Agricultural Engineering research focuses on innovative and environmentally friendly farming systems. This research covers livestock technology, environmental technology, mechanisation and technology for use during harvesting and post-harvest. We develop and evaluate new and existing technologies and integrate innovative production systems to further sustainable agriculture and horticulture.

More information:
www.ilvo.vlaanderen.be/tandf

Services in 2009

- Accredited laboratory analyses for food authenticity and food safety (including GMO analyses)
- Technological tests on agricultural engineering and for agro-food and feed transformation in the pilot plant
- Spray technology: accredited testing services for sprayers and a spraying technique accredited laboratory
- "Control": Control-approved milk cooling tank and technicians
- Reference working for the Milk Control Centre Flanders (MCC) and in the context of the role of National Reference Laboratories (NRL) for GMOs, for milk and milk products and for water content in chicken meat
- TAD Dairy: new practices and technologies on dairy farms, dairy farm producers, and small- and medium-sized enterprises
- Consultancy services to governments in relation to authenticity (including GMOs), food safety, food quality and Flemish accreditation of food quality schemes

2 Noteworthy accomplishments

2.1 Communication

Within ILVO, regular updates to the intranet keep personnel informed as quickly and accurately as possible. A "Newsflash" informs all employees of relevant information in a timely way. The personnel newsletter, OVLI, is published quarterly.
The communication group meets monthly to discuss and adjust the communication plan as needed.
External communication in 2009 included:

- "Nieuwsgolf" every two months and three theme numbers (Energy, Grassland, and Sustainable Fishery Techniques)
- Organisation of a information day for new employees of the Agriculture and Fisheries policy area
- Assistance with these trade shows: "Werktuigendagen", "Agriflanders" and "Agribex"
- Participation in the "ikhebeenvraag.be" project, an initiative of the Flemish government that answers questions on all scientific subjects.

Customer Satisfaction Survey

We created a customer satisfaction survey together with Significant Gfk and the Agency for Government Personnel. This survey of more than 600 ILVO customers (government agencies, scientific institutes, research centers and others) was conducted in November 2008, with results published in 2009. Some results (see also Figure 1):

- More than 90% of the respondents know that ILVO can be contacted via e-mail (96%), via telephone (95%) or via in-person visits (93%).
- Of the people who were aware of these contact possibilities, eight out of ten actually used them. The frequency of use of telephonic contact (81%) is slightly lower than e-mail (85%) or personal visits (87%).
- Ninety-four percent of respondents were satisfied to very satisfied with their contact person at ILVO, and only 2% were not satisfied.
- The very high satisfaction rate is mostly thanks to the courtesy and professionalism of the ILVO contact person. Ninety-six percent and 94% of respondents were satisfied to very satisfied about courtesy and professionalism, respectively.

This large-scale survey indicates a generally high level of work at ILVO.

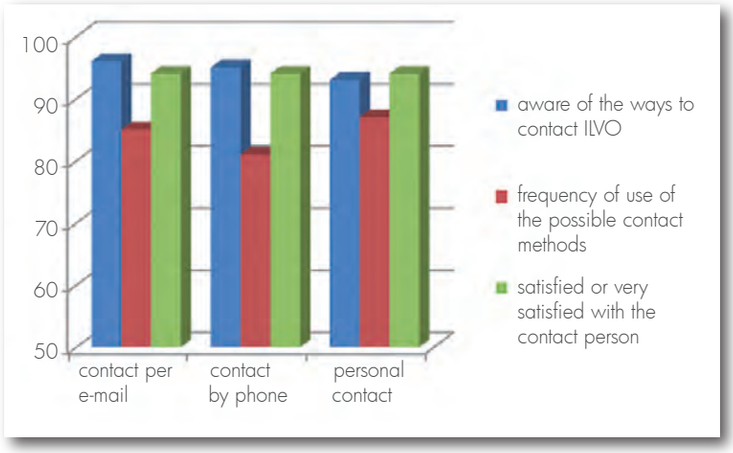


Figure 1: results of customer satisfaction survey ILVO

2.2 ICT

The ICT service supports more than 500 ILVO employees. ICT's six employees manage the computer infrastructure and networks at ILVO's seven locations. In addition, they create customised applications to support ILVO's diverse activities. ICT also takes care of the technical side of the website and intranet in collaboration with the communication group.

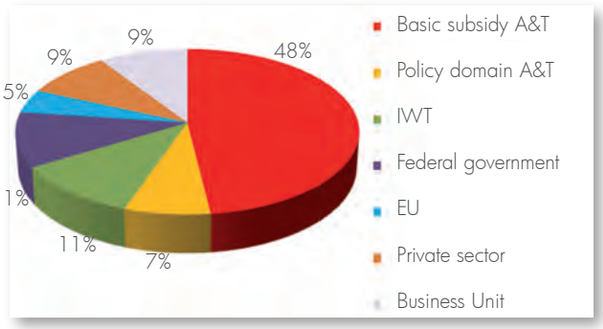
ICT's accomplishments this year:

- Migrated the website and intranet to a content management system (CMS). The website was awarded the Anysurfer label for accessibility for persons with a handicap.
- Set up a support database application for (financial) project management.
- Centralised and automated software and printer installations.
- Added responsibility for telephony at ILVO to ICT's responsibilities.

2.3 Environment and Occupational Health and Safety

Environment and occupational health and safety are always under consideration at ILVO. We ensure a safe, healthy and comfortable workplace by systematically sensitising our colleagues to health and safety issues and providing material support through targeted investments. In collaboration with AFM and consultancy bureaus, we have incorporated sustainable, recycled and recyclable materials into the design of the new glasshouse and dairy cattle housing whenever possible. Utilities can be reached safely without need of assistance. Further, we ensure utmost safety during maintenance and cleaning, even when this means calling on third parties. We also

continually carry out smaller projects to increase safety at work. One example of this is updating of fuse box at our seed processing centre in Bottelare.



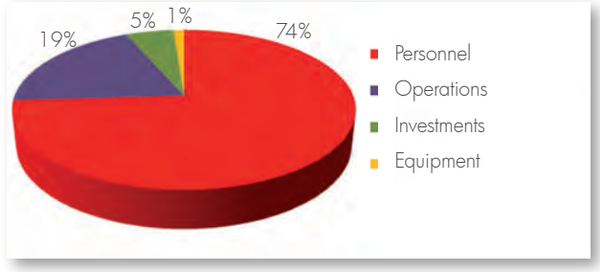
Income sources 2009

2.4 Management control and finances

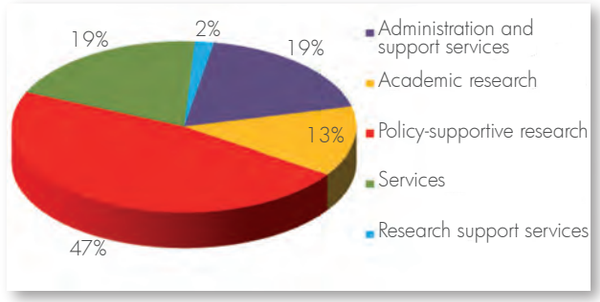
In the beginning of 2009, the action plan for organisational management 2009-2010 was approved and implemented throughout the year. The COWEDI conducted a mid-year evaluation in June in order to estimate our level of organisational maturity. In the middle of 2009, IAVA conducted an audit, the results of which will be known in the beginning of 2010. During the strategic seminar in October 2009, the COWEDI set priorities for actions that had yet to be implemented; those activities were then accomplished.

In the framework of Balanced Score Cards (BSC), in the beginning of 2009, some new critical success factors (KSFs) and critical performance indicators (KPIs) were created for all the units and the administration. In April, the administration completed the annual evaluation of the BSC and evaluated the indicators for their effectiveness. Some adjustments were made.

The next step in the development of the BSC is to coordinate the BSCs of all the units and the administration to be able to examine the accomplishment of the strategic goals at the ILVO level in function of the individual KPIs and KSFs. The consolidation was written up at the end of 2009; the full implementation is foreseen for mid-2010. Each year, we meld the income from the Flemish government's basic subsidy, which funds the wages of all Flemish Government personnel, and the income from the Business Unit (Own Capital) in order to determine ILVO's total working cost.



Expenses 2009



FTE's by function

2.5 Research coordination

This year we gave special attention to research planning through continuing the ILVO2020 initiative. In the first place, the programme coordinators presented the content of each programme to the Agriculture and Fisheries administration on 15 January 2009. This practice will continue in the coming years in order for us to maintain an intensive collaboration with the administration. The programme groups revised the ILVO2020 document with feedback received on 24 June 2008 from the policy makers and several stakeholders.

The research projects for 2009-2010 were bundled into the nine programmes. Each of these programmes has an introduction from the coordinator of the programme. In spring, the programmes were discussed with the administration that later gave them a score (to be used for calculating Performance Indicators). An overview of research output can be found in table 1.

Fifteen young researchers began their doctoral research at ILVO in 2008. Eleven doctoral mandates were extended during 2009. Doctoral scholarships are one way that ILVO can answer several interdepartmental research challenges, build competence in certain areas and work with specific stakeholders.

Memorandum of Understanding

On 18 August 2009, ILVO signed a Memorandum of Understanding with the Hebei Academy for Agricultural and Forestry Sciences (PR China). The agreement encompasses collaboration in 1) genetics and plant breeding, 2) crop protection, 3) products of plant and animal origin and food quality, 4) plant and soil interactions and sustainability, 5) agricultural economy and development, 6) agricultural mechanisation and constructions.

Doctoral Mandates

During 2009 ILVO made an agreement with Ghent University about the communal financing of doctoral mandates for subjects where cooperation between both institutions can add value. We also made an agreement with the Katholieke Universitetit Leuven to collaborate on common supervision of MSc theses.

Advisory Committee

The Advisory Committee met for the first time on 30 May 2009. ILVO's Executive Director presented ILVO and its work. The committee decided its working methods and goals. On 17 and 18 December the four working groups of the Advisory Committee met to evaluate the academic research of the nine programmes.

Permanent Delegation

On 5 June ILVO's management hosted the Permanent Delegation of the Province of East Flanders. On 3 September, ILVO's Fisheries research group hosted the Permanent Delegation of the Province of West Flanders.

2.6 Noteworthy accomplishments within each unit

Hydrangea paniculata Mega Mindy

The introduction of the *Hydrangea paniculata* Mega Mindy® is ILVO and BEST-select's latest high-quality addition to the assortment of ornamental nursery stock plants. Free Souffriau, the actress who plays the role of Mega Mindy in the popular children's series, helped us present the plant to the public in September. This new hortensia is a solid and well-developed shrub with upright branches. Typical of this plant are its large cone-shaped flowers, which turn pinkish red in late summer and autumn. Proceeds from the Hydrangea Mega Mindy® support the non-profit Children's Cancer Foundation (Kinderkankerfonds vzw).

Table 1: Overview of research output ILVO

year	A1 publications	Other scientific articles	Books and chapters in books	Proceedings and abstracts of congresses and symposia	Popularised articles	Reports	PhD theses	ILVO communica-tions
2006	60	19	24	163	84	104	6	16
2007	98	28	18	173	159	100	7	19
2008	103	19	23	291	180	135	8	18
2009	118	6	16	325	175	113	5	16

"Mega Mindy" with the team from ILVO. From left to right: Frederik Delbeke, Roger Dobbelaere, "Mega Mindy" Free Souffriau and Jo De Groote

Summer course on "Modern breeding techniques for improvement of leguminous crops" for developing countries

The Growth and Development research area organised the summer course entitled "Modern breeding techniques for improvement of leguminous crops" in collaboration with the Institute for the Promotion of Biotechnology in Developing Countries" (IPBO). The course was oriented to scientists from developing countries that are involved in breeding research or breeding programmes on local crops. Twenty-five researchers from 14 countries participated in the course. In addition to learning the theory, they participated in a practicum in the molecular lab at the Plant Sciences Unit, where the students could learn DNA-marker techniques and their applications in plant breeding.

34th Annual Animal Nutrition Research Forum

This forum for researchers in animal nutrition, organised in alternate years by a Flemish or a Dutch research institute, took place this year at ILVO Animal Sciences. Forty-six participants attended. Fifteen oral presentations and seven poster presentations were spread over four sessions, i.e., cattle, pigs, poultry and pets. ILVO Animal Sciences contributed three oral presentations and two posters. Conference proceedings with the abstracts were subsequently published.

Conference "Castration of piglets: completed and beginning research at ILVO"

Male piglets (boars) are commonly castrated by surgical castration without anaesthesia. This practice, common not only in Belgium but Europe in general, is done to avoid boar taint, an unpleasant smell that can occur when heating meat of intact boars. Recent years have seen increasing social pressure to ban castration without anaesthesia. Ninety-two participants attended our conference, which presented the vision of the Flemish Government on the subject as well as completed and beginning research concerning the following alternatives to castration: intact boars, early detection of boar taint, and immune castration. We also presented results of inquiries from the most important stakeholders in Flanders and Europe.

Information session ILVO Animal Sciences: "Current results from cattle experiments"

This annual information session, this year with 100 participants, presented the latest results from research on dairy and fattening cattle. Among the results presented for dairy cattle were: 1) results of an IWT-project about protein evaluation and feeding, which resolved the problems of determination of the protein value (normally very laborious, time-consuming and expensive) by presenting regression equations based on more simple laboratory parameters. 2) The OEB value of the ration is strongly linked to the excretion of N into the environment; we thus proposed a minimum norm. 3) We demonstrated how to cut the use and import of soya by almost half by protecting soya bean meal against rumen degradation. For fattening cattle, we showed that white blue double-muscled heifers on pasture not only need a supplementation with energy but also with protein. New projects about the feed evaluation and valorisation of the byproducts originating from bio-ethanol production were also presented.

What we learn from cow's gait patterns: automatic gait analysis

Between 2007 and 2009, ILVO's Technology and Food Science Unit developed an automated system for dairy cattle gait analysis. This system supports the current cattle lameness detection research programme, where each cow's gait is measured twice daily to check for lameness.

The system is based on a pressure-sensitive mat (0.6 x 4.9 m²) that records the spatial and temporal distribution of all foot-imprints. Measurements are automatically started by a cow detection and separation gate, located at the exit of the milking parlour. The imprint pattern is automatically analysed and daily gait variables are stored in a database. These will be matched with veterinary records of cow health to develop a warning system for cow lameness.

Space for agriculture: decision support tool for spatial planning in agricultural areas

Rural areas in densely populated regions are faced with a high demand for land. Agriculture still is a main user of open, non-built space, yet agricultural land is increasingly replaced by other functions such as residential areas and nature reserves. A tool to support the decisions made by Flemish agricultural policy makers on conservation of land for agriculture has been developed: the land value assessment tool (LVA). LVA combines multiple criteria in a map that allows to differentiate farmland value. By request of the Flemish agricultural policy domain (ADLO) and in cooperation with the Flemish Land Agency (VLM), ILVO analyses the scientific soundness of this tool. Although the tool still needs to be fine-tuned, it is already used to support planning processes, such as the implementation of the Habitat Directive.

Farm-level monitoring and risk analysis in Flemish agriculture

Agriculture is becoming an increasingly risky business. Globalisation, revision of the Common Agricultural Policy, increased external financing, climate change, and restrictions on the use of inputs and other aspects all increase the level of uncertainty and volatility in agriculture. Proper risk management is thus of paramount importance for agricultural producers. The Social Sciences Unit, in collaboration with Hasselt University, initiated a project to develop farm-level instruments for the monitoring, analyses and management of agricultural risk. A first study of this project served as background for a keynote lecture at the Agribex-symposium "Price volatility and income crisis in farming: how can farmers cope with it?" on 4 December 2009. The symposium was organised by Landbouwkrediet, in cooperation with the Belgian Association of Agricultural Economics. A publication of this pre-study was distributed to the participants.

"Melkveecafé" (Dairy Café): an interactive learning process on sustainable agriculture

The "Melkveecafé" project is a collaboration between the Social Sciences Unit and the Division for Agricultural Policy Analysis from the Department of Agriculture and Fisheries. Two groups of about ten specialised dairy farmers meet a few times per year to discuss aspects of a sustainable farm management. Attention is paid to ecological, social and economic themes. Per farm, figures from the Flemish farm accountancy data network (LMN) are converted into MOTIFS (Monitoring Tool for Integrated Farm Sustainability), through which sustainability performances are assessed. During the sessions, farmers can exchange results and experiences with colleagues and an expert in order to explore sustainable measures. Based on this interactive learning process, potential measures can be tested against the specific farm context. The Social Sciences Unit uses this project as a case to investigate the extent to which MOTIFS, when used in discussion groups, can support learning processes on sustainability.

Economic "melkveecafé" with dairy farmers from East Flanders

Turning point in the fisheries

On 21 January 2009 a press conference entitled "Turning point in the fisheries" took place in Ostend. This large event (160 attendees), was organised by the Technical Fisheries research group. Minister President Peeters and Ostend's governor Breyne both attended. The purpose was two-fold: 1) to inform the entire fishing industry and the press, and 2) to stimulate and motivate shippers and ship owners toward innovation. The turning points mentioned in the title refer to passive fishing gear, use of the alternative beam trawl, flyshooting, pulse trawl for shrimp fishery, standing rigs, line fishing and the use of links and pots. Hans Polet presented the conference. His presentations were based on current and future projects in ILVO and on various contacts with international fellow scientists. This lecture was supported by some testimonies from fishermen and the conference was concluded by a speech by the Minister President.

Quality of Marine Benthic Life

The Flanders Marine Institute (VLIZ) recently created a number of short films about the research activities at sea of different marine research entities. One film (http://www.vliz.be/vmdcdata/photogallery/movies.php#movie7) introduces the Bio-Environmental Research Group of ILVO-Fisheries. They research the quality of the marine environment, specifically the impact of all kinds of human activities (like sand extraction, dredge dumping, windmills, fisheries) on the benthic life of the Belgian part of the North Sea. Both the sampling at sea and the work in the laboratories are presented. Their research is supported by a completely renewed microscopy lab at ILVO's Fisheries site, completed in December 2009.

Sustainable fishing techniques

The history of the Flemish sea fisheries is characterised by change. The past 150 years, fishermen constantly had to adapt to a changing world in which different types of vessels, fishing methods and fishing grounds appeared and vanished again. Today the fishing industry again has come to a turning point. Therefore, in 2009 a special issue of the ILVO Nieuwsgolf was devoted to the theme "sustainable fishing techniques". This issue gives an overview of current and completed research projects of ILVO-Fisheries on the subject.

Following topics were discussed: (1) a long-term vision for the fleet, which explains how the success of the beam trawl has led to a highly one-sided (emphasis on flatfish) and inflexible fleet (only one fishing method) that undermines the viability of the fisheries sector (2) alternative techniques, such as alternative beam trawl, pot fishing for cuttlefish, pulse trawling for shrimps, alternative fishing with hooks, but also the introduction of outrigger nets in the beam trawl fleet could possibly reverse the trend, (3) economics, ecology and quality will naturally be influenced by these alternative methods, (4) cooperation with the Netherlands, because the Dutch and Belgian fishing industries show strong similarities in fishing methods, target species and fishing grounds, so similar problems arise, and (5) policy, because this aspect is also important when sustainable fishing techniques are introduced.

State of the stocks

On 23 July 2009, the European Commission in Brussels organized a seminar called "State of the Stocks" for all top officials of the EU Member States, all stakeholders in the fisheries sector and the environmental organisations in the EU. For the first time in history, all these different stakeholders were invited simultaneously by the EU for an overview of the status of all stocks that are fished by the European fleets. The Scientific, Technical and Economic Committee for Fisheries (STECF) and the International Council for the Exploration of the Sea (ICES) were asked as guest speakers. ILVO-Fisheries employee and STECF member Willy Vanhee presented two overviews and participated in the panel discussion of this seminar.

ICES-advice for the management of fish stocks

Each year, after the release of the scientific advice on the status of the fish stocks by the International Council for the Exploration of the Sea (ICES), ILVO's Biological Fisheries research group holds an information session to clarify the new TAC recommendations (with focus on the Belgian fishing sector) to the Central Board of the fishing sector (de Rederscentrale) and other stakeholders in the fisheries sector. This took place on 24 September 2009. New information included a presentation on the data on which the catch projections and stock assessments are based (e.g., the difference between fisheries data and survey data) and on the methodology behind these calculations. The role of ICES, STECF (Scientific, Technical and Economic Committee for Fisheries of the European Commission), national fisheries institutes (ILVO for Belgium), and the national and European authorities in the process of "data to quota" was clarified. The attendance from the sector, the interaction with the audience and the reactions afterwards, indicated that the initiative to be more open on the science behind the stock assessments and the catch limitations was well received and might be repeated in the future.

Second prize for "Hovercran" in the WWF Smart Gear Competition

The 2009 International Smart Gear Competition of WWF awarded one of the two runner-up prizes to a team at ILVO. The team took the $10,000 prize for their innovation of the HOVERCRAN, a fishing device that improves commercial catch quality and lessens seabed damage in the brown shrimp fishery. They were second in a competition with 72 participants. The new fishing gear is named "Hovercran", which is a combination of the verb "to hover" because the gear hovers over the seafloor with minimal seafloor contact, and "cran" from the scientific name Crangon crangon of the target species, i.e., brown shrimp.

The gear is based on an alternative stimulation by means of low energy electric pulses, that startles shrimps into the net (which is hovering some 15 cm above the sea bottom). Other organisms are not stimulated to jump and are left untouched on the seafloor. The gear leads to a much lower seafloor impact and a reduction in bycatch and discards.

Second prize for WAKO-presentation

For the 10th VLIZ Young Scientists' Day (in Ostende) the WAKO project was selected from more than 150 abstracts for a 5-minute oral presentation.

The five-minute presentation, entitled "Are trammel net fisheries a cure for the disease called fisheries impact? or … the WAKO story", received 2nd prize. The WAKO project looks at the differences between trammel net and beam trawl fisheries and thus hopes to answer the question whether trammel nets might be seen as more sustainable alternatives for the beam trawl (which is known to have a serious impact on the environment and the fish stocks). The WAKO project is a collaboration between ILVO-Fisheries, MUMM (who presented the story), INBO and UGent-Marbiol. A PDF version of this presentation can be found on the website of VLIZ.

Offshore wind farms at sea

On 15 December 2009 the State Secretary for Mobility Etienne Schouppe licensed Eldepasco to build a new wind farm in the North Sea (in addition to already existing authorisations for C-Power and Belwind). Linked to this, the book "Offshore wind farms in the Belgian part of the North Sea" was presented, which discusses the positive and negative effects of the first six windmills at sea after 2 years of monitoring. The monitoring program was performed by MUMM in collaboration with INBO, ILVO-Fisheries, UGent-Marbiol and UGent-RCMG.

One of the most obvious changes is the rapid and intense colonisation of the windmill foundations by marine organisms. After only a few months a high biodiversity (49 species) was recorded. The effects of this and the impact of additional wind turbines will be monitored in the coming years in support of a sound management of the North Sea.

CIVIS-Workshop for the fishing industry

The Fishing Gear Technology research group again organized their yearly workshop for the fishing industry. About 70 participants with different backgrounds showed up to this 5th edition, from fishermen to people from retail, management, education and science domains. It had two themes: innovation in the industry and price setting for fish.

2.6 Personnel Services ILVO

The Management Committee approved several personnel policies at ILVO on 15/12/2009. This led to action on the following themes.

Competence-Based Management

In January, we gave information sessions for all personnel to illustrate the importance of life-long learning. We gave a training to all supervisory staff of levels C and D entitled "Develop Your Competencies" and a three-day training on the coaching style of supervision.

We took an important step towards creating high quality and uniform job descriptions by implementing the first phase of grouping functions into function-families. This project began with the research staff.

Promotion Opportunities

We gave personnel a view of promotion opportunities and opened seven promotion opportunities. In light of this, we gave an information session about the possibility for promotion in levels B, C an D.

Cooperation

Cooperation begins at the team meetings of the personnel service itself. Further cooperation happened with the personnel staff at each unit. We also developed a vision document to clarify the cooperation between the management support services from the Department of Agriculture and Fisheries and the personnel service of ILVO. This had the support of the General Director of the Department and ILVO's Executive Director.

We also sought to collaborate with other scientific institutes of the Flemish Goverment outside of our policy area (INBO, VIOE, KMSKA). As a result, we now regularly consult with the HR managers from these organisations.

Continual Improvement

Trainings for specific groups were:
For the cleaning staff: workshops on ergonomics, health, stress and working with others;
For the ILVO2020 leaders: "Facilitating groups".

Table 2: Total staff composition as of 31/12/09, number of staff expressed in full-time equivalents (FTE)

	male/FTE	female/FTE	total/FTE	female percent/FTE (%)	percent OC (%)
A-level	115/111.8	120/110.4	235/222.2	51.1/49.7	55.7/57.6
B-level	48/45.7	58/45.6	106/91.3	54.7/49.9	45.3/43.9
C/D-level	120/114.7	94/70.0	214/184.7	43.9/37.9	37.9/38.8
Total	283/272.2	272/226.0	555/498.2	49.0/45.4	46.7/48.1

Integrity

By the end of 2009, all personnel had taken the "dilemma training". This brought us up to date in this training process.

Diversity

ILVO, one of the first institutions within the Flemish Goverment to do this, asked for and received financial support for a staff member with a handicap. In addition, we offered internships to students with a handicap.

Two scientific directors say good-bye to ILVO

On August 31st 2009 the Social Sciences Unit said farewell to Dirk Van Lierde. He started his career in 1976 at the Agricultural Economics Institute in Brussels, where he became head of the "Accounting and Financial Analyses" section in 1987. He did not consider the Farm Accountancy Data Network only as a data source for making the annual sector reports, but found it important

Retirement celebration for Dirk Van Lierde, Scientific Director of the Social Sciences Unit (From left to right: his colleagues of many years in research on ornamentals, Adrien Saverwijns (ADLO) and Eddy Volckaert (former director of PCS), Dirk Van Lierde and his spouse)

that this data was used as a basis for farm management advice, research and policy support. Later, as head of the "Micro-Economics" department, he was one of the first to attract external financing for research projects. He took part in many international workshops and congresses and succeeded in writing an impressive range of publications, especially in the horticultural sector. As scientific director at ILVO, he was actively involved in setting up the Social Sciences Unit. His retirement party was an excellent occasion to thank him and his spouse for many years of commitment to agricultural economics.

Lucien Carlier graduated from Ghent University as a Chemical and Agricultural Engineer in 1968. In that same year, he started working as Scientific Researcher at the National Centre for Grassland and Green Fodder Research. During a span of more than 40 years in the sector, he has witnessed significant shifts in grassland

Retirement celebration for Lucien Carlier, Scientific Director of Plant Sciences, Growth and Development, and his spouse

exploitation, forage production and agricultural research. During his latest years as Scientific Director at ILVO's Crop Husbandry and Environment research area, he was the pioneer and driving force behind the transfer of knowledge to Central and Eastern Europe financed by the Federal and Flemish Government. Lucien Carlier retired on 1 November, 2009, after a wonderful 41-year career.

2.7 Policy-relevant reports and reports of mandated and other assignments

In 2009 researchers from all four units contributed to more than 100 policy-relevant reports. The Fisheries research group of the Animal Sciences Unit contributed the most reports. Most of these were directed to the International Council for the Exploration of the Sea (ICES). Some titles were: Guidelines for the Study of the Epibenthos of Subtidal Environments; cooperative research reports (Effects of Extraction of Marine Sediments on the Marine Environment); reports from working groups (e.g., Crangon Fisheries and Life History; Marine Shellfish Culture; Assessment of Demersal Stocks in the North Sea and Skagerrak; Benthos Ecology); Mixed Fisheries Advice for the North Sea; Fishery Management Plan Development and Evaluation; Celtic Seas Region; Benchmark and Data Compilation for Roundfish and Flatfish; Ecosystem Effects of Fishing Avtivities; Marine Chemistry; Biological Effects of Contaminants; Sampling Methods for Recreational Fisheries; Quantifying all Fishing Mortality and Methods to Evaluate and Estimate the Accuracy of Fisheries Data used for Assessment; reports from the Planning Group (e.g., Commercial Catches, Discards and Biological Sampling; and reports from the ad hoc group (Mixed Fisheries in the North Sea).

Animal Sciences – Fisheries further contributed to reports on behalf of the Advisory Committee on Fisheries and Aquaculture (ACFA), Scientific, Technical and Economic Committee for Fisheries (STECF), with reports entitled Fishing Effort Regimes, Evaluation of Management Plans, and Evaluation of Member States' National Programmes for 2009 and 2010. They also contributed to the National Data Gathering Programme (NDGP) with the NDGP programme proposal 2009-2010, and annual reports, ECOSTAT, WEFTA (Western European Fish Technologists' Association) and EUTROF.

The Social Sciences Unit reported in 2009 to the Flemish Government about a "Background study of the subsidies for organic agri- and horticulture in Flanders", a "Decision support tool for spatial planning in agricultural areas: description and scientific analysis" and "Random monitoring plan for the Agricultural Monitoring Network for fiscal year 2010". The Network for Research on Organic Agriculture and Food (NOBL) received reports on "Research priorities for organic agriculture in Flanders: 2009-10" and "With NOBL towards an innovative and high quality organic sector in Flanders".

Plant Sciences researchers produced policy-relevant reports on "Culture and Value and Use Experiments (seed maize, silo maize, fibre flax, ray grasses and chicory), results of research on objective assessment of the damage from wintering geese, and reports of research on the use and working of gft-compost in the culture of maize.

The Technology and Food Science Unit reported to various governments on special measures to reduce the risk for consumers through *Salmonella* in table eggs (EFSA); results of the ring trials for antibiotics: including microbiological tests and rapid tests; scientific recommendations; honey research (EU) and GMO-detection (FOD - public health).

2.8 ILVO communications

Vandecasteele B. , Van Waes C. en Carlier L. (2009) Vlasirub-ringtest november 2008. Nr 54.

Vandenberghe A., Cools A.-M. en Van Lierde D. (2009) Analyse en evaluatie van reductiemogelijkheden voor het gebruik van gewasbeschermingsmiddelen en nutriënten in de grondgebonden teelt van glasgroenten. Nr 55.

Van Lierde D. (2009) Analyse en evaluatie van reductiemogelijkheden voor het gebruik van gewasbeschermingsmiddelen en nutriënten in de vollegrondsgroenteteelt. Nr 56.

Van Waes J., Chaves B., Van Waes C., Carlier L. en De Vooght N. (2009) Belgische beschrijvende en aanbevelende rassenlijst voor industriële cichorei 2009. Nr 57.

Van Waes J., Chaves B., Van Waes C., Carlier L. en De Vooght N. (2009) Catalogue Belge des variétés de chicorées industrielles 2009. Description et recommandation. Nr 58.

Van Waes J., Chaves B., Van Waes C., Carlier L., Calus A., Wittouck D. en De Vooght N. (2009) Belgische beschrijvende en aanbevelende rassenlijst voor vezelvlas 2009. Nr 59.

Van Waes J., Chaves B., Van Waes C., Carlier L., Calus A., Wittouck D. en De Vooght N. (2009) Catalogue Belge des variétés de lin textile 2009. Description et recommandation. Nr 60.

Muylle H., Van Waes J. en Van Peteghem K. (2009) Themanummer Nieuwsgolf mei 2009. Samen naar rationeel energiegebruik in land- en tuinbouw. Nr 61.

Vandecasteele B. , Van Waes C. en Carlier L. (2009) Vlasirub-ringtest mei 2009. Nr 62.

Rijckaert G. en De Dijn J. (2009) Voorlopige resultaten bij praktijkproeven met modus – Groeiregulator in zaadgewassen van Italiaans raaigras – Oogstjaar 2008. Nr 63.

De Vliegher A., Van Waes J. en Van Peteghem K. (2009) Themanummer Nieuwsgolf oktober 2009. Grasland: een mooie toekomst tegemoet? Nr 64.

Chaves B., Van Waes J., De Vliegher A., Carlier L. en De Vooght N. (2009) Belgische beschrijvende en aanbevelende rassenlijst voor voedergewassen en groenbedekkers 2010. Nr 65.

Chaves B., Van Waes J., De Vliegher A., Carlier L. Herman J.L. en De Vooght N. (2009) Catalogue Belge. Description et recommandation plantes fourragères et engrais verts 2010. Nr 66.

Van Der Straeten B., Buysse J., Nolte S., Lauwers L., Van Huylenbroeck G., Kempen I., Claeys D. en Marchand F. (2009) Mestverwerkingsplicht: een sociale bijsturing? Nr 67.

Lauwers L., de Mey Y., Wauters E., Van Meensel J., Van Passel S. en Vancauteren M. (2009) De volatiliteit van het landbouwinkomen. Nr 68.

Fouqué D. en Demeyer P. (2009) Optimalisering en actualisering van de emissie-inventaris ammoniak landbouw. Nr 69.

3 Internal communication – lecture sessions

An internal lecture series provides a forum for understanding and communication within and between the units. During the lectures, a researcher introduces his or her work to the (sub)unit. This can be advanced research, where results are already available, or starting research. Ample time is dedicated to discussion after the lecture, as it can be very enriching to look at a research topic from (sometimes very) different perspectives or backgrounds.

Social Sciences

The Social Sciences Unit opens their monthly "lunch sessions" to colleagues from other units.

- Indirecte duurzaamheidseffecten in tijd en ruimte van technologiekeuzen in de Vlaamse veehouderij, Bert Vander Vennet
- Onderzoek naar de ruimtelijke kwaliteit van het Vlaamse platteland in transformatie, Anna Verhoeve
- Multifunctionality and Local Identity as paradigms for a Competitve and Sustainable Agriculture, Lies Messely
- Afwegingsinstrument voor planning van de landbouwruimte, Eva Kerselaers
- Supporting firm-specific decisions on improving economic performance and reducing environmental pressure, Jef Van Meensel
- Monitoringssystemen voor duurzaamheid in de praktijk: leerprocessen bij de implementatie, Karen De Mey
- Op zoek naar elegante oplossingen. Landbouwwetenschap en –beleid in België (1944 '94), Jan Roobroeck
- Het Pigs2Win model, Ine Kempen en Jef Van Meensel
- Observeren en discoursanalyse, Veerle Verguts en Lies Messely
- N Vivo 8: een korte handleiding, Karen De Mey en Lies Messely

Every three months, Social Sciences opens the door even wider, when external lecturers and participants are invited as part of the CoPKO activities (see 5.9).

Technology & Food Science

- Denaturing gradient gel electrophoresis, Katrien Broeckaert
- Nanotechnology in food and agriculture, Lieve Herman
- Outlook + intranet, Jürgen Vangeyte
- Presentaties onderzoeksprogramma 2009/2010, Peter Demeyer en Isabel Taverniers
- Toepassing van real-time PCR in het onderzoek van voedselpathogenen, Els Van Coillie
- Procedure investeringen, Lieve Herman en Katleen Coudijzer
- Schimmels I, Els Van Pamel
- Schimmels II, Elzbieta Kozakiewicz en Els Van Pamel
- Pilootfabriek, Katleen Coudijzer
- Opleiding veiligheid-prototype-procedures, Jürgen Vangeyte
- Opleiding gebruik afdoodautoclaaf, Jessy Claeys
- Bionumerics, Geertrui Rassschaert en Veerle Piessens
- Excel, Jeroen Baert en Bert Verbist
- Toelichting over de mogelijke toepassing van technieken uit het landbouwonderzoek binnen visserijonderzoek, Jurgen Vangeyte

Plant Sciences

Plant@3 is the name of a monthly seminar series within the Plant Unit. The "@3" refers to the start time of 3 p.m. Each Plant@3 seminar is comprised of two scientific presentations, each lasting about 30 minutes, followed by time for questions. The presentations are mainly given by the doctoral students from the Plant Sciences Unit, for whom participation is required. Each student normally gives two presentations during his or her doctoral research: once about halfway through their research, and once at the end. The main goal of Plant@3 is to raise the general knowledge base of the unit. It also presents an opportunity to receive feedback, and plays a role in staff training and development.

- Rice and seed-associated microbial communities: a general overview, Bart Cottyn
- Use of genomic knowledge in *Arabidopsis* for the improvement of seed yield in oilseed rape, Inge Van Daele
- Asymmetric somatic hybridization of ornamentals, Tom Eeckhaut
- *Erwinia chrysanthemi* in seed potatoes, Johan Van Vaerenbergh
- Image Analysis: How? Feasibility studies and research, Peter Lootens
- Pathotypes of *Puccinia horiana* on chrysanthemum, Mathias De Backer
- Candidate gene approach to identify genes underlying drought stress tolerance in *Fragaria* sp., Farzaneh Razavi
- Using flow cytometry to detect *Pseudomonas cichorii,* Liesbet D'hondt
- Een vlakke loopbaan, Lucien Carlier
- *Xanthomonas fragariae* in strawberry: not just another whodunnit…, Joachim Vandroemme
- Actual inulin chicory breeding, Joost Baert
- Genetic improvement of the saccharification of lignocellulosic crops for production of bio-ethanol, Steven Van Hulle
- Effect of ensiling on fatty acid composition and lipid metabolism in forages and the possible role of red clover polyphenol oxidase, Gijs Van Ranst
- The influence of farm compost on crop yield and soil quality, Tommy D'Hose
- From the lab to the greenhouse: evaluation of *Arabidopsis* as a platform for molecular farming, Rolinde Demeyer
- Effect of green manure crops on hatching of the potato cyst nematode *Globodera rostochiensis,* Yirina Valdés
- Nitrogen utilization and crop quality in function of soil condition, Koen Willekens

Animal Sciences

- Invloed slachtleeftijd vleeskippen op productieresultaten, karkassamenstelling en hak- en voetzoolletsels, Luc Maertens
- Broeikasgassen in de landbouw, Nico Peiren
- Onderzoek naar viskwaliteit, Sabrine Derveaux
- Europese richtlijnen: evaluatie en monitoringsverplichtingen in Belgische mariene wateren, Gert van Hoey
- Filmvoorstelling "The end of the line" gebaseerd op het boek van Charles Clover
- project CLIMAR, Els Vanderperren
- The effect of micropollutants on North Sea brown shrimp (*Crangon crangon* L.), Yves Verhaegen
- Overzicht van reeds geteste aanpassingen aan de boomkor, Hans Polet

4 Internal Working Groups

4.1 Accreditation

The accreditation working group drafted eight measurable goals for 2009. Each member of the group was assigned responsibility to accomplish certain goals. These goals were: 1) and 2) two cost/benefit studies on software applicable for accreditation, 3) advice concerning the ILVO web pages on services for third parties, 4) programme for various trainings, e.g., "Internal auditor", 5) demonstration of a customer enquiry, 6) creation of a system for the registration of education and trainings, 7) draft of a guideline for researchers and students using facilities in an accredited workspace, and 8) draft of a general framework for a uniform quality management system in the various ILVO units. All eight goals were successfully accomplished and discussed during four meetings of the working group. We established a system to keep a current inventory of all accredited ILVO activities. Various overview documents for all the ILVO units are now available on ILVO's intranet.

4.2 Organic Agriculture

In 2009, the organic agriculture working group continued its work as a member of NOBL (the organic agriculture and food network). NOBL is a network of researchers, policy makers, and representatives of organic agriculture. Its goal is better guidance and cooperation within research for organic agriculture in Flanders. Our work focused on the creation of a research programme for organic agriculture in Flanders. The members of ILVO's working group strive for connection with national and international research via participation in working groups and tracking Flemish and European research on organic agriculture. Based on this information, the different ILVO units have formulated the priorities for future research at ILVO. On 3 December, we presented the current research on organic agriculture to a delegation of Polish researchers and government workers.

4.3 Sustainibility

In keeping with ILVO's research on sustainability, we also desire to integrate a sustainable environmental policy for our current activities and our growth in the coming years. We collaborate with AFM for our infrastructure projects and complement these projects with internal activities, such as systematic sensitisation of our colleagues and a centralised and well-structured waste policy and purchase policy.

ILVO participated in the "Week of Sustainability" by placing four posters in the Flemish government's Boudewijn building in Brussels. The same posters were also posted in each of ILVO's buildings in Merelbeke, Melle and Ostende.

As a result of our research activity, we produce a great deal of hazardous waste. We successfully introduced a uniform procedure for all ILVO sites. One big advantage of this is that a worker who is temporarily assigned to another lab will always know in which recipient different kinds of waste should be placed. We continue to emphasise that waste prevention is not only the basis of a good waste management policy, but is also cost-effective.

We also developed necessary measures to reduce our energy use. Where financially realistic, we have switched from oil to gas heating. Oil tanks that are no longer used were correctly disposed of. At the same time, we have evaluated the possibility of producing green energy on our campus. This has been included in the policy documents of the prime minister.

The "Ik Kyoto" programme was a success again this year. Seventy-four employees reduced their car use by 38,300 km or a reduction in CO_2-emission by 8 tonnes!

4.4 Energy

Problems concerning climate change and energy supply affect Flemish agriculture. All four units conduct research to answer these questions. This includes research on socio-economic aspects of climate change, research towards a sustainable and profitable production of biomass for bio-energy production, and nutritional aspects by which by products in the production process of bio-energy are used as feed. Technological research is also conducted to reduce the energy demand in greenhouses and animal husbandry.

The working group mainly facilitates communication and synergy between different research units at ILVO. The group consists of 20 scientists working in different research units. We meet at least twice yearly, but also ad hoc. On the agenda for these meetings are initiatives and research results of ILVO research concerning the energy problem.
This working group identifies new project ideas and possible collaborations with the private sector. The working group represents also ILVO in different organisations concerning sustainable energy use (ODE, VALBIOM, GBEV, etc.). Furthermore the working group serves as a communication line through the different units to circulate information as position papers, congress information, etc.

In 2009, the working group organised a symposium to present the research conducted at ILVO concerning agriculture and energy. This was accompanied with a newsletter summarising ILVO's research into this topic. The group will continue to stimulate the integrated approach at ILVO level concerning this research topic of agriculture and energy.

4.5 Working group for equal opportunity and diversity

ILVO, along with the Flemish government, wishes to mirror

the diversity present in society. Our personnel policy reflects this desire to include people from various target groups. ILVO chooses to focus its equal opportunity and diversity policies on the following five groups:

- women (middle management and higher);
- people of foreign origin;
- people with a handicap;
- people with a low education;
- experienced employees (+45j).

ILVO's management is supported by an interim emancipation representative, who is in turn supported by the working group for equal opportunity and diversity.

This group's goal is to:

1) work on ILVO's awareness about the target groups in order to find ways to include them within the various units and sites at ILVO;
2) work on the annual update of the equal opportunity and diversity plan within the Agriculture and Fisheries policy area (L&V);
3) collaborate on ways to achieve the numerical goals stated in the L&V diversity plan within the planned timeframe.

The working group meets annually with all representatives from the various ILVO sites.

Our focus for 2009 was on:

1) offering internships to people with a handicap;
2) pay special attention to hiring people from the abovementioned groups;
3) ensure appropriate support for people with a handicap who encounter difficulty in their current work at ILVO, e.g., wage subsidies.

4.6 IT & Statistics

The IT working group welcomed our newest members. The meeting encompassed a critical overview of the past year's activities and a discussion of the running and future IT projects.

The most notable event was the meeting with Paul Quataert, head of BMQ-department (Biometrics, Methodology and Quality) of the Research Institute for Nature and Forrest (INBO). INBO is a scientific institute of the Flemish Government and is quite comparable with ILVO. The goal of the meeting was to exchange ideas on the efficient organisation of internal centralised statistical services.

4.7 Nutrient flow

In 2008, the nutrient flow working group had created an overview of ILVO's projects, equipment and expertise on nitrogen (N) and carbon (C). This overview clearly indicated opportunities for cooperation between the different units. This led to 2009 interdepartmental projects, such as 1) research on greenhouse gases and ammonia produced by calves, beef cattle, dairy cattle and pigs (Animal Sciences Unit and Technology and Food Science Unit), 2) development of an indicator on ammonia emission at farm level (Technology and Food Science Unit and Social Sciences Unit) and 3) a literature study on soil quality in the framework of the interreg project BodemBreed (Plant Sciences Unit and Social Sciences Unit). These positive experiences have led to a more detailed data collection of the projects. We are now considering whether to add phosphorus (P) and dust to our research, and are examining our research results to see which environmental compartment they would most influence in order to optimise the nutrient flows.

4.8 Organisational Management

In the beginning of 2009, the organisational management working group finalised the 2009-2010 action plan for organisational management. The plan was approved by our Director's Council (Directieraad) and was implemented throughout the year. In June, the Committee of Scientific Directors (Cowedi) estimated the progress of the organisational management; a new maturity level was determined per theme. During the months of July, August and September, IAVA (the control organ from the Flemish Government) audited ILVO to check our progress on the measure of our organisational management (as of December 2009 we had not seen the results). During the strategic conference of 2009, we set priorities for the activities that had yet to be implemented. We also decided to split up the working group into three separate groups, where each unit is represented. These working groups are based on the 2009 IAVA progress report.

The three groups are:

1. Stakeholders, Information and Communication, and Organisational Culture
2. Goal-setting, Process- and Risk-management, Human Resource Management, Organisational Structure, and Finance
3. Facilities, ICT, and Monitoring.

4.9 Genetically Modified Organisms (GMO)

The GMO working group regularly discusses all current developments on GMO research, legislation, public opinion and so forth.

ILVO wants to contribute in the future to the objective evaluation of GM crops that may have advantages for Flemish agriculture and horticulture. These activities fit perfectly within the Flemish policy vision on GMOs, as recently expressed in the White Book on Agricultural Research and the recent policy document of Minister President Kris Peeters. One example of this is ILVO's commission by the Flemish government to study and evaluate the practical applicability of the recently developed co-existence law.

4.10 LATIVIS

At the ILVO-Animal-Fisheries mini-symposium (May 2007) we decided to set up an internal working group to create a vision and long-term strategy for the Flemish fishery and aquaculture sector. This working group, called "the long-term vision and strategy for the Flemish fisheries and aquaculture sector (LATIVIS)" will compile existing initiatives and expand them into a consensus vision and strategy for the sector. The working group started by writing a vision document to streamline the internal research and communication strategies.

Key objectives of the long-term vision

The LATIVIS vision — the Flemish fishery and aquaculture sector in an "ideal world" — is built around six key objectives (Figure 2).

The protection of the marine environment and the preservation of its biological diversity is part of the European fisheries and environmental policy, which emphasises an ecosystem approach. This approach includes all functional components and their interactions within the marine ecosystem (biota and habitat). Naturally, sustainable fisheries and aquaculture strive to minimise their impact on the marine ecosystem.

Stocks are harvested in a responsible manner by a diversified fleet, which is in size and composition set up to exploit the fishing opportunities in a sustainable way and to minimise discarding as much as possible. Both professional and recreational fisheries are largely self-regulating. They will be adjusted by a fisheries management system based on three aspects: reducing catch, effort limitation, and technical measures. Aquaculture ensures that fish stocks are less pressured or grow artificially.

To obtain an optimal economic viability of fisheries and aquaculture added value is created by improving the cost structure and offering a high quality product. The fishing companies operate in a relatively stable investment

climate. The fish quotas, for instance managed by the companies themselves as in an ITQ system, also remain relatively stable. Deficiencies in the fishery production are supplemented by fish farming in Flanders.

The involvement of the sector at all (management) levels and attention to individual needs leads to a viable, clean and safe working and living environment. The sector functions better thanks to good communication and cooperation between the various stakeholders, and the available expertise is used to the fullest.

In order to supply a healthy, high quality and safe food product, the fisheries and aquaculture sector needs to take the requirements of the consumer and statutory regulations into account. The fish market and the consumer are informed —via marketing campaigns, for example— about quality, nutritional value, labelling, traceability and certification.

The activities of the sector take place in a wider context and require an integrated approach. Entrepreneurs, scientists, policy and other stakeholders work together on sustainable management. They share responsibility and create a good business environment. Innovation and transition, control and enforcement, and sharing information are key.

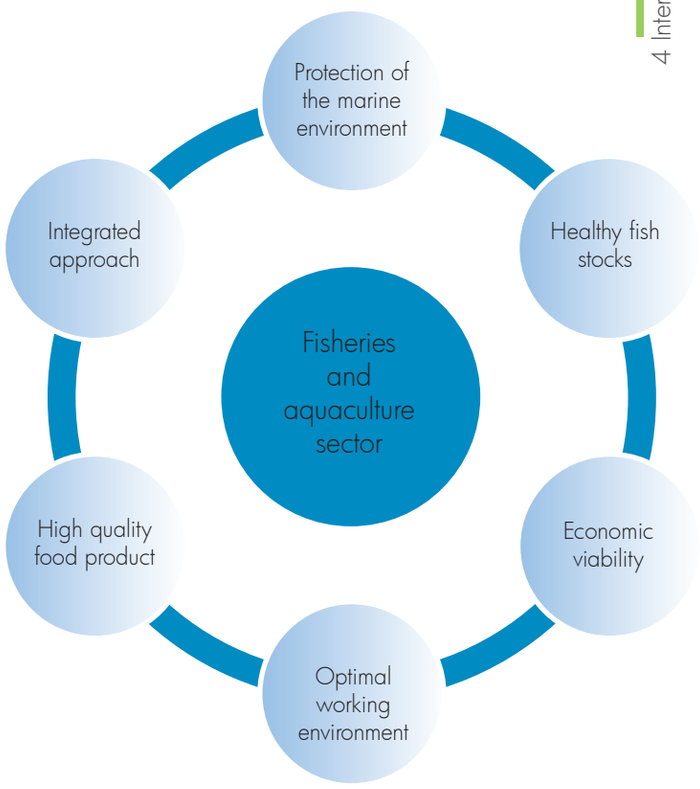
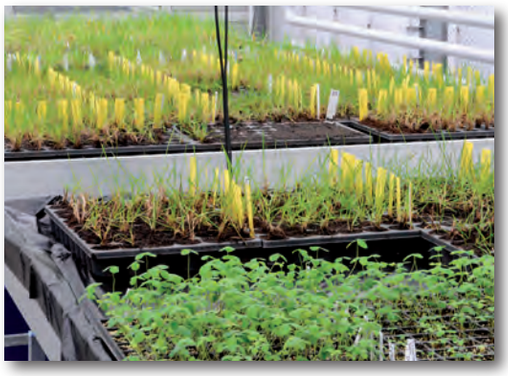


Figure 2: The six key objectives of the LATIVIS long-term vision for the Flemish fishery and aquaculture

The foundations are laid

After an internal consultation a final vision text was drawn-up which will underpin a strategy to create sustainable Flemish fisheries and aquaculture and outlines the role that ILVO can play.



5 Main Research Results

5.1 Feed supplementation for Belgian Blue double-muscled heifers on pasture

Young cattle cannot always take in as much feed from grass as adult cows. They thus need a feed supplement on pasture. Further, the feed intake capacity of double-muscled animals is lower than non-double-muscled animals. Recent research from the Animal Sciences Unit indicated that Belgian Blue double-muscled heifers should have a body weight of 600 kg prior to a first calving at ±2 years. Excellently managed grassland offers one of the cheapest feeds, but is it good enough to gain weight up to 600 kg?

Effect of different feed supplements

All grass-fed double-muscled heifers younger than one year first received an extra 2 kg beet pulp per day. Their weight gain was disappointing: 0.48 kg/day. On beet pulp fed to appetite, the daily gain was still low: only 0.55 kg. To investigate the mode of action behind this weak performance, animals were kept in confinement and fed grass and beet pulp. It became clear that low intake and a replacement of grass by pulp resulted in inadequate protein intake. We then investigated the effect of a protein supplement: 20% soybean meal and 80% beet pulp, compared to solely beet pulp for the control group. With this supplement freely available, daily gain increased significantly: from 0.59 to 0.85 kg.

Weight gain was somewhat lower when using by-pass soybean meal instead of untreated soybean meal, either on a weight basis (ratio 80/20) or on the basis of a similar metabolisable protein content. Blood urea content was always lower for heifers receiving the by-pass soybean meal. This may indicate a lack of protein, which would in turn lead to less weight gain. However, the reason for the lower performances may be a shortage of rumen available protein, rather than lack of metabolisable protein. We then gave the heifers the same intake of another supplement with a similar metabolisable protein content as the mix of 20% soybean meal and 80% beet pulp, namely maize silage instead of beet pulp supplemented with soybean meal. This resulted in a decreased gain from 0.85 to 0.76 kg/d. This lower daily gain may be explained by the lower dry matter content of the supplement and the lack of some minerals.

Heifers older than one year and calving at 2 years of age may also need feed supplementation. Heifers on pasture (summer period) lost body weight during the last 100 days of pregnancy, whereas a weight loss was not observed for heifers confined indoors (winter period). Nutritional stress as a consequence of the body weight loss is unlikely, as the birth weight of the calves from the heifers at the end of the summer period was not significantly different from that of calves born at the end of the winter period.

Importance of the quality of the grass

The quality of grass is reduced by ageing, resulting in a higher fibre content, while protein content, digestibility and energy value are reduced. Grass intake (in addition to a beet pulp supplement of 2 kg/d) is negatively correlated with the crude fibre content of the grass, and is positively correlated with the crude protein content of the grass. This means that good pasture management is not an unnecessary luxury.

Appropriate supplementation is desirable

5.2 Broiler production: earlier slaughter age and sex-segregated housing

Selection programmes for fast growth and improved feed efficiency have been highly successful in meat-type birds – maybe too successful. Due to the fast growth, the weight of the broilers no longer meets the consumers' wishes if slaughtered at 42 days. Figure 3 illustrates the weight at 42 days (common slaughter age) of male broilers over the last 30 years.

The weight of a filet or a drumstick in a 2.8 kg broiler (Figure 4) is higher than the requested one-person portion

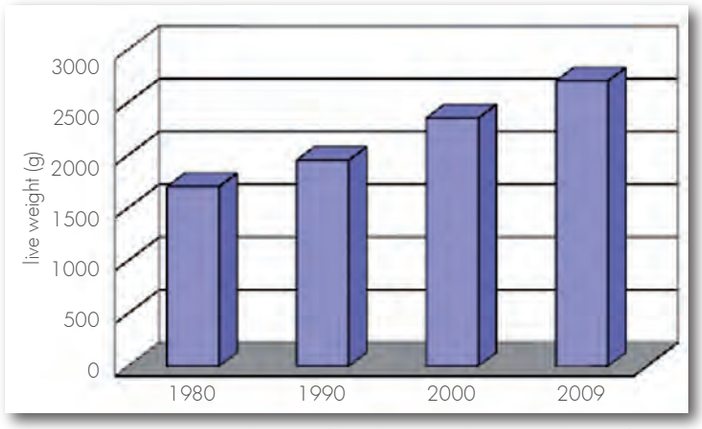


Figure 3: Evolution of broiler weight at 42 days of age

of about 200 g. For this reason, slaughter houses ask for flocks of broilers with a mean weight less than 2.5 kg. In contrast, farmers strive for the highest quantity of broilers in kg/m² of their stable, as this is the basis of their payment. Moreover, the higher meat yield per surface unit should compensate for the higher work load, because earlier slaughtering means more batches of broilers (e.g., 7-8 rounds instead of 6-7 per year).

Mixed sexes and broiler welfare

In Belgium, male and female broilers are currently housed together. However, there are considerable differences in development between both sexes. In some countries, big integrators already house males and females separately. This may optimise both broiler production and help with implementation of the EU directive on housing density.

We have studied the impact of both an earlier slaughter age (35 days instead of 40 days) and sex-separated housing on production performance and the prevalence of footpad and hock burn.

Production performance

The difference in weight between slaughter at 35 and 40 days amounted to 25% (1.91 and 2.38 kg, respectively). Finishing weight of males was on average 12% higher than for pullets. Feed conversion ratio (kg feed/kg weight gain) increased strongly during the finishing period (+14%) when broilers were slaughtered at 40 days, particularly for pullets. Production costs (per kg) for pullets older than 35 days are thus significantly higher than for males. It is recommendable to slaughter female broilers at a maximum of 2.0 kg.

Slaughter age also had consequences for the welfare of broilers. The prevalence of footpad and hock lesions was nearly twice as high at 40 days than at 35 days. This phenomenon was most pronounced in males because of their heavier weight.

Slaughter characteristics and carcass composition

The slaughter yield (carcass weight/live weight) was comparable for male and female broilers, but increased by 1.4% if broilers were slaughtered at 40 days instead of 35 days. The percentage of breast meat in the carcass also increased with age, especially in males. Males should thus be slaughtered at a heavier weight than females in order to optimise the portion of breast meat.

Female broilers also had a significantly higher fat content than males. Already at 35 days, their fat content was 13% higher than the males, but at 40 days the difference increased to 19%. This is another reason to slaughter females earlier than males.

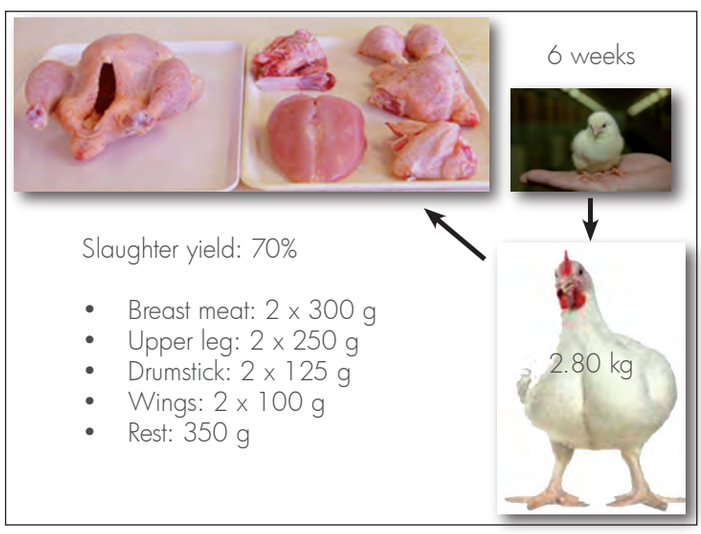


Figure 4: Weight of the different parts after cutting up a meat chicken with a weight of 2.8 kg

5.3 Hatchability and chick quality: the effect of long chain n-3 fatty acids in the maternal layer diet

Many studies about fatty acids (FA) indicate that enriching meat and eggs with fatty acids may improve human health by providing a more optimal FA profile. The healthiest fatty acids are the long chain polyunsaturated fatty acids (LC PUFA), such as eicosapentaenoic acid (EPA, 20:5 ω-3) and docosahexaenoic acid (DHA, 22:6 ω-3). Besides the positive health effects for humans, the animals themselves may profit. Some studies show that FA available from maternal diets will affect FA composition of progeny tissues and exert positive health effects during various stages of post-hatch life. The FAs may induce changes in immune responses and eicosanoid synthesis in progeny chicks.

Maternal transmission of ω-3 fatty acids

Unlike mammalian neonates, the chick embryo is dependent upon nutrients stored in the egg for its growth and development during the 21-day incubation period. Yolk FAs are the major source of energy for the developing chick during embryogenesis. Over 80% of yolk FA is absorbed by the developing embryo for energy production and structural membrane synthesis. It follows that manipulating the yolk FA (especially the long-chain PUFA (EPA and DHA)) through changes in dietary FA may affect embryonic FA metabolism, embryonic growth, hatching variables and chick quality.

We investigated the maternal effect of two fat sources (soy oil (SO) as control treatment, and fish oil (FO)) in standard layer breeder diets at 3%. Breeders produced hatching eggs in four pens of 20 birds each, with a ratio of one male to 10 females. At the age of 55 and 60 weeks, 200 eggs per treatment were collected and incubated in a commercial incubator. We investigated the following effects of supplemented oil: performance, FA incorporation into eggs, fertility, hatchability characteristics, chick quality and post-hatch growth.

Experimental set-up to determine relative growth of the chickens

External pipping

Improved relative growth

The dietary FA profile was indeed reflected in the yolk of the eggs. This indicates that the FA composition of eggs can be substantially modified through altered feeding strategies. Dietary ω-3 FA did not have any effect on egg weight, hatchability characteristics, chick weight and chick quality, but did increase relative growth of the progeny. Relative growth was significantly higher for the progeny of breeders which received the FO supplemented diet instead of the SO supplemented diet (82.5% versus 75.5%). Adding fish oil to the maternal diet can have a positive impact on performance of the chickens.

5.4 Boar taint: can the problem be solved?

The meat and fat of some non-castrated male pigs release an off-odour called "boar taint", which smells like urine and/or faeces. The most common way to prevent boar taint is to surgically castrate piglets without anesthesia. This practice remains popular despite heavy social pressure to ban it. The aims of this study were 1) to reduce boar taint using various management strategies, 2) to study different methods for detecting boar taint post-mortem, and 3) to investigate the feasibility of predicting at an early age whether boars are likely to have boar taint by the time they have reached slaughter age. Another project investigated the possibilities of producing and commercialising entire male pig meat.

Management strategies

The main components contributing to boar taint are skatole and androstenone. According to literature, skatole content in fat can be reduced by adding certain ingredients to the feed. In a feed experiment, different ingredients like raw potato starch, wheat bran, inulin, clinoptilolite and lupins were tested. None of these reduced skatole. Another experiment examined if good stall hygiene can reduce skatole content. In order to simulate the best- and worst-case scenarios, boars were either washed daily or rubbed with faeces daily. Consumers gave higher scores for the meat from the clean group than the dirty group, but trained experts preferred the dirty group to the control group. There were thus no clear indications of reduction by feed or hygiene. In a third experiment, boar taint prevalence in three pig breeds (Piétrain, Large White and Belgian Landrace) was investigated at four slaughter weights (50, 70, 90 and 110 kg). Boar taint occurred more often in Large White than in Piétrain, with Belgian Landrace in between. Boar taint also increased with higher slaughter weight, but the optimal weight appeared to be breed dependent.

Early detection

Detecting at an early age which boars are likely to have boar taint at slaughter would be very useful. If these high-risk boars can be reliably identified at an early age, farmers can take action, such as surgical castration with anaesthesia, immunocastration, or slaughter at an earlier age. We investigated behavioural predictors (aggressive, sexual and skin-floor contact) and physical predictors (size of testes, skin lesions and hygiene status) because these all have been linked with levels of androstenone and/or skatole. Among others, we found testes length and volume and aggressive and sexual behavior to be positively correlated with the concentration of skatole in fat. Further, skin lesions and sexual behaviour were correlated with the score given when melting the fat using hot iron (the hot iron method). Some of these predictors offer the possibility of predicting boar taint at an early age.

Entire male pigs

The possibilities for raising and commercialising entire male pigs were studied on two farms. Both pig producers noticed typical mating behaviour and the boars on one farm were also very aggressive and frequently bit the other pigs' tails. We also performed two consumer panels: a standardised consumer panel for meat products and home consumer panels for fresh meat. The consumers did not detect clear problems related to boar taint. On the other hand, in a more extended study, clear differences were found between meat from boars and barrows for the hot iron method, the consumer panel, the expert panel and the lab analyses of indole, skatole and androstenone. In general, at least 4% of the boars slaughtered at 110 kg clearly had boar taint.

Pietrain boars from the breed and slaughter weight experiment

5.5 Group housing of sows: a difficult reconversion

Group housing systems for gestating sows were prevalent in Belgium in the 1960s and 70s, then were replaced by individual stalls, as the latter were more efficient and profitable. However, pigs are social animals, and concerns have increased about how individual housing affects their welfare. These concerns resulted in a EU ban on housing sows individually from 4 weeks after service to 1 week before farrowing, to be implemented by 2013 at the latest.

The reconversion to group housing is difficult for Belgian pig farmers, as indicated from ILVO's biannual survey of 250 to 350 Flemish sow-keepers (ongoing since 2003). In 2003, 10.5% of respondents housed at least some of their sows in a group. By 2007, this percentage had risen to 29.8% (see figure 5). With an additional 6.6% of the respondents planning to change to group housing within two years' time, we expected at least 36% of the farms to have group housing by 2009. However, the 2009 survey indicates that the percentage of farms with group housing decreased to 24.6%. Few farms have been recently reconverted, and farmers with old group housing systems have quit farming. This is confirmed by the decline of the mean age of the group housing system from 12 years in 2003 to 5.5 years in 2009.

The survey revealed also that free access stalls are the most common type of group housing system in Flanders and its popularity is increasing (from 35% in 2003 to 44% in 2009). However, user-satisfaction for this system was not higher than that of most other group housing systems. User-satisfaction was highest for ad libitum feeding, and lowest for electronic feed dispensers.

Ad libitum feeding systems rank highest

We studied 41 Flemish pig farms with group housing in order to optimise group housing and support pig producers who are planning to reconvert. Our aim was to identify animal-, environment- and management-based factors associated with animal welfare status, production results and sanitary status. Systems with ad libitum feeding generally scored well, as exemplified by the low scores for sham chewing, skin damage, fearfulness and respirable dust concentration, and by the highest integrated animal welfare index. The other systems, i.e., free-access stalls, electronic feeding systems, trickle feeding systems, interval feed dispensers and troughs, all had inferior scores on one or several parameters.

Recommendations

The more frequently that new sows were introduced into a group, the higher the score for skin damage and vulva lesions. The frequency of such introductions should preferably be kept to a minimum. The study also revealed that the more often the farmer visited the sow unit, the less fearful the sows were. Straw bedding increased animal welfare: with straw bedding, fewer sows showed sham chewing behaviour and the ammonia and respirable dust concentrations in the farm building were lower. Legal demands for minimum floor area per sow and for light intensity were not yet met at a number of farms. The average number of pigs farrowed per sow per year was 23.2.

Group housing of sows with straw bedding

This cross-sectional observational study has highlighted several factors associated with the sustainability of the group housing system. Experimental trials are needed to determine whether these factors have a causal relation to the sustainability measures for group housing.

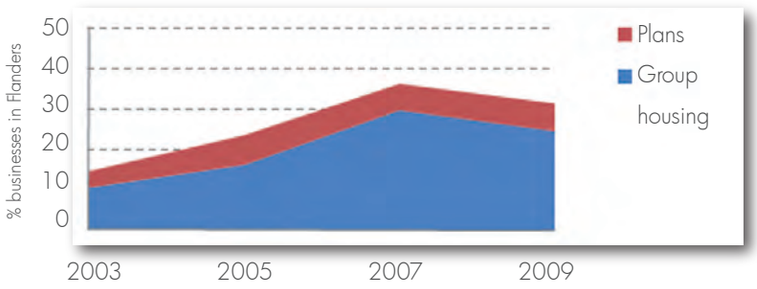


Figure 5: Evolution of the estimated percentage of farms in Flanders with group housing for (some of) the gestating sows, and the percentage of farms planning to reconvert within two years time. This graph shows the increasing share of farms with group housing from 2003 (10.5%) to 2007 (29.8%), and the subsequent decline in 2009 (24.6%)

5.6 The use of macrobenthos data in the context of recent European directives

Recently, some concepts like "the management of natural resources", "spatial planning at sea", and "good quality of the marine environment" have been integrated in important European directives, e.g., the Water Framework Directive and the European Marine Strategy. These directives build on the older Habitat- and Bird directives and on the OSPAR-convention for the Protection of the Marine Environment of the North-East Atlantic. To implement these directives (inter)nationally, management and policy instruments are needed (1) to evaluate the human impact on the marine system, and (2) to determine how the system recovers after (forced) measures are taken to reduce the impact. Biotic indices - based on biological indicators - are an excellent tool to reach this goal.

Macrobenthos as biological indicator and the translation to biotic indices

The Bio-Environmental research group at ILVO Animal Sciences-Fisheries (in cooperation with several scientific institutes) has been studying the state of the marine environment of the Belgian part of the North Sea (BPNS) for several years. This research uses the macrobenthos as one of biological indicators of the ecosystem. The macrobenthos is closely associated with the sea bottom, is not highly mobile, and forms an important link in the marine food web. Therefore, changes in the macrobenthos (due to disturbance, but also due to natural variation) will have direct and indirect repercussions on the rest of the system.

To summarise the large amount of data on macrobenthos (and other organisms) in a simple way – so it becomes useful as a simple management tool – several biotic indices are being developed, such as the Benthic Ecosystem Quality Index (BEQI). In an objective manner a simple score in five classes (excellent quality to bad quality) is calculated through a web interface (www.beqi.eu). This BEQI-score visualises the deviation (in density, biomass, species number and composition of the macrobenthos) of the impact (assessment) values against the chosen reference (control) data. ILVO's long-term datasets (>20 years) concerning the macrobenthos of the BPNS are a good base for the determination of the reference values. Recent research studies follow an Impact/Control design or even a BACI (Before/After Control/Impact) design, which enables us to calculate BEQI-scores and to compare different types of impact with each other.

Some applications of the Benthic Ecosystem Quality Index

We have been monitoring the macrobenthos of the 1-Mile zone of the Belgian coast since 2007. This monitoring, paid for by FPS-Environment, occurred in the framework of the the Water Framework Directive. In 2007 and 2008, the average BEQI-score was 0.61. As such, the ecological status of the benthos of the Belgian coast can be evaluated as "good". However, this should be nuanced, as some habitats in certain zones only got a "moderate" status (Figure 3). This means that we cannot yet speak of a "healthy" benthic coastal ecosystem. ILVO also participates in international calibration exercises that try to get all the different European countries oriented in the same direction concerning the implementation of the European Water Framework Directive.

In another project paid by FPS-Environment, the eutrophication status of the Belgian marine waters was evaluated in 2009 in the framework of the OSPAR-convention for the protection of the marine environment. This study forms the basis for future monitoring of the macrobenthos within the EC-Marine Strategy Directive. An important result is that the potential danger of eutrophication for the macrobenthos is largely related to the sediment/habitat type. No effect can be detected

Important representatives of the macrobenthos: polychaetes, amphipods and bivalves

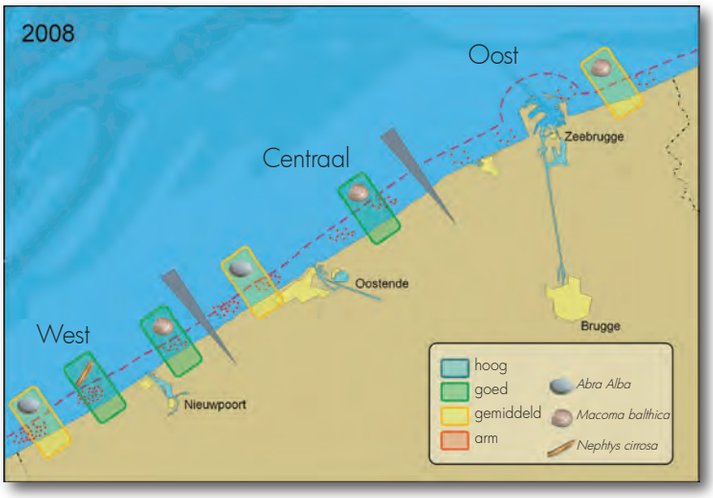


Figure 6: Visualisation of the overall ecological status (BEQI-level 3) for the Belgian coast in 2008

in the offshore sandy bottoms, while in muddy/fine sand substrate closer to the coast, eutrophication only creates a problem in absence of habitat structuring and bioturbating macrobenthic organisms (e.g., tube worms). Still, eutrophication is a potential threat to the macrobenthos in very muddy habitats, such as the eastern coastal zone of the BPNS. Different biotic indices all give the same result, but it remains difficult to calculate an overall BEQI-score, as good reference values (i.e., prior to the eutrophication problem) are lacking.

Also for other impact studies carried out by ILVO (e.g., sand extraction and windmill farms), BEQI-scores based on macrobenthos data are being calculated. For example, it is shown that dumping of dredged material in the Belgian coast has a negative impact on the macrobenthos (BEQI <0.5), but only in these dumping zones where >3 million tonnes of dry matter of dredged material is dumped yearly (Figure 7).

Some requirements for the use of biotic indices

The optimal use of biotic indices has several requirements. As shown above, there is an urgent need for good reference values and adequate control areas with minimal or nil impact of human activities. This can be accomplished by the delineation of marine protected areas (MPAs). Secondly, the impact evaluation has to be accompanied by objective data on the pressure of the impact, something which is feasible for example for sand extraction, but up till now is almost impossible for fisheries. Finally, biotic indices should be seen as tools to synthesise complex patterns, but they will never provide an explanation of the observed patterns. Therefore, the results should always be interpreted with caution. Bearing these requirements in mind, biotic indices are an ideal instrument to manage and protect the marine environment.

The use of biological data in geographical information systems

Next to biotic indices, recent developments in GIS (geographical information systems), based on integrated long-term data (on macrobenthos, among others) from several scientific institutes, also constitute an important tool to objectively support the management for the protection of the marine environment. In 2009 ILVO-Fisheries collaborated in the HABITAT-project (also financed by FPS Environment), taking the habitat types from Annex I into account, and the bird, fish and sea mammal species from Annex II of the Habitat Directive. The result is a compound GIS-map, based on objective biological knowledge, that visualises areas which should be declared as "areas of communal importance" (i.e., extension of the Natura 2000 areas) in the Belgian part of the North Sea to comply with the requirements of the European Biodiversity action plan in 2012. As a continuation of this project, preservation aims will be formulated in the beginning of 2010 to be able to evaluate the management that aims for a "positive preservation status" of the species and habitat types under consideration.

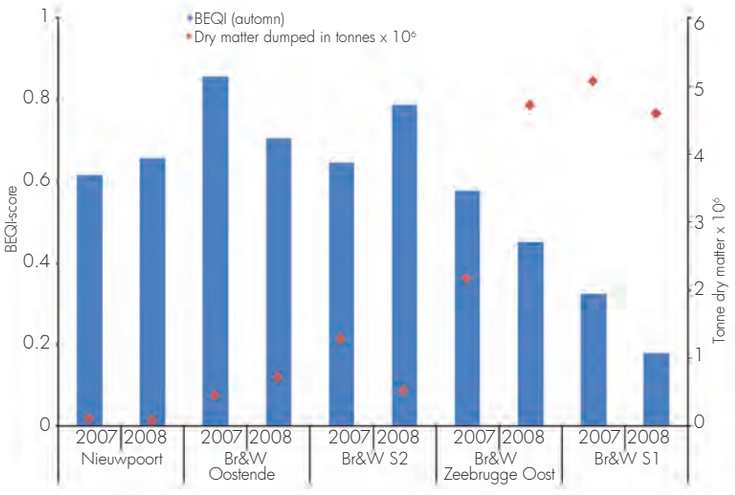


Figure 7: Average BEQI-score (autumn 2007-'08) (left axis) and dumping intensity of maintenance dredged material (right axis) for 5 dumping sites on the Belgian coast

5.7 Regional identity: driver for regional development

During the last decade, focus has shifted to a regional approach to politics, science and society. Globalisation processes expose most parts of the world to similar influences. As a consequence, people and companies are less bound to a particular region. People may start to feel insecure as their traditional cultural underpinning weakens. This cultural insecurity leads people to look for recognisable points of reference in their own surroundings. Differences between regions are emphasised, and region-specific features are assigned more value and used to fix identity.

Regional identity and rural development

Regional identity is often seen as the unifying factor between different features of an area. The location, the spatial shape of the area, the use of it by inhabitants, their characteristics and values, their way of treating each other, the atmosphere…all these factors determine the identity of an area. Regional branding initiatives often focus on regional identity. Regional branding, in the restricted sense, contains the creation of a brand for the region, which is assigned to all products and services produced and delivered by the region. In the broadest sense, regional branding also means that perspectives and regional and rural development initiatives are based on insight in the specific identity of the area. The idea is that the development of regions that are connected to and based on their identity, better meets the expectations of (potential) inhabitants and makes areas more successful. Regional identity can also mobilise people. A shared identity and appreciation of region-specific values motivates people to dedicate themselves to the region. As demonstrated by the case studies, each region also needs a few initiators - enthusiastic people with a passion for the region and an extensive social network, who can initiate changes and start up projects.

Region-specific characteristics, such as animals or crops typical of a region, are used to fix regional identities (Source: istockphoto)

One example of multifunctional agriculture: connecting care and agricultural production (Source: Wageningen UR, 2009)

Multifunctionality as unifying paradigm

Globalisation, coupled with modernisation, has created specialised, integrated and larger-scale agricultural enterprises. Modernisation processes in the agricultural sector have consequences on the economy, ecology and the social sphere. These side-effects of modernisation put pressure on modern agriculture. At the same time, society also has new expectations about the role of agriculture. Multifunctional agriculture is seen as a unifying paradigm to bring post-modern agriculture in accordance with new societal demands. Multifunctional agriculture produces both commodities and non-commodities like green care, management and maintenance of the landscape and farm tourism.

MUSICAL

Multifunctionality and local identity can be used as drivers for change in the countryside. The MUSICAL-project (MUltifunctionality and Local Identity as paradigms for a Competitve and Sustainable Agriculture) investigates whether multifunctional agriculture adds to the competitiveness of a region by contributing to regional identity. Theoretical insights on the use of regional identity in rural development are elaborated, based on literature study and case studies (grounded theory approach).

5.8 Pigs2Win: farm-specific advice for pig farms

The profitability of the pig sector is under pressure. Pig prices are determined by increasingly international competition, while the prices of raw materials are fluctuating and reducing nitrogen pollution implies additional costs. More than ever, pig farmers needs farm-specific advice to make the right decisions that will safeguard their income. As an answer to this need, we developed a decision-support tool to assist advisors.

Structure of the tool

The Pigs2Win tool was designed for "farrow to finish" pig farms. It consists of two phases: first, a diagnosis, then a simulation. The diagnosis compares the performance of the selected farm with the performances of the best reference farms (Figure 8). These reference farms use the least amount of material inputs (mostly feed for the pig finishing process and farrowing process) per unit of produced output (kg slaughter pig). A farm can only be considered as a reference if the combination of material inputs is similar to the combination of material inputs of the selected farm.

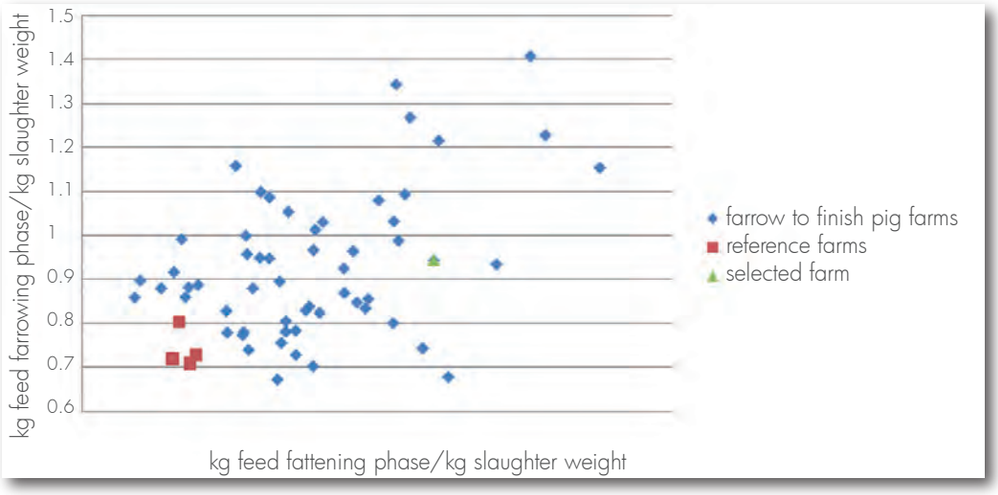


Figure 8: Ideal effectiveness of material inputs for the selected farm vs. reference farms

In addition to a graphical comparison, the tool also presents a numeral comparison using important farm-specific key figures (gross margin, variable costs, revenues, nitrogen excretion, feed conversion, prices, etc.). Furthermore, this tool can compare results of the selected farm with the results of farms whose performance lies between the reference farms and the selected farm. This is because farms mostly evolve step by step. This diagnosis also allows for detecting key figures which can still improve. In the simulation phase, the effects of an improvement of these key figures on the performance of the farm can be simulated. This allows the user to determine the key figures that need the most attention.

Realistic and specific comparisons

This tool adds value to traditional advisory in four different ways. First, it allows the user to identify realistic benchmarks. In traditional advisory, benchmarks are selected for each key figure. For example, a benchmark for feed conversion can be selected as the average of the 10% best farms for feed conversion, while a benchmark for daily growth is the average of the 10% best farms for daily growth. Clearly, the combination of these benchmarks does not correspond to a realistic farm. Our tool integrates several technical key figures to input use and output production. Therefore it allows the user to identify realistic benchmarks that correspond to a real farm. A second added value is the comparison with the best farms as well as with intermediate farms, to elaborate stepwise improvements. A third added value is that technical information is separated from price information. Are high revenues for the pig farmer due to the efficiency of his production or due to the high price received for the product? Our tool can answer this question. The fourth added value is the possibility to simulate the effects of an improvement of key figures on the performance of the farm.

"farrow to finish" pig farms

5.9 CoPKO: Collective learning about qualitative research

In 2008, the Social Sciences Unit created the Community of Practice Qualitative Research (CoPKO) as a way to collectively answer questions about qualitative research methodologies.

CoPKO at work

CoPKO's mission is to build and to exchange knowledge and expertise about qualitative research methodologies and methods, and about multi-stakeholder processes. To this end, we are developing a database of the current knowledge of all the researchers; taking courses and then teaching the rest of the unit; organising seminars and discussing current research together.

Dynamic learning pathways

First, the knowledge database enables information exchange and identifies knowledge gaps. Then, different researchers have the opportunity to fill the gaps by taking courses on subjects such as focus groups, discourse analysis and quality of methodology. So far, we have taken ten courses and shared the information with our colleagues. Further, all didactic information is centralised in a "knowledge folder" and the person who takes the course stays available to further guide colleagues using the method.

Second, in response to great demand, we organised a course on qualitative interviewing. Two experienced teachers from KWALON, the Dutch platform for qualitative research, came to teach. We invited ILVO colleagues and other researchers to participate. This led to an interesting melting pot of different disciplines.

Focus groups of greenhouse farmers discussing molecular farming (Social Sciences Unit, in collaboration with ILVO's Technology and Food Science Unit)

Invitations for seminars and the course on qualitative interviewing

Third, CoPKO leads an interactive seminar about qualitative research methodology. External researchers of different disciplines share their methodological knowledge and experiences with an audience from inside and outside ILVO. We were honored to welcome Pierre Stassaert, Francis Turkelboom, Jeroen Bryon en Jan Lepoutre, who talked about intervention research, challenges for qualitative research as relevant to policymakers, and the role of qualitative research in sustainable land use and management issues. We also were pleased to invite Katrien Termeer and Filip De Rynck, who spoke from the point of view of the public administration.

Last, CoPKO stimulates discussion among researchers on designing interview questions, coding, and interpreting results. This helps researchers in different disciplines, especially those doing qualitative research, to arrive at better and more trustworthy results.

5.10 Indicators for sustainable entrepreneurship and management

Current Flemish (and European) agricultural policy stimulates competitive and sustainable agriculture and horticulture. A transitional process will lead to sustainable agriculture in which the entrepreneur will be key. Craftsmanship alone is no longer enough; entrepreneurial and managerial skills are becoming more important.

Sustainable agricultural development requires sustainable entrepreneurship/management. One important question is thus "when is entrepreneurship/management sustainable"?

Brainstorming session on "Sustainable entrepreneurship/management" by stakeholders of Flemish agriculture and horticulture

Entrepreneurship and MOTIFS

The Social Sciences Unit has developed an indicator-based Monitoring Tool for Integrated Farm Sustainability (MOTIFS), for assessment of sustainable development of agricultural and horticultural companies. The aim of MOTIFS is to develop indicators for assessment and stimulation of sustainable entrepreneurship and management of Flemish agricultural and horticultural holdings.

This instrument, which is continually being refined, examines all aspects of sustainability, e.g., economic, ecological and social. Integration of these very divergent aspects will require farmers and growers to develop entrepreneurial and managerial skills. For this reason, sustainable entrepreneurship and management is one of the main topics in MOTIFS.

Workshop provides insight in important topics

Indicators cannot be thought up in isolation. To this end, we organised a workshop on indicators for sustainable entrepreneurship and management. More than 20 stakeholders in Flemish agriculture and horticulture attended. The stakeholders were private and governmental advisors (both technical and economic), bank consultants, representatives of agricultural and horticultural organisations, training agents, public authorities, and researchers, as well as farmers and horticultural growers themselves. Participants brainstormed on the following two questions:

1. Which topics are relevant for assessing farmers and growers' entrepreneurial and managerial skills?
2. What are relevant indicators for these topics?

The following themes emerged from the first brainstorming session: 1) vision/strategy, 2) planning/organisation/control/evaluation, 3) networking/cooperation, 4) risk management, 5) opportunity recognition and realisation/pro-activeness, 6) searching and learning behaviour, and 7) innovation. Some of the participants also emphasised the importance of craftsmanship.

The group assigned top priority to the first four above-mentioned topics. We then brainstormed on possible indicators for these four topics. This generated valuable input for further development of the indicators.

Determination of themes for "Sustainable entrepreneurship/management" by means of an interactive group process

5.11 Root-knot nematode *Meloidogyne chitwoodi:* quality damage to carrots and sanitation with fodder radish

The root-knot nematode *Meloidogyne chitwoodi* can multiply on a wide variety of important agricultural crops. This nematode causes severe quality damage to carrots. Chemical treatments against these nematodes are expensive, not profitable and environmentally unsafe. Control with crop rotation is only possible in few cases. Since the 1990s, an increasing number of lots of carrots have been refused by the canning industry, especially from the sandy soils in the provinces of Antwerp and Limburg. Nowadays, contracts are only given for fields free of *M. chitwoodi*. These fields are becoming scarce. We thus examined the presence of resistance and tolerance in commercial carrot cultivars. We also studied the importance of the field period on the damage development of *M. chitwoodi* on carrots.

Avoiding damage to carrots

Five carrot cultivars were grown in a fully randomised block design on a field naturally infested with *M. chitwoodi*. We chose one cultivar with a high nematode multiplication (ABK), two cultivars with a moderate multiplication (Mokum and Sweetheart) and two cultivars with a low multiplication (Berlanda and Parmex). The carrots were sown at the end of May. The initial population (Pi) of *M. chitwoodi* was determined at the same time. The carrots were harvested after a field period of 100, 120 and 140 days and evaluated for quality damage. At the time of harvest, the end population (Pf) of *M. chitwoodi* was also determined. Two cultivars showed no damage: Berlanda and Parmex. All cultivars had minimal damage when the field period was shortened to 100 days. The results from our study show that carrots can be grown with limited damage on fields with a low initial *M. chitwoodi* infestation. The choice of the cultivar and the length of the field period play an important role. All cultivars were host plants for *M. chitwoodi*. Some only maintained the population (Pf ≤ Pi), while others provoked a substantial rise in the population (Pf > Pi). It is therefore important to sanitise the field after growing carrots.

Lowering the population of *M. chitwoodi*

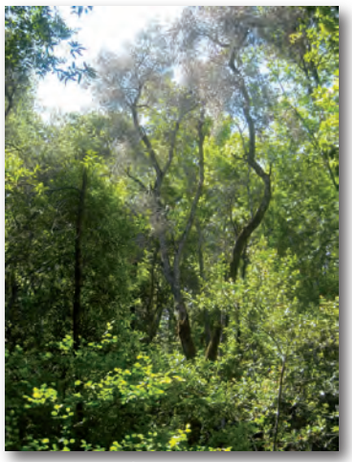
During winter and in the absence of a host plant, the population of *M. chitwoodi* decreases substantially. Planting fodder radish as a green manure crop can be an alternative for black fallow. We examined two cultivars and two candivars from a breeding program for *M. chitwoodi* resistance. In both cultivars and candivars, resistance was present. In the field plots, the population of *M. chitwoodi* decreased in the same amount under fodder radish as under black fallow.

An additional nematicidal effect could come from fodder radish's ability to decompose glucosinolates present in the plants. We thus examined the amount of these compounds in fodder radish and their retention time in the soil. No significant differences were found between the cultivars and candivars. In stems and leaves, glucorahenine (GRE) was the most important glucosinolate; in the soil, glucoraphasatine (GRH) was prevalent. Four days after incorporation of fodder radish in the soil, the concentration of GRH was highest; 18 days after incorporation, GRE was highest. Three weeks after incorporation almost no glucosinolates were retrieved from the soil. Glucosinolates from the above ground plant material were gradually released in the soil. It may be beneficial to incorporate fodder radish before the frost period to maximise its nematicidal properties. This subject needs further investigation.

Quality damage on carrots caused by Meloidogyne chitwoodi

5.12 *Phytophthora ramorum*: risk for Rhododendron, Belgian forests and public green space

Phytophthora ramorum is a new Phytophthora species that has caused extensive mortality of local oaks - called "Sudden Oak Death" - in the west coast of the US. *P. ramorum* has been found in Europe, including Belgium, but it has mostly been limited to *Rhododendron* in ornamental nurseries.



Mortality of local oaks on the west coast of the US, known as "Sudden Oak Death"

To date, *P. ramorum* has only caused limited damage to trees in Europe, and none in Belgium. But as an answer to the potential threat, EU emergency phytosanitary measures were created in 2002. If *P. ramorum* is detected at a nursery, severe quarantine measures are implemented. Flanders is one of the largest European producers of rhododendron, so the issue is very relevant for our horticultural industry.

In 2002, the amount of scientific information about this pathogen was limited, making it difficult to estimate the risk for the European nurseries, public green space and forests. Both legislators and growers needed more scientific information about this disease. ILVO received two research grants to study *P. ramorum*: one to increase our knowledge on pathogen spread and control in nurseries and one to study genetic diversity, potential for mating and chances for infection and survival in Belgian forests and soils.

Spread and control of *P. ramorum* in nurseries

Direct above-ground spread of *P. ramorum* happens mainly over very short distances and usually requires direct contact with an infected plant part. However, the pathogen can spread over several metres via its zoospores that wash into the water film on the plastic surface. From there, they can reach new above-ground plant parts via splash dispersal. The water film can also enable the pathogen to move into the root ball of new plants, in which it can survive in a latent state for at least 8 months. This last point creates a clear risk factor for the latent spread of the organism in the international horticultural trade.

The susceptibility of Rhododendron cultivars differs markedly. The resistance does not inherit in a dominant manner. It takes place at the level of host penetration, and it is well-correlated with resistance to other *Phytophthora* species. Certain fungicides are very effective for preventive above-ground control of *P. ramorum*. However, there is a considerable risk for development of fungicide resistance, as indicated by *in vitro* tests. Fortunately, field isolates are not yet resistant to most fungicides.

Experimental set-up at a quarantaine mock nursery for the study of Phytophtora ramorum *spread via the water film to the root ball*

Analysis of the Belgian *P. ramorum* population and conclusions about introduction and evolution

We determined the genetic diversity using AFLP and (mainly self-developed) microsatellite markers. The genetic structure of the Belgian *P. ramorum* population indicates the primary introduction of a genotype that spread epidemically and from which other, continuously more unique genotypes, developed via stepwise mutation. According to the genotyping information, together with data on isolation year and site, multiple separate introductions took place at certain nurseries. In some cases, *P. ramorum* survived locally (and latently). There is no clear association between certain genotypes and specific hosts. Certain control measures affected the genetic diversity.

In Europe, all isolates are of A1mating type, except for three A2 isolates from Belgium (from 2002 and 2003). Genotypic and phenotypic analysis of A1 and European A2 isolates indicates a single mating type switch event, presumably via mutation and several years before the detection of the isolates.

Risk for mating, spread and survival in Belgian forests

Microsatellite marker analysis of *in vitro* progeny (generated at the Walloon Agricultural Research Centre (CRA-W)) demonstrated that these progeny are indeed recombinants, but often aneuploid and unstable. Thus far, they are not more pathogenic than the parent strains.

Based on the dispersal characteristics of the pathogen and the susceptibility and distribution of potential hosts, we do not expect a steep increase of the disease in Belgian forests. It should be noted however that *P. ramorum* can survive at least 1.5 years in detached infected leaves inside Belgian forest substrates.

5.13 Forages: a big fat problem?

Interest in the fatty acid composition of ruminant products (milk and meat) is increasing. There is more and more evidence that saturated fatty acids are linked to cardiovascular disease in humans, and that unsaturated fatty acids are beneficial for human health. The fatty acids that animals consume affect the concentrations of fatty acids in their meat and milk. Feed composition has been too high in saturated fatty acids, and the concentrations of unsaturated fatty acids too low. This has created the need to find feed strategies to improve the fatty acid composition. Forages, a significant part of the ruminant ration, have a relatively high percentage of polyunsaturated fatty acids. However, these fatty acids already partially degrade during wilting and ensiling due to oxidation and lipolysis. Feeding red clover silages also result in a higher proportion of polyunsaturated fatty acids in milk and meat in comparison to feeding ryegrass silages. This is probably caused by the lipid-protecting activity of red clover polyphenol oxidase (PPO).

With the ultimate goal of improving fatty acid composition of ruminant meat and milk in order to improve human health, we carried out the following studies. We first examined the effect of wilting and ensiling on the degradation of forage lipids, and we also assessed PPO's lipid protecting properties *in vitro*, *in silo* and in an *in vitro* rumen system.

Wilting and ensiling protect fatty acids in forages

Wilting forages gave rise to oxidation. At first, it appeared that specific wilting conditions could reduce these losses. However, differences persisted between forage species under similar wilting conditions. This indicates that other factors could influence the extent of the oxidation. These factors are likely plant-specific, such as anti-oxidants, lipoxygenase activity, or the like.

Agricultural practice only affected lipolysis in the silage to a limited extent. Lipolysis was decreased by a strong reduction of the fermentation from adding formic acid to the silage additive. Clover silage, especially red clover, generally showed less lipolysis than ryegrass silage over several experiments.

Polyphenol oxidase (PPO) and lipid metabolism

We performed *in vitro* experiments to study the effect of PPO on lipid metabolism. These experiments strongly indicated that lipases, which are responsible for lipolysis in the silage, can be directly inhibited by protein bound phenols resulting from PPO activity. Damaging of red clover induced PPO activity, which lowered lipolysis at the highest degree of damaging.

Labscale silages made by vacuum packing the forages in polyethylene bags

The lipid-protecting effect of damaging could not be confirmed during the *in vitro* rumen incubation. Nonetheless, silages of red clover showed lower bio-hydrogenation than fresh clover, regardless of degree of damaging. This could indicate that lipid protection occurred during ensiling, but further research on this topic is needed.

Conclusions

A short wilt followed by restricted fermentation can reduce lipid degradation in forages. Additionally, lipid degradation is generally lower in clover silages.

In the case of PPO, protein bound phenols can inactivate enzymes, which can be enhanced by damaging of red clover. The effect of PPO on the protection of lipids in the rumen has yet to be elucidated, however.

Intense brown colouring of red clover after severe damaging is an indication if high induction of polyphenol oxidase activity

5.14 Plant breeding in a test tube

Innovation is important in agriculture and horticulture. In the Applied Genetics and Breeding research area, we develop techniques and use them to create valuable and innovative pre-breeding material. *In vitro* techniques can help to improve the success of breeding, and can make genetic combinations possible that would otherwise not be possible. At ILVO, we are continually increasing our expertise in creating novelties through in vitro techniques.

Inducing polyploidy

Polyploid plants, which have a higher number of chromosome sets, often show improved morphological and physiological characteristics and better fertility. Polyploidisation is a common practice in plant breeding. It is often accomplished *in vitro* by plant tissue culture. Hybridisation between two plants is often difficult if one parent plant is diploid and the other tetraploid, but *in vitro* polyploidisation can be used to get parent plants to the same ploidy level. This makes crossing possible, with a novel plant as the result.

Ploidy chimera, where cells with different chromosome numbers exist in the same plant, can also be manipulated *in vitro* to make plants with a stable chromosome count that can subsequently be bred. ILVO looks for techniques to find ploidy chimera and to regenerate stable polyploids out of chimeric tissue *in vitro*. For example, ILVO researchers discovered that an azalea with two-coloured petals and broth margins had tetraploid cells on the edges while the centres were diploid. *In vitro* regeneration led to complete tetraploid azaleas, which are currently used in breeding.

Embryo rescue

Seeds of interspecific hybridisation often degenerate because of a lack of nutricion (endosperm) in the seed. *In vitro*, the growth substrate can supply an alternative to feed the embryo and help it survive (called embryo rescue). Depending on the crop, one can put a complete seed in tissue culture or only the isolated embryo. ILVO has raised seed cultures of interspecific azalea and *Buddleja* (butterfly bush) crosses, as well as isolated embryos of *Hibiscus*. The offspring plants are raised in the greenhouse or on the field to be evaluated as possible novelty.

Isolation of an embryo for in vitro *embryo rescue*

Protoplastfusion

A protoplast is a plant cell without cell wall. When these protoplasts are fused, this leads to new chromosome combinations and novel plants. ILVO develops protocols for asymmetric protoplast fusion with partial exchange of chromosome fragments of donor and acceptor parent. We test ornamentals within the Araceae family, and various types of chrysanthemum. Protoplast fusion is also applied to *Cichorium intybus* (industrial chicory) and a related species, *Cichorium endivia*, with the aim of generating new varieties that produce more inulin (a healthy and useful additive that has many applications in food).

In vitro *plantlets after interspecific azalea crossing*

Somaclonal variants

Somaclonal variants are plants with an altered phenotype after *in vitro* propagation. This spontaneous variation is unwanted in commercial *in vitro* propagation, but it can be very useful to find a plant with altered form, flower or leaf colour. Azalea is known for its spontaneous changes in flower colour while cultivated (sport formation). At ILVO, we use *in vitro* culture to induce these sports for breeding purposes.

5.15 Industrial chicory: cold stress tolerance

Industrial chicory is mainly cultivated in Belgium for inulin production. Inulin can be used as a sweetener or a soluble nutritional fibre, and it functions as a prebiotic. Inulin is a linear fructose polymer with a glucose at the end. Chicory's most important characteristics are root yield, inulin yield and quality. These characteristics are strongly influenced by the variety used, as well as the sowing and harvest date. The current cultivation conditions (sowing in mid-April) provide the best inulin quality in September, but the largest root yield is only reached in November. Sowing in March would produce higher root yield when the inulin quality is the highest. Under these conditions, plants would need have an efficient early vigour at lower temperatures, and be bolting resistant. Early vigour is a complex characteristic and is difficult to evaluate in the field. This complicates the selection of better varieties. Moreover, the climate conditions are not suitable each year to determine the breeding material's tolerance to cold stress under field conditions.

Photo 1: Measurement of the chlorophyll fluorescence for industrial chicory using the CFImager (Technologica, UK)

Aim

The aim of this study was to develop a physiological screening procedure to evaluate the cold sensitivity of the early vigour for industrial chicory under controlled conditions at temperatures just above 0°C.

Results

We looked for a procedure based on a physiological process linked with early vigour; one that could be evaluated quickly and objectively. We studied early vigour and the related physiological processes for eight varieties and lines grown under stress and control temperatures. A positive correlation was found between the early vigour and the photosynthetic efficiency, and a negative correlation between the early vigour and the energy-dissipation (energy not used for photosynthesis). The latter can be determined quickly and non-destructively through chlorophyll fluorescence. We evaluated the cold sensitivity of seedlings at different temperatures and light intensities through chlorophyll fluorescence image analysis (Photo 1). We then selected a parameter that could estimate the damage to the photosynthesis complex, and selected a measurement condition to distinguish between genotypes with different early vigour capacity at low temperatures.

The experiments also revealed that certain genotypes coloured red during cold (Photo 2). The colouration of the upper epidermal layer of the leaf is attributed to the accumulation of anthocyanin. Chlorophyll fluorescence measurements showed that red leaves were more resistant to photoinhibition. Anthocyanin acts as a sunscreen that reduces the availability of the light for photosynthesis and reduces the risk to the formation of free radicals that could damage the photosynthesis complex.

Photo 2: Anthocyanin formation for industrial chicory during cold stress

Conclusion and perspectives

The cold sensitivity of industrial chicory can be evaluated through a chlorophyll fluorescence parameter related to energy-dissipation.

This knowledge will be implemented in the industrial chicory breeding programme to select genotypes with better early vigour during cold stress. These genotypes will lead to the development of new varieties with better early vigour. The methodology used for chicory may also be useful in selecting cold-tolerant genotypes for other crops.

5.16 Earthworms as indicators of soil quality

Earthworms are considered the most important soil invertebrates in most soils worldwide in terms of biomass and activity. They play an important role in soil formation and affect soil structure, as their burrows are important in maintaining soil aeration and drainage. Furthermore, they contribute to the breakdown of organic matter. When earthworms feed, most of the nutrients are converted into a form available to plants.

Lumbricus terrestris. *This earthworm lives in permanent vertical burrows in mineral soil layers (up to 1m deep) and feeds at the soil surface by dragging litter into the soil*

Populations of earthworms vary greatly in terms of numbers or biomass and diversity. The size of these populations depends on a wide range of factors, including the climate, soil properties and most importantly the ready availability of organic matter, as it is a food source for the earthworms. Earthworm populations are also greatly affected by many of the main agricultural practices; certain cultivations decrease earthworm abundance, whereas no-till and conservation tillage practices favour the buildup of earthworm populations. Fertilisers and organic matter amendment help build large earthworm populations, whereas inorganic fertilisers contribute indirectly because of increased crop yields, thus increasing the amount of crop residues added to the soil. Crop rotation, the inclusion of perennial crops, high-residue crops, and cover crops should also increase earthworm populations.

Soil quality

Maintaining soil quality is a hot topic. Several definitions of soil quality have been suggested so far, but Doran and Parkin's (1996) definition is widely accepted: "soil quality is the ability of a soil to sustain biological productivity, maintain environmental quality and promote plant, animal and human health". A wide range of indicators of soil quality has been suggested; it has become clear that the indicators must include biological components. Earthworms are easy to sample, easy to identify, and greatly influence soil quality. For all these reasons, earthworms are one of the best biological indicators of soil quality.

Earthworms as indicators of soil quality

ILVO is running several long-term experiments, established to study the effect of different agricultural management practices like fertilisation and crop rotation on crop yields and soil quality. We sampled a number of these field experiments for the numbers and weights of earthworms in the top 20 cm of soil, using a combined method of extraction by mustard powder solution and hand sorting. The survey of the earthworm population revealed a positive relation between organic matter amendment and earthworm abundance. Exogenous organic matter serves as a food source, which encourages the buildup of larger earthworm populations. Furthermore, we noticed significantly higher earthworm numbers under grassland in comparison with arable land. Under permanent grassland disturbance is limited and food is presumably more abundant, which increases the earthworm population.

Earthworms tend to respond well to changes in agricultural management. This makes them useful as an indicator organism. However, while evaluating soil quality, we have to keep in mind that it is important to integrate physical and chemical indicators as well as biological indicators, as the correct functioning of a soil depends on an immense number of physical, chemical and biological properties. Earthworms cannot be the only measurement of soil quality, but they are a good indicator.

Applying a mustard powder solution. The solution flows into the earthworms' burrows and floats them to the surface for collection

5.17 Agricultural damage by wintering geese

Flanders is a popular winter destination for several migratory goose species. Their population rises to almost 100 000 during the winter months. These geese feed on farmers' fields which can lead to financial loss for the farmers. In 2009, the Flemish government decided to alter the system for compensation of farmers. ILVO teamed up with the Nature and Forest Agency (ANB) and the Research Institute for Nature and Forest (INBO) to research the geese, agricultural damage and damage assessment.

Pink-footed geese on grassland

ILVO researchers aimed to answer the following three research questions:

1. Does grazing by wintering geese lead to measurable effects that last until the harvest period on winter wheat, grassland and ryegrass seed production?
2. What are appropriate methods and parameters to accurately assess yield differences in these three crops?
3. Does the presence of wintering geese lead to fertilisation of agricultural fields?

Wintering geese on agricultural crops: are there losses? How to measure them?

Grazing on grassland in winter resulted in an average loss of 450 kgDM/ha in the first cut in spring. However, quality of the grazed crop did not decline: protein levels increased by 1% and cellulose decreased by almost 1%. Measurement of grass height is best performed during dry weather conditions and when grass height is between 10 and 25 cm. Furthermore, a clear relationship between grass production and grass height was confirmed (Figure 9). The loss per cm grass height was calculated at 150 kgDM/cm*ha.

A sole grazing event by wintering geese on five parcels winter wheat resulted in a limited yield increase of 0.4 ton/ha on average, whereas repeated grazing on one parcel showed losses up to 1.4 ton/ha. Single grazing events seemed to stimulate sprouting, with an average increase of 20 ears/m^2. The moisture content of harvested wheat was 1.1% higher on average. When geese grazed repeatedly on the same field, the moisture content was even higher.

We evaluated three options for assessing agricultural damage in winter wheat, with ILVO performing the yield measurements for evaluation. The first method consisted

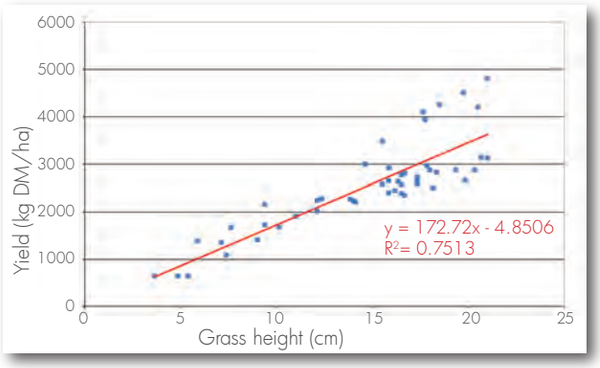


Figure 9: Relation between grass height and production

of counting and calculating average ear density and ear weight. These parameters showed such high variability, that we had to exclude them for damage assessment. The second method was assessment based on satellite information about wheat yield production. A Dutch company called Basfood provided this information (Figure 10). For two parcels, yield estimations deviated not more than 5% from ILVO's measurements, which is acceptable. However, results of two other parcels differed more than 10 and 20%. Yield prediction with this system thus still has some shortcomings. The third option, currently used in the Netherlands, is using experts who visually estimate yield losses in terms of percentages. The results from the Dutch expert who performed damage assessment on a few parcels remained within 5% deviation from ILVO's yield measurements.

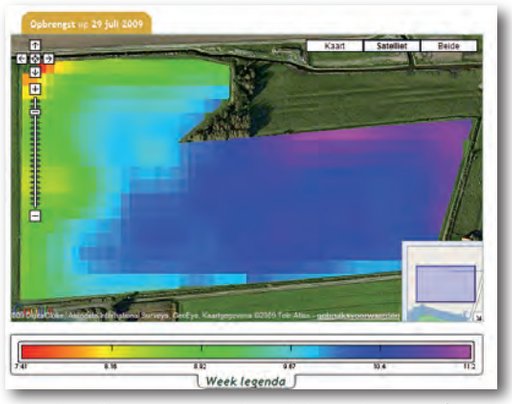


Figure 10: Satellite image with yield prediction of winter wheat

Only one out of three parcels grass seed production was grazed by wintering geese. Seed yield was not affected, but we did notice a loss of about 500 kgDM/ha on fodder production, by measuring the grass height. However, the inherent crop characteristics of Italian ryegrass made it impossible to arrive at a fixed number for loss per centimetre.

Fertilisation by goose droppings in winter: a serious problem?

We estimated the amount of nitrogen coming from goose droppings that was added to agricultural fields during the winter. First, nitrogen addition was calculated by dropping counts and analysis of droppings composition. We also sampled the soil of four heavily grazed fields and analysed it for nitrogen content. In general, grasslands showed larger additions than arable fields. The maximum amount of added nitrogen was a mere 10 units (kg) per hectare.

5.18 S*almonella* control in pig production

Contamination of pork carcasses due to *Salmonella* infection in pig farms is a major concern for human health, and can damage the pork export market position. We evaluated the risk of human infection and evaluated interventions throughout the pork chain. Innovative feed additives were tested in practice as an intervention to reduce the shedding of *Salmonella* by fattening pigs.

There were 3944 human *Salmonella* strains were registered in 2008, of which 58% belonged to the serotype Typhimurium. This serotype is also most frequently isolated from pork (69% of the isolates in 2006) (Figure 11).

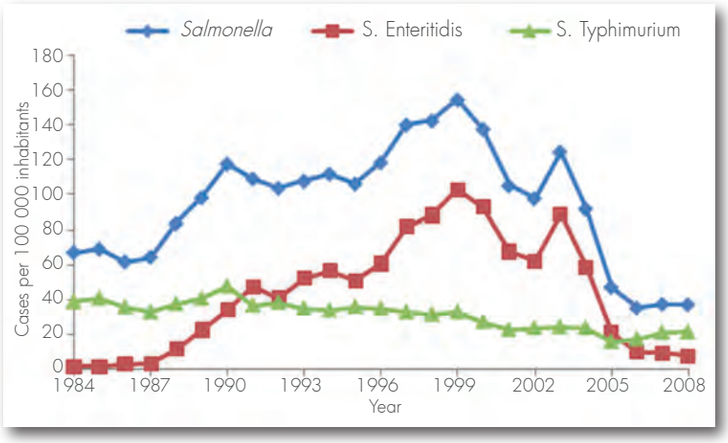


Figure 11: The yearly number of human salmonellosis case per 100 000 inhabitants in Belgium, 1984-2008. The serotype Enteritidis was most frequently registered until 2005, after which the serotype Typhimurium became the most common

Quantitative microbial risk assessment

A quantitative microbial risk assessment (QMRA) was conducted to evaluate the risk of human salmonellosis through household consumption of fresh minced pork meat in Belgium. The exposure assessment was carried out by building the modular risk model METZOON, which covers the pork production from farm to fork with six consecutive modules: (1) primary production, (2) transport and lairage, (3) slaughterhouse, (4) post-processing, (5) distribution and storage, and (6) preparation and consumption. The number of annual salmonellosis cases was estimated using the number of consumptions of fresh minced pork meat, the population size and the fraction of susceptible population (estimated as 24%). The predicted number of annual salmonellosis cases is 20 513 [9 932 – 38 246]. The risk was estimated to be higher for the susceptible population (13 517 [7 887 – 21 691]) compared to the normal population (6 996 [2 045 – 16 555]) and is mainly due to undercooking and, to a smaller extent, cross-contamination in the kitchen.

The model produces highly realistic results and was used to assess the effectiveness of intervention strategies. According to our results, the most effective interventions were during slaughter processes, i.e., polishing, evisceration and chilling, as well as during post-processing. Interventions in the primary production and at the beginning of the slaughter process seemed to be less effective. Improving consumer awareness was also effective.

Innovative feed additives to reduce *Salmonella* contamination of pork

In collaboration with Ghent University's Laboratory of Animal Feed and Quality of Animal Products (LANUPRO), feed preparations supplemented with short or medium chain fatty acids and/or essential oils were tested on their potential to reduce *Salmonella* shedding by fattening pigs.

Sampling feces of fattening pigs for Salmonella *analysis*

Feces sampling of fattening pigs would lead to reduced contamination of both 1) the carcasses during slaughter and 2) the processing line. If the processing line is less contaminated, this cross-contamination will also be reduced to batches slaughtered afterward. In cooperation with "Dierengezondheidszorg Vlaanderen" (DGZ), we selected six finishing farms and six closed pig farms with a known *Salmonella* history. The first five months (or first fattening period) were considered as the control period, whereas during the test period, supplemented feed was administered during the 15 months following (or three consecutive fattening periods). In the control period, on average 14% of the finishing pigs were shedding *Salmonella* at slaughter age, whereas only 6% of the finishing pigs (all ages) on the closed farms were *Salmonella* shedders. Typhimurium was the predominant serotype (62%), followed by Agona (20%) and Derby (9%).

Results showed that during the test period, the number of *Salmonella* shedding animals decreased to 3% on the finishing farms, but not on the closed farms (9%). These results are not only the consequence of the feed additives, but possibly also to other variable company factors during the test (e.g., cleaning and disinfection protocol, use of antibiotics, origin of animals). The results must therefore be interpreted carefully.

5.19 Microbiological egg quality: influences and improvements

The legal requirements for housing systems for laying hens requires the ban of conventional cages starting in 2012. From then on, only the use of furnished cages and non-cage systems will be allowed. In the light of this change, we researched the sanitary status and the quality of eggs from furnished cage systems vs. non-cage systems.

We studied the sanitary status of eggs during an international on-farm comparison. The mean bacteriological contamination of the air was significantly lower in the furnished cages compared to the non-cage systems, but no difference was found for Enterobacteriaceae. The study also indicated that the surfaces in both systems may have a comparable hygiene status after cleaning and disinfection. The eggshells of eggs from furnished cages were on average less contaminated with total bacterial flora than eggs from non-cage systems. Eggshell contamination with Enterobacteriaceae and the proportion of eggs with eggshell dirt was not influenced by the housing system. Interesting to note was the higher percentage of cracked eggs in furnished cages than non-cage systems. In summary, the study showed acceptable differences in sanitary status and egg quality between both housing systems. More striking were the considerable within-flock differences for each housing system. These results indicate that not only the housing system influences egg sanitation, but that farm construction or management also causes differences.

Aviary housing system for laying hens (Provincial Centre of Applied Poultry Research in Geel)

Influence of vitelline membrane properties on *Salmonella* penetration and chitosan coating of the eggshell

In 2008, 20.9% of the human salmonellosis cases in Belgium were caused by *Salmonella enterica* serovar Enteritidis (SE). Eggs and egg products are considered to be the main source of infection.

High *Salmonella* counts in the egg content are mainly reached after vitelline membrane penetration, as this allows rapid bacterial multiplication in the yolk. It is thus of interest to investigate the correlation between the SE penetration through the vitelline membrane and its characteristics: the strength, the protein content (via SDS-PAGE) and the ultra structure, such as thickness and the percentage of the area with electron-dense material (determined via transmission electron microscopy). The vitelline membrane strength was correlated with its thickness and with the percentage area of electron-dense material. Also, a slight but significant correlation was found between the vitelline membrane strength and the moment of vitelline membrane penetration, suggesting that it is harder for SE to penetrate a stronger vitelline membrane.

Shell contamination can also affect human health. To reduce the shell contamination and penetration by SE and to preserve the internal quality of the egg, a shell coating with chitosan, a natural polysaccharide with antimicrobial activity and film-forming properties, was applied. First, a chitosan type was selected out of eight types, based on its antimicrobial activity against SE in a model system. Subsequently, we investigated the effect of the chitosan coating (0.25, 1 and 2% chitosan) on the shell contamination, on the trans-shell penetration and on the internal quality of the egg.

Uncoated (0% chitosan) and coated (0.25, 1 and 2% chitosan) eggs

While the SE shell contamination was not affected by the chitosan coatings tested as compared to the uncoated eggs, trans-shell penetration was affected. A 2% chitosan coating significantly reduced the trans-shell penetration by SE. Eggs coated with 1% and 2% chitosan also kept their internal quality longer.

5.20 Tasteful and healthy dairy products

Overweight and obesity are important risk factors for developing a chronic disease, such as cardiovascular disease, cancer, diabetes, hypertension and osteoporosis. Key factors in obesity are increased consumption of high-calorie food that is rich in saturated fats and sugars together with low amounts of physical activity.

Influence of milk fatty acid composition on the quality of ice cream

Animal fat, milk fat included, is rich in saturated fatty acids that contribute to an increased risk for cardiovascular disease. Lowering saturated fatty acids and increasing unsaturated fatty acids may positively affect human health.

For this reason, ILVO Technology & Food performed a study to adapt and improve the milk fatty acid composition through a selective feeding system for dairy cattle. This research aims to raise the relative amount of unsaturated fatty acids in the milk and to examine to what extent the quality, shelf life and processing of this milk is different from that of conventional milk.

A comparison was made between ice cream prepared of milk with a conventional milk fatty acid composition and milk enriched with omega-3 fatty acids. Both the process conditions and the quality of the ice cream were examined. Ice cream with increased unsaturated fatty acid content possessed a smoother texture and faster melting behaviour, but no significant differences were observed during organoleptic tests.

This study showed that delicious ice cream can be produced from milk with a modified fatty acid composition without needing to change processing conditions.

Quality of ice cream with reduced milk fat content

Another project examined to what extent the milk fat in ice cream could be reduced without quality loss. Research demonstrated that the use of certain fat replacers allowed the production of ice cream with 5% of milk fat with the same quality as that of ice cream with 8% milk fat. Further reduction of the milk fat to 2.5% is also possible, when the use of a balanced combination of fat substitutes is used. However, this kind of ice cream melts more rapidly and has a firmer mouth feel.

Sugar reduction and/or replacement in neutral and fermented beverages and ice cream

We also studied reduction and/or replacement of added sugar in various dairy products. Several sugar substitutes were tested in neutral and sour beverages. The relative sweetness of the different sweeteners in milk beverages, soy beverages and fermented milk beverages were determined and compared with their relative sweetness in water. The taste profile of the different sweeteners was determined for 30% sugar reduction and maximum possible sugar reduction. Based on these results, several sweetener combinations were tested for their sweetness and taste profile. Certain combinations could replace sugar completely.

Within the framework of this project, we also developed a programme to calculate the composition of ice cream mixes by means of their ingredient list. The programme shows how the composition of the ice cream must be adapted when certain ingredients are reduced or raised in concentration. The programme also calculates the freezing point and the caloric value of the end product, and can determine the cost of the mix. With this tool, ice cream mix formulations with at least 30% reduction of total sugars were optimised by using a combination of sugar substitutes. The quality and taste of the 30%-less-sugar ice cream was comparable to that of the reference ice cream.

Start of melting behaviour of ice cream with modified milk fatty acid composition

End of melting behaviour of ice cream with modified milk fatty acid composition

5.21 Current challenges in GMO detection: the quest for unauthorised GMOs

Different legislations worldwide govern the authorisation of genetically modified organisms (GMOs). Despite these regulations, novel GMOs occasionally enter the market without authorisation (unauthorised GMOs or "UGMs"). Recently reported incidents have created an urgent need to harmonise regulations at a global level and call for appropriate strategies to discover UGMs. Products carrying genetic modifications that are unknown to authorities, or for which an officially validated test is not available, are excluded from routine analytical detection. Also, due to the high cost of analytical testing, only a limited number of products are analysed, and the different tests performed are limited. Nevertheless, UGM discovery capacity is crucial to limit the potential risks associated with UGMs, both curatively and preventively. We therefore propose a paradigm shift in the way UGMs can be discovered and focused on two complementary approaches to tackle this challenge.

Knowledge-technologies-based discovery of UGMs

The first approach is a documentation-based screening for products that potentially contain UGMs using knowledge technologies. This product-centered approach is built on the observation that GMOs "lead a life" in two parallel spaces: first in physical space and second in documentation space. Clearly, conventional analytical testing is restricted to physical space. Knowledge technologies like data mining and others can be used to exploit the documentation space, i.e., to collect, structure, and interpret documents available through the Web, and to extract knowledge from it, with the purpose of discovering UGMs. This strategy aims to complement the routine analytical screening, which is analyte-centered (Figure 12). This new documentation-based strategy enhances market coverage, reduces discovery time, focuses on informed, targeted selection of suspect products for dedicated analytical confirmation, and consequently ensures efficient use of analytical resources.

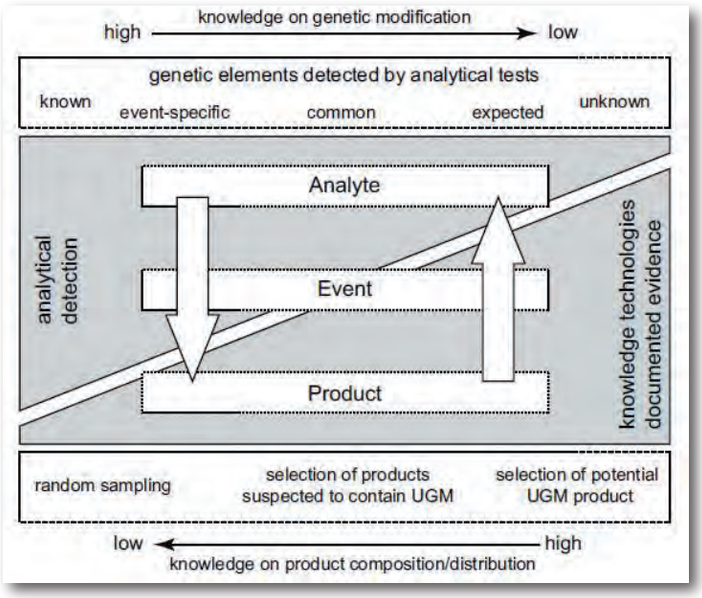


Figure 12: Two complementary approaches, "analyte-centered" and "product-centered", are necessary to discover UGMs

Fluorescent anchor-PCR fingerprinting

Currently, UGMs are detected by screening blind samples for commonly used transgenic elements, such as p35S or t-nos. If positive detection of such elements shows the presence of transgenic material but none of the known GMOs are positively detected, then the presence of an UGM is inferred. However, such evidence is indirect because it is based on negative observations and it is inconclusive, because the procedure does not identify the causative event per se. In addition, detection of UGMs is hampered in products that also contain known authorised events. Therefore, we developed a new fluorescent anchor-polymerase chain reaction (PCR) method for the identification of the sequences flanking the p35S or t-nos screening elements (Figure 13). Anchor-PCR fingerprinting is a high-resolution profiling technique that allows the detection of unique discriminative signals for each event in parallel. In addition, sequencing of amplicons directly identifies every event present in a

sample. Screening for UGMs in the food and feed chain is important to protect environmental and public safety. At the same time, reporting the discovery of UGMs may have huge consequences for international trade and public perception. It is thus equally important to avoid false alarms. The method that we developed provides conclusive and unambiguous evidence to identify all events present in a product.

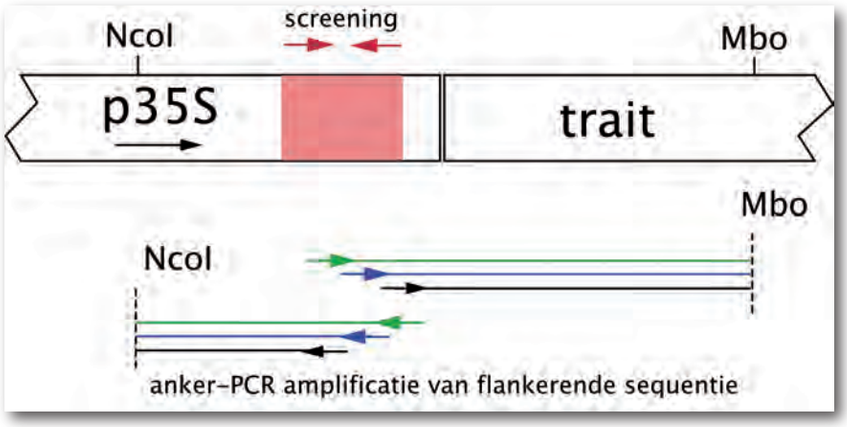


Figure 13: Schematic representation of fluorescent anchor-PCR fingerprinting. The technique is based on the use of restriction enzymes, subsequent ligation of corresponding adapters, followed by PCR amplification using one primer targeting the genetic element detected in the routine screening test and another primer based on the adapter. The use of 3 nested PCRs and the specific 3-colour triplet structure normally obtained after capillary electrophoresis suppress false positive amplicons

5.22 Energy consumption model for off-road use of mobile machinery in agriculture (OFFREM)

ILVO and VITO have made an emission model, as requested by the Department of the Environment, Nature and Energy. This model will be used to calculate the emissions from mobile machinery during off-road use. In agriculture, mobile machinery is used almost exclusively off the road. The model includes numbers per region for Belgium. The core of the emission model, in which exhaust and non-exhaust emissions are included, is the energy consumption of the machines. The exhaust emissions are determined first by energy consumption, then taken together with the fuel type and the engine type, capacity, technology and age.

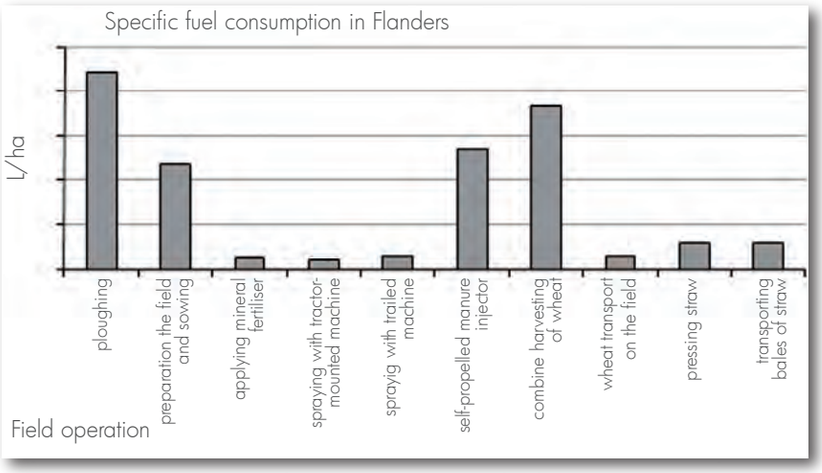


Figure 14: Culture and field operation specific fuel consumption (L/ha) in Flanders for a number of field operations during the cultivation of winter wheat. Ploughing is the most energy-consuming activity (22L/ha) whereas applying mineral fertiliser or spraying with a trailed machine barely consumes 2L/ha

Model calculation for energy consumption in agriculture

The energy consumption model is based on a German study on the specific fuel demand of diesel engines in agriculture with respect to the machine size, the type of trailed or tractor-mounted machine, the soil resistance, the field size, and the load (L spraying liquid/ha or tonnes of product/ha) (KTBL, 2005). Data on the fuel demand were combined with data on cultivation technique, soil type, field size, and average capacity and age of the tractors, taken for each region in Belgium (Flanders, Brussels, and Wallonia). The model includes stationary fuel consumption, fuel consumption while working on the field, and fuel consumption for transport to and from the field. The model uses a fixed number of hours of engine service for general tasks related to livestock farming such as mucking out the stable, scooping silage, etc. That number was estimated per farm type, as based upon the agro accounting of 125 pig farmers and 392 cattle farmers as inventoried by "Boerenbond" (the largest Belgian farmer's association).

The agricultural sector was categorised into agriculture, pasture and livestock farming. The following subcategories were distinguished: cereals, industrial crops, fodder, potatoes, dry harvested legumes, and vegetables grown in open air ("agriculture"), temporary and permanent pastures, and fallow land ("pasture") and cattle, pigs and poultry ("livestock farming"). A technical sheet on the cultivation practice was created for each crop culture. These sheets contain information on the number of field operations, plus (per field operation) the number of field runs, the percentage of fields subjected to the operation (e.g., a green manure crop is sown on 90% of the wheat fields after harvest) and the partial (specific) fuel consumption. The fuel consumption for the same culture and field operation varies slightly between regions, and so does the total relative fuel consumption (L/ha) for that culture. Per culture and per region, this relative fuel consumption or indicator is multiplied by the total area under cultivation to yield the absolute fuel consumption (L). Data on the cultivation area are drawn from the agricultural census of the NIS. The distribution of field sizes per region is derived from the detailed agricultural census of 2007. Agricultural machines were divided into 3 classes according to their size: 13% small (35-69 pK), 85% medium (70 179 pK) and 2% large (>180 pK) tractors. Soil data were derived from the soil map of Belgium.

Greenhouse cultivation, orchards, tree nurseries, open-air ornamental plant culture and "other industrial crops & agricultural seeds" are not part of the study as there was insufficient or no information on the cultivation practice.

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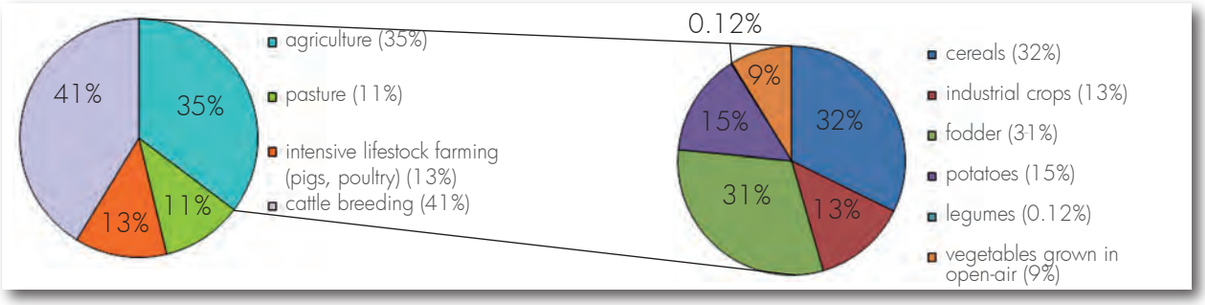


Figure 15: Relative share of the different subsectors of agriculture in the absolute off-road energy consumption in Flanders. Agriculture (35%), pasture (11%), intensive livestock farming (pigs, poultry) (13%) and cattle breeding (41%) total 4.133PJ (2007) of primary energy consumption. Of the energy consumption in agriculture, cereals account for 32%, fodder for 31%, potatoes for 15%, industrial crops for 13%, open-air grown vegetables for 9% and legumes for 0.12%

5.23 Drift and drift reduction from field crop sprayers: an integrated approach

Spray drift from agricultural pesticides can cause crop protection chemicals to be deposited in undesirable areas. This can cause serious consequences such as damage to sensitive adjoining crops and susceptible off-target areas, environmental contamination, illegal pesticide residues, and health risks to animals and people.
Spray drift and risks connected with application of pesticides in agriculture are attracting increased attention from the general public as well as the scientific community. In 2003, ILVO started a five-year-long collaboration with Ghent University and Katholieke Universiteit Leuven to study drift and drift reduction from field crop sprayers.

Field measurement to investigate the effect of crop type on the amount of spray drift

Integrated approach

Indirect drift experiments (spray quality and wind tunnel measurements) and direct drift experiments (in the field) were performed, and drift models developed. These experiments revealed the effect of spray application technique, droplet characteristics, buffer zones, meteorological conditions, spray liquid properties, border structures, and crop characteristics on drift from field crop sprayers. Various spray application factors were also evaluated, such as spray boom height, air support, nozzle type and pressure and driving speed. The results indicated that indirect drift measurements can be a valuable alternative to field drift experiments.

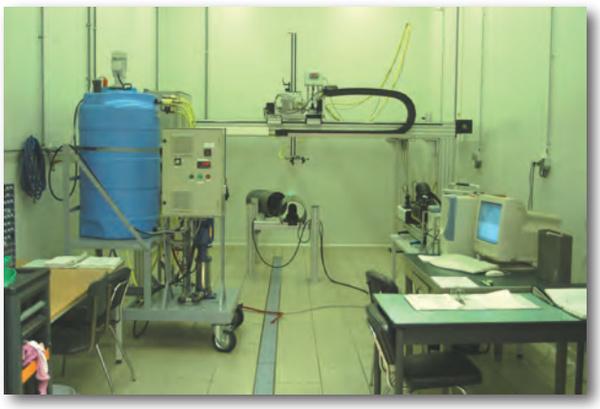
Katholieke Universiteit Leuven developed a validated 3D Computational Fluid Dynamics (CFD) mechanistic drift model. This model can be used to systematically study different influencing factors. This model was reduced to a fast and accurate 2-D diffusion advection model, which is a useful hands-on drift prediction tool.

Results

This project resulted in drift measuring protocols and advanced measuring techniques, a unique drift database useful for spray drift risk assessments, and spray drift models. We developed measures to minimise the negative effects of spray applications on the environment. These measures will raise farmer's and manufacturer's awareness of good agricultural practices.

The experiments and the models revealed the most influential spray application factors to be the fraction of small droplets and the spray boom height. Meteorological conditions and crop characteristics significantly affect the amount of spray drift. Drift can be greatly reduced by using screens or buffer zones.

The protocols, data and models now available will help to further understand and reduce the complex phenomenon of spray drift. This information is available for manufacturers, farmers and policy makers.



PDPA laser based measuring set-up of for measuring droplet size and velocity measurements of spray nozzles


Transferpette
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6 Service Provision

6.1 Sietinet

SIETINET, a VIS-TD project that began in 2004, aims to supply the ornamental sector with essential scientific information. During 2009 we continued to promote this transfer of knowledge. Two workshops were organised, one on photosynthesis and another on data management in plant breeding. Sietinet encouraged the associated companies to invest in research and development in a long-term manner. This resulted in an IWT-funded innovation project in 2009 and two submitted project applications (an EU project for SMEs and an IWT-innovation project). In 2009 alone, the members of SIETINET submitted more than 170 questions concerning plant physiology, plant breeding, plant tissue culture and plant biotechnology.

6.2 Accreditation Extended for the Diagnostic Centre for Plants (DCP)

The Diagnostic Centre for Plants (DCP) is the most prominent plant health laboratory in Flanders. Safeguarding and improving the health and quality of commercially produced plants and plant products provides significant support for two areas: 1) sustainable agriculture and horticulture via policy makers and the sector, and 2) evaluation of plant health in public and private green spaces. The DCP is accessible for growers, consultants, private customers, research facilities and government extension services. The DCP performs a number of important tests for the certification of planting material and for the implementation of the European plant health legislation to ensure that high quality planting material, substantially free from plant pests and diseases, is available to growers. It also implies detection and identification of quarantine organisms in plants, plant products, soil, growing substrates and surface water. The DCP treats more than 6,500 samples per year, some of which are part of large-scale surveys.

The DCP traces, isolates and identifies bacteria, fungi, viruses, mites, insects and nematodes. To this end, we use an extensive variety of conventional and molecular analytical methods. These provide a timely and accurate result.

In 2008, the DCP obtained an accreditation according to the standard ISO17025 (BELAC certificate n° 304-TEST) for the entomology and mycology discipline. In 2009, this scope was extended to include the bacteriology laboratory's accreditation for demonstrating the presence of *Clavibacter michiganensis* ssp. *sepedonicus* and *Ralstonia solanacearum* in potato tubers, and of *Ralstonia solanacearum* in surface water. In addition, the nematology laboratory obtained an accreditation for demonstrating the presence of *Meloidogyne* ssp. in potato tubers, plant roots and soil. The entire scope is available at http://diensten.ilvo.vlaanderen.be/diagnosecentrum/Documents/Accreditatiecertificaat.pdf.

6.3 Accreditation for Crop Husbandry and Environment's Reference Lab for Plant and Soil

The reference laboratory for plant and soil of the Plant Sciences Unit's Crop Husbandry and Environment research area gained a positive result for the BELAC audit held in September 2009. The accreditation for chemical and NIRS analyses of forages was maintained. For plant analyses, the accreditation scope was extended with the matrix "energy crops" for the following parameters: moisture, crude ash, crude protein, crude fibre, and cell wall components NDF, ADF and ADL. Moreover, the scope was extended with the matrix "mineral soil". Starting on 8 December 2009, all analyses of organic carbon, pH-KCl and nitrate and ammonium nitrogen (1M KCl-extract) in mineral soil are now executed under BELAC-accreditation.

6.4 Detection of Italian ryegrass in seed lots perennial ryegrass using image analysis

For the certification standard, only 1% of seeds of other species are allowed to be present in seed lots of perennial ryegrass. The presence of Italian ryegrass in seed lots of perennial ryegrass can be a problem in some cases. However, it is very difficult, even for an expert, to distinguish cleaned seeds of perennial ryegrass from Italian ryegrass, as the most discriminating characteristic (the chaff needle present with Italian ryegrass) is removed due to the cleaning process. We have studied the feasibility of using image analysis to inspect for the certification standard. The morphology of the rachilla section, and the morphology, colour, and texture of the seed and rachilla of perennial and Italian ryegrass were compared. Based on the parameters derived from the rachilla section, 94 and 87% of the seeds of perennial and Italian ryegrass, respectively, could be correctly

classified. Characteristics related to morphology, colour, and texture of the seeds and the rachilla enabled 90 and 93% of the seeds of perennial and Italian ryegrass to be correctly classified. The representative shape of the rachilla section, the rachilla and the seeds of perennial and Italian ryegrass were described. Unfortunately, we could not develop a model enabling seed classification of the two grass species with a precision of 99%. Nevertheless, the results of this study have resulted in an improved description of these ryegrass seeds. This led to improved visual assessment by experts. The results were discussed in detail with the experts of the laboratory for seed testing and the seed producing companies.

6.5 Several new cultivars registered on variety lists

Our breeding programme resulted in 2009 in the registration of several cultivars on variety lists, through which they can be commercialised. The Italian ryegrasses "Meldiva"(2n) en "Melmia" (4n) were registered on the Belgian and German variety list, respectively. In the Netherlands, the nematode resistant fodder radish "Guillotine" was registered. A new white celery "Goldfever" was selected and became available in 2009 for the vegetable market. The chicory breeding programme was very successful, with four new cultivars: "Canzona" and "Diésis" on the Belgian list and "Dolce" and "Cadence" on the Dutch and French list, respectively. Last but far from least, the Hydrangea paniculata "Mega Mindy®" was introduced to the market in September.

6.6 Extraordinary seed yields for red clover and white mustard

The 2009 harvest resulted in extremely high seed yield. The hard winter and a cold spring were the ideal basis for an optimal vernalisation and low incidence of fungal disease. 2009 was a hot year with lots of sunshine and a fair amount of wind, which favored pollinisation. During the harvest season, the weather conditions were quiet stable, dry and sunny, resulting in few lodging problems. All these factors led up to very high seed yields. Ryegrasses yielded on an average 275 kg/ha, more than the past five years. Best results were obtained with tetraploid ryegrass cultivars as "Meritra", "Meroa", "Gemini" and "Merkem". They yielded more than 2000 kg/ha.

Seed yield of red clover reached extraordinary weights of even 700 kg/ha and more. This is twice the mean of the past five years. White mustard also had record yields with mean seed yield values of 1800 kg/ha compared to the average of 1200 kg/ha. New and optimal crop husbandry techniques assisted with these higher yields, but the optimal weather conditions were a very important factor in the high yields.

6.7 ILVO-GMO lab obtains ISTA accreditation for GMO analyses in seeds

Monitoring the presence of GMOs in seeds falls under regional authority in Belgium. The Laboratory for Seed Analysis from the Product Quality Monitoring unit (ALV) has many years of experience in seed testing. The Seed Analysis Laboratory since years is accredited by ISTA, the International Seed Testing Association (Zurich, Switzerland). It is the aim of the GMO laboratory of ILVO Technology & Food Science to be ready for the analysis of GMO seed lots in Flanders once the co-existence regulations will be in force in Flanders. We have thus already written procedures for the detection and quantification of GMOs in seeds. Besides a BELAC accreditation according to ISO 17025 since 2004, the GMO lab obtained an ISTA certificate for the screening of GMOs in seed lots in June 2009. This accomplishment was in large part thanks to a close collaboration with the Seed Analysis Laboratory. Since 2008, the ILVO Technology & Food Science GMO lab actively screens for GMOs in maize (corn) seed lots on behalf of the Flemish Government.

6.8 Technical/scientific support for the FASFC and analyses for the government and sectors on non-authorised GMO linseed/flax event FP967

Via the Rapid Alert System for Food and Feed (RASFF), in early September 2009, German authorities reported the presence of Canadian linseed with the non-authorised GMO linseed/flax variety FP967/CDC Triffid in seed lots tested. About 70% of the Canadian linseed in Europe goes to the bakery and confectionery sector for processing. The same linseed was also detected in Belgium in the same month. These findings, and questions from Europe and the Belgian Food Agency (FASFC), led the Belgian National Reference Lab for GMOs – of which ILVO's GMO lab is part – to rapidly implement FP967 linseed specific detection methods and perform a set of analyses on imported linseed. In addition, we answered many technical and scientific questions concerning the linseed case, originating from FASFC, external labs and industry.

6.9 ILVO measures the efficiency of low-emission animal housing systems and techniques

The Agricultural Engineering research group performs air quality measurements of low emission animal housing systems in collaboration with farmers. These housing systems are equipped with one or more emission reduction techniques, such as air scrubbers, dust collection devices, fogging systems, etc. These measurements are

then used to quantify the emission reduction efficiency and to evaluate the influence on indoor air quality with respect to occupational safety. Automated sampling and analysing instruments perform continuous measurement of gases and dust concentrations.

6.10 A new agreement between ILVO, MCC Flanders and CRV regarding the calibration of ICAR-approved milk metres

Thanks to ILVO's agreement with the Milk Control Centre Flanders (MCC) and the Cooperative for Beef Improvement (CRV) signed on 9 September 2009, from 2010 onwards it will be possible to calibrate all ICAR-approved milk metres linked to a PC. A test is first conducted using water and then a comparative report is produced. Properly adjusted milk metres deliver more precise measurements and have a lower pressure loss in the milk pipelines. This leads to fewer bacterial infections and udder health problems. The test will be carried out by qualified technicians during the annual inspection of the milking machine. Participation in the project will be encouraged but is not compulsory.

6.11 Inspection of sprayers in Flanders

Since 1995, ILVO's Technology & Food Science Unit is responsible for the mandatory and periodic inspection of sprayers in Flanders. Every three years, about 12,000 field sprayers, 2,000 orchard sprayers and 1,000 greenhouse sprayers are tested by three mobile inspection teams. In 2010, we added three new and fully equipped vans to carry out these inspections.

6.12 Investment in a pilot plant to support innovation of the Flemish agro-food industry

Flanders' FOOD and ILVO Technology & Food have teamed up to upgrade ILVO's previously dairy-focused pilot factory to include equipment for research lines for other food products. Flanders FOOD is the competence pool for the Flemish food industry. They coordinate this project, which began in September, and ILVO Technology & Food is executing it.

Prior to beginning the construction project, we surveyed the Flemish agro-food companies about the need for public pilot plant infrastructure. 900 contacts from the various food sectors were asked to complete the survey. 113 contacts replied within the required time period, resulting in a response rate of ±13%.

All food processing sectors need equipment to reduce and mix food products, with a high preference for mixing, sieving, suspending and homogenising. They all need the following: 1) conservation technologies such as pasteurisation, cooling, freezing and drying; 2) filling and packaging options, such as MAP packaging of solid products; 3) equipment for processing viscous products, such as pumps and heaters; and 4) controlled thawing.

The results of the survey will be taken into account when selecting the new pilot plant equipment. The various equipment suppliers have now been asked to make their bids. Construction will continue into 2010.

6.13 Successful fourth renewal of the BELAC accreditation for food analyses

On 17, 18 and 19 June 2009 began the fourth audit cycle of the Quality Division of ILVO's Technology and Food Science Unit (ILVO-T&V). A new BELAC audit team performed the "fourth prolongation audit" during those three days. They audited both the ISO 17025 testing laboratories and the proficiency studies organised according to the ILAC-G13:08/2007 Guide.

The prolongation audit was combined with an expansion of the scope with the identification and quantification of NSAID's (Non Steroidal Anti-Inflammatory Drugs) in meat using LC-MS/MS and the detection of tetracyclines in tissue of animal origin using the Tetrasensor Tissue 20. The latter method was introduced by the flexible scope.

ILVO-T&V's Quality division of has been accredited since 1995. The activities are performed in four laboratories: 1) the laboratory for physical and chemical analyses, 2) the laboratory for chromatographic analyses, 3) the laboratory of microbiological and GMO analyses and 4) the laboratory for the detection of antibiotics.

The Quality Division is accredited for 65 analyses and 6 types of proficiency studies.

The complete scope of accredited analyses can be found on our website: http://www.ilvo.vlaanderen.be/Portals/8/Documents/scope_QA.pdf

6.14 Additional regarding the determination of residues in meat at ILVO's Technology & Food Science Unit

The application of veterinary drugs can lead to the presence of residues in the meat for human consumption, eventually with a concentration above the Maximum Residue Limit (MRL).

Carcasses are checked on a regular basis by the Federal Food Agency (FAVV) on the presence of injection sites. We have validated methods to screen meat for antibiotics and developed a liquid chromatographic method coupled to mass spectrometry (LC-MS/MS) in order to identify and quantify residues of anti-inflammatory drugs in these samples.

The meat sector and control organs of certain quality labels also showed interest in the determination of residues in meat. For certification of certain meat exports (e.g., to the Russian Federation) certain residue analyses are mandatory.

For screening of residues of antibiotics and chemotherapeutics in meat, we performed a primary validation according to the Commission Decision 2002/657/EC criteria of the Premi®Test (DSM Food Specialties, Delft, NL) after solvent extraction in pork meat. In a second step, we performed a validation on a limited number of substances of different families of antibiotics on meat of different animal species origin (beef, chicken and fish). The fish species *Pangasius* was used in the test case.

Regarding the detection of (fluoro) quinolones and tetracyclines in meat, a similar validation of the *E. coli*-plate test and the TetraSensor Tissue (20 µg/kg) (Unisensor, Wandre, BE) was performed.

Non Steroidal Anti-inflammatory Drugs (NSAIDs) belong to different chemical classes and have an inflammatory effect besides their antipyretic and analgesic properties. ILVO's Technology & Food Science Unit developed a multi-residue LC-MS/MS method, which is currently used to determine nine different NSAIDs in meat. We may later extend this method to other compounds belonging to the group of NSAIDs. With this method all substances can be demonstrated at MRL level or at 10 µg/kg of the components for which no MRL is set. The method was fully validated according to Commission Decision 2002/657/EC.

6.15 ANIMALAB – accreditation for ILVO-Animal Sciences Unit

Since 2007, four laboratories of ILVO's Animal Sciences Unit in Melle are accredited according to the ISO 17025 standard. As all analytical activities of ILVO's Animal Sciences Unit were united under ANIMALAB (Animal Marine Laboratory), the laboratories of the Fisheries research area in Ostend, also have to work according to this standard by 2011. The 16 labs have expertise in the field of biochemistry, chemistry, chromatography, physics, genetics, immune physiology, culture, microscopy, wet, organoleptic, otoliths, plankton, technology, digestive physiology, fish and fish quality. At first, only a limited number of chemical (PAHs and PCBs) and biological parameters (age determination in fish, identification of macrobenthos, determination of toxic phytoplankton) will be analysed according to the protocols in this ISO-standard. In 2009 we focused on the completion and implementation of the management system, i.e. instrumentation, global management and infrastructure projects. The entire Microscopy lab was renewed at the end of 2009. Further, processes such as sample receipt, analysis protocols, result processing, validation, reporting and archiving were standardised and documented. More general processes such as training of personnel, the maintenance and calibration of equipment, infrastructural and safety aspects were made uniforme. In addition to documenting most testing procedures, some draft validation plans were also made. The pursuit of accreditation should contribute to the reference functioning of ANIMALAB and the appeal of the associated scientific research groups and projects of ILVO's Animal Sciences Unit.

7 Publications

7.1 Articles published in journals and included in the Science Citation Index

Animal Sciences Unit

Aluwé M., Millet S., Nijs G., Tuyttens F. A. M., Verheyden K., De Brabander, H.F., De Brabander D. L. en Van Oeckel M. J. (2009) Absence of an effect of dietary fibre or clinoptilolite on boar taint in entire male pigs fed practical diets. Meat Science, 82: 346-352.

Bossaert P., Leroy J. L. M. R., De Campeneere S., De Vliegher S. en Opsomer G. (2009) Differences in the glucose-induced insulin response and the peripheral insulin responsiveness between neonatal calves of the Belgian Blue, Holstein-Friesian, and East Flemish breeds. Journal of Dairy Science, 92: 4404-4411.

Buijs S., Keeling L., Rettenbacher S., Van Poucke E. en Tuyttens F. A. M. (2009) Stocking density effects on broiler welfare: identifying sensitive ranges for different indicators. Poultry Science, 88: 1536-1543.

De Backer A., Adam S., Monballiu J., Toorman E., Vincx M. en Degraer S. (2009) Remote Sensing of Biologically Reworked Sediments: A Laboratory Experiment. Estuar Coast, 32 (6): 1121-1129.

De Campeneere S., De Boever J. L., Vanacker J. M., Messens W. en De Brabander D. L. (2009) Feeding measures to reduce nitrogen excretion in dairy cattle. Archives of Animal Nutrition, 63 (2): 87-103.

Delezie E., Maertens L., Huyghebaert G. en Lippens M. (2009) Can choice feeding improve performances and N-retention of broilers compared to a standard three-phase feeding schedule? British Poultry Science, 50 (5): 573-582.

Fiems L. O. en De Brabander D. L. (2009) Optimum growth rate of Belgian Blue double-muscled replacement heifers. South African Journal of Animal Science, 39 (supplement 1): 6-10.

Fiems L. O., De Campeneere S., Van Caelenbergh W. en De Brabander D. L. (2009) Effect of indoor energy restriction level and management on beef production in Belgian Blue double-muscled cow-calf pairs. Journal of Animal Physiology and Animal Nutrition, 93 (6): 678-687.

Fredriksen B., Font i Furnols M., Lundström K., Migdal W., Prunier A., Tuyttens F.A.M. en Bonneau M. (2009) Practice on castration of piglets in Europe. Animal, 3 (11): 1480-1487.

Gliozzi T. M., Zanibone L., Maldjian A., Luzi F., Maertens L. en Cerolini S. (2009) Quality and lipid composition of spermatozoa in rabbits fed DHA and vitamin E rich diets. Theriogenology, 71 (6): 910-919.

Grémare A., Labrune C., Vanden Berghe E., Amouroux J. M., Bachelet G., Zettler M. L., Vanaverbeke J., Fleischer D., Bigot L., Maire O., Deflandre B., Craeymeersch J., Degraer S., Dounas C., Duineveld G., Heip C., Herremann M., Hummel H., Karakassis I., Kedra M., Kendall M., Kingston P., Laudien J., Occhipinti-Ambrogi A., Rachor E., Sardá R., Speybroeck J., Van Hoey G., Vincx M., Whomersley P., Willems W., Wlodarska-Kowalczuk M. en Zenetos A. (2009) Comparison of the performances of two biotic indices based on the MacroBen database. Marine Ecology Progress Series, 382: 297-311.

Lippens M., Delezie E., Maertens L. en Huyghebaert G. (2009) Influence of feed texture and early quantitative feed restriction on performance, growth development and carcass composition of two broiler strains. Archiv Für Geflügelkunde, 73 (1): 29-40.

Metzger Sz., Szendrö Zs., Bianchi M., Hullar I., Fébel H., Maertens L., Cavani C., Petracci M., Radnai I. en Biro-Németh E. (2009) Effect of energy restriction in interaction with genotype on the performance of growing rabbits. II. Carcass traits and meat quality. Livestock Science, 126: 221-228.

Renaud P. E., Webb T. J., Bjørgesæter A., Karakassis I., Kedra M., Kendall M., Labrune C., Lampadariou N., Somerfield P. J., Wlodarska-Kowalczuk M., Vanden Berghe E., Claus S., Aleffi I. F., Amouroux J. M., Bryne K. H., Cochrane S. J., Dahle S., Degraer S., Denisenko S. G., Deprez T., Dounas C., Fleischer D., Gil J., Grémare A., Janas U., Mackie A. S. Y., Palerud R., Rumohr H., Sardá R., Speybroeck J., Taboada S., Van Hoey G., Weslawski J. M., Whomersley P. en Zettler M. L. (2009) Continental-scale patterns in benthic invertebrate diversity: insights from the MacroBen database. Marine Ecology Progress Series, 382: 239-252.

Smet K., De Block J., De Campeneere S., De Brabander D. L., Herman L., Raes K., Dewettinck K. en Coudijzer K. (2009) Oxidative stability of UHT milk as influenced by fatty acid composition and packaging. International Dairy Journal, 19 (6-7): 372-379.

Sprenger M., vangestel C. en Tuyttens F. A. M. (2009) Measuring thirst in broiler chickens. Animal Welfare, 18 (4): 553-560.

Struelens E. en Tuyttens F. A. M. (2009) Effects of perch design on behaviour and health of laying hens. Animal Welfare, 18 (4): 533-538.

Struelens E., Tuyttens F. A. M., Ampe B., Ödberg F., Sonck B. en Duchateau L. (2009) Perch width preferences in laying hens. British Poultry Science, 50 (4): 418-423.

Teirlynck E., Bjerrum L., Eeckhaut V., Huyghebaert G., Pasmans F., Haesebrouck F., Dewulf J., Ducatelle R. en Van Immerseel F. (2009) The cereal type in feed influences gut wall morphology and intestinal immune cell infiltration in broiler chickens. British Journal of Nutrition, 102: 1453-1461.

Tuyttens F. A. M., Maes D., Geverink N., Koene P. en Rodenburg T. B. (2009) Assessing animal welfare at farm and group level: introduction and overview. Animal Welfare, 18 (4): 323-324.

Tuyttens F. A. M., Sprenger M., Van Nuffel A., Maertens W. en Van Dongen S. (2009) Reliability of categorical versus continuous scoring of welfare indicators: lameness in cows as a case study. Animal Welfare, 18 (4): 399-405.

Vanermen N., Stienen E., De Meulenaer B., Van Ginderdeuren K. en Degraer S. (2009) Low dietary importance of polychaetes in opportunistic feeding Sanderlings *Calidris alba* on Belgian beaches. Ardea, 97 (1): 81-87.

Vanhonacker F., Verbeke W., Van Poucke E., Buijs S. en Tuyttens F. (2009) Societal concern related to stocking density, pen size and group size in farm animal production. Livestock Science, 123: 16-22.

Vanhonacker F., Verbeke W. en Tuyttens F. A. M. (2009) Belgian consumers' attitude towards surgical castration and immunocastration of piglets. Animal Welfare, 18 (4): 371-380.

von Borell E., Baumgartner J., Giersing M., Jäggin N., Prunier A., Tuyttens F. A. M. en Edwards S. A. (2009) Animal welfare implications of surgical castration and its alternatives in pigs. Animal, 3 (11): 1488-1496.

Villamide M. J., Carabaño R., Maertens L., Pascual J., Gidenne T., Falcao-E-Cunha L. en Xiccato G. (2009) Prediction of nutritional value of European compound feeds for rabbits by chemical components and *in vitro* analysis. Animal Feed Science and Technology, 150: 283-294.

Webb T. J., Aleffi I. F., Amouroux J. M., Bachelet G., Degraer S., Dounas C., Fleischer D., Grémare A., Herremann M., Hummel H., Karakassis I., Kedra M., Kendall M., Kotwicki L., Labrune C., Nevrova E. L., Occhipinti-Ambrogi A., Petrov A., Revkov N. K., Sardá R., Simboura N., Speybroeck J., Van Hoey G., Vincx M., Whomersley P., Willems W. en Wlodarska-Kowalczuk M. (2009) Macroecology of the European soft sediment benthos: insights from the MacroBen database. Marine Ecology Progress Series, 382: 287-296.

Social Sciences Unit

D'Haene K., Sleutel S., De Neve S., Gabriels D. en Hofman G. (2009) The influence of reduced tillage on carbon dynamics in silt loam soils. Nutrient Cycling in Agroecosystems, 84 (3): 249-265.

Lauwers L. (2009) Justifying the incorporation of the materials balance principle into frontier-based eco-efficiency models. Ecological Economics, 68 (6): 1605-1614.

Meul M. en Nevens F. R. D. (2009) Validating sustainability indicators: Focus on ecological aspects of Flemish dairy farms. Ecological Indicators, 9 (2): 284-295.

Segers K., Dessein J., Hagberg S., Develtere P., Mitiku H. en Deckers J. (2009) Be like bees – the politics of mobilizing farmers for development in Tigray, Ethiopia. African Affairs, 108 (430): 91-109.

Van der Straeten B., Buysse J., Van Huylenbroeck G. en Lauwers L. (2009) Impact of policy-induced structural change on milk quality: evidence from the Flemish dairy sector. Journal of Dairy Research, 76 (2): 234-240.

Van Passel S., Van Huylenbroeck G., Lauwers L. en Mathijs E. (2009) Sustainable value assessment of farms using frontier efficiency benchmarks. Journal of Environmental Management, 90 (10): 3057-3069.

Plant Sciences Unit

Alaei H., De Backer M., Nuytinck J., Maes M., Höfte M. en Heungens K. (2009) Phylogenetic relationships of *Puccinia horiana* and other rust pathogens of *Chrysanthemum x morifolium* based on rDNA ITS sequence analysis. Mycological Research, 113 (6-7): 668-683.

Alaei H., Baeyen S., Maes M., Höfte M. en Heungens K. (2009) Molecular detection of *Puccinia horiana* in *Chrysanthemum x morifolium* through conventional and real-time PCR. Journal of Microbiological Methods, 76 (2): 136-145.

Ansari M. A., Hussain M. A. en Moens M. (2009) Formulation and application of entomopathogenic-nematode-infected cadavers for control of *Hoplia philanthus* in turfgrass. Pest Management Science, 65: 367-374.

Bert V., Seuntjens P., Dejonghe W., Lacherez S., Thuy H. T. T. en Vandecasteele B. (2009) Phytoremediation as a management option for contaminated sediments in tidal marshes, flood control areas and dredged sediment landfill sites. Environmental Science and Pollution Research, 16 (745): 764.

Bobev S. G., Van Poucke K. en Maes M. (2009) First report of *Phytophthora nicotianae* on German statice in Bulgaria. Plant Disease, 93 (5): 551.

Chaves B., De Vliegher A., Van Waes J., Carlier L. en Marynissen B. (2009) Change in agronomic performance of *Lolium perenne* and *Lolium multiflorum* varieties in the past 40 years based on data from Belgian VCU trials. Plant Breeding, 128: 680-690.

Cottyn B., Debode J., Regalado E., Mew T. W. en Swings J. (2009) Phenotypic and genetic diversity of rice seed-associated bacteria and their role in pathogenicity and biological control. Journal of Applied Microbiology, 107: 885-897.

Cottyn B., Heylen K., Heyrman J., Vanhouteghem K., Pauwelyn E., Bleyaert P., Van Vaerenbergh J., Höfte M., De Vos P. en Maes M. (2009) *Pseudomonas cichorii* as the causal agent of midrib rot, an emerging disease of greenhouse-grown butterhead lettuce in Flanders. Systematic and Applied Microbiology, 32: 211-225.

Debode J., Van Hemelrijck W., Baeyen S., Creemers P., Heungens K. en Maes M. (2009) Quantitative detection and monitoring of *Colletotrichum acutatum* in strawberry leaves using real-time PCR. Plant Pathology, 58 (3): 504-514.

Denef K., Roobroeck D., Manimel Wadu M. C. W., Lootens P. en Boeckx P. (2009) Microbial community composition and rhizodeposit-carbon assimilation in differently managed temperate grassland soils. Soil Biology en Biochemistry, 41: 144-153.

Devacht S., Lootens P., Roldán-Ruiz I., Carlier L., Baert J., Van Waes J. en Van Bockstaele E. (2009) Influence of low temperatures on the growth and the photosynthetic activity of industrial chicory, *Cichorium intybus* L. partim. Photosynthetica, 47 (3): 372-380.

Dewitte A., Leus L., Eeckhaut T., Vanstechelman I., Van Huylenbroeck J. en Van Bockstaele E. (2009) Genome size variation in Begonia. Genome, 52 (10): 829-838.

Dewitte A., Eeckhaut T., Van Huylenbroeck J. en Van Bockstaele E. (2009) Occurrence of viable unreduced pollen in a Begonia collection. Euphytica, 168: 81-94.

Dewitte A., Eeckhaut T., Van Huylenbroeck J. en Van Bockstaele E. (2009) Meiotic aberrations during 2n pollen formation in Begonia. Heredity, 104 (2): 215-223.

Dewitte A., Eeckhaut T., Van Huylenbroeck J. en Van Bockstaele E. (2009) Induction of 2n pollen formation in Begonia by trifluralin and N_2O treatments. Euphytica, 171 (2): 283-293.

Dhooghe E., Grunewald W., Leus L. en Van Labeke M. C. (2009) *In vitro* polyploidisation of *Helleborus* species. Euphytica, 169: 89-95.

Dhooghe E., Denis S., Eeckhaut T., Reheul D. en Van Labeke M. C. (2009) *In vitro* induction of tetraploids in ornamental *Ranunculus*. Euphytica, 168: 33-40.

Du Laing G., Meers E., Dewispelaere M., Rinklebe J., Vandecasteele B., Verloo M. G. en Tack F. M. G. (2009) Effect of water table level on metal mobility at different depths in wetland soils of the Scheldt estuary (Belgium). Water, Air and Soil Pollution, 202: 353-367.

Du Laing G., Meers E., Dewispelaere M., Vandecasteele B., Rinklebe J., Tack F. M. G. en Verloo M. G. (2009) Heavy metal mobility in intertidal sediments of the Scheldt estuary: Field monitoring. Science of the Total Environment, 407: 2919-2930.

Du Laing G., Rinklebe J., Vandecasteele B., Meers E. en Tack F. M. G. (2009) Trace metal behaviour in estuarine and riverine floodplain soils and sediments: a review. Science of the Total Environment, 407: 3972-3985.

Grünwald N. J., Gos E. M., Ivors K., Garbelotto M., Martin F. N., Prospero S., Hansen E., Bonants P. J. M., Hamelin R. C., Chastagner G., Werres S., Rizzo D. M., Abad G., Beales P., Bilodeau G. J., Blomquist C. L., Brasier C., Brière S. C., Chandelier A., Davidson J. M., Denman S., Elliot M., Frankel S. J., Goheen E. M., de Gruyter H., Heungens K., James D., Kanaskie A., McWilliams M. G., Man in't Veld W., Moralejo E., Osterbauer N. K., Palm M. E., Parke J. L., Perez Sierra A. M., Shamoun S. F., Shishkoff N., Tooley P. W., Vettraino A. M., Webber J. en Widmer T. L. (2009) Standardizing the nomenclature for clonal lineages of the sudden oak death pathogen, *Phytophthora ramorum*. Phytopathology, 99: 792-795.

Jacquemyn H., Brys R., Adriaens D., Honnay O. en Roldán-Ruiz I. (2009) Effects of population size on genetic diversity and structure of the tuberous orchid *Orchis mascula*. Conservation Genetics, 10: 161-168.

Jacquemyn H., Vandepitte K., Roldán-Ruiz I. en Honnay O. (2009) Rapid loss of genetic variation in a founding population of *Primula elatior* (Primulaceae) after colonization. Annals of Botany, 103: 777-783.

Jacquemyn H., Wiegand T., Vandepitte K., Brys R., Roldán-Ruiz I. en Honnay O. (2009) Multigenerational analysis of spatial structure in the terrestrial, fooddeceptive orchid *Orchis mascula*. Journal of Ecology, 97: 206-216.

Khatri-Chhetri H. B., Waeyenberge L., Manandhar H. K. en Moens M. (2009) Natural occurrence and distribution of entomopathogenic nematodes (Steinernematidae and Heterorhabditidae) in Nepal. Journal of Invertebrate Pathology, 103 (1): 74-78.

Khokon Md. A. R., Okuma E., Rahman T., Wesemael W., Murata Y. en Moens M. (2009) Quantitative analysis of the effects of diffusates from plant roots on the hatching of *Meloidogyne chitwoodi* from young and senescing host plants. Bioscience, Biotechnology and Biochemistry, 73 (10): 2345-2347

Leroy B. L. M., De Sutter N., Ferris H., Moens M. en Reheul D. (2009) Short-term nematode population dynamics as influenced by the quality of exogenous organic matter. Nematology, 11 (1): 23-38.

Li H. M., Trinh P. Q., Waeyenberge L. en Moens M. (2009) Characterisation of Bursaphelenchus spp. isolated from packaging wood imported at Nanjing, China. Nematology, 11 (3): 375-408.

Maloukh L., Matousek J., Van Bockstaele E. en Roldán-Ruiz I. (2009) Housekeeping gene selection for Real Time-PCR normalization in female hop (*Humulus lupulus* L.) tissues. Journal of Plant Biochemistry en Biotechnology, 18 (1): 53-58.

Mestdagh I., Sleutel S., Lootens P., Van Cleemput O., Beheydt D., Boeckx P., De Neve S., Hofman G., Van Camp N., Vande Walle I., Samson R., Verheyen K., Lemeur R. en Carlier L. (2009) Soil organic carbon–stock changes in Flemish grassland soils from 1990 to 2000. Journal of Plant Nutrition and Soil Science, 172: 24-31.

Moens M. en Perry R. N. (2009) Migratory Plant Endoparasitic Nematodes: A Group Rich in Contrasts and Divergence. Annual Review of Phytopathology, 313-332.

Monbaliu S., Van Poucke C., Van Peteghem C., Van Poucke K., Heungens K. en De Saeger S. (2009) Development of a multi-mycotoxin liquid chromatography/tandem mass spectrometry method for sweet pepper analysis. Rapid Communications in Mass Spectrometry, 23 (1): 3-11.

Stanton S., Honnay O., Jacquemyn H. en Roldán-Ruiz I. (2009) A comparison of the population genetic structure of the parasitic *Viscum album* from two landscapes differing in degree of fragmentation. Plant Systematics and Evolution, 281: 161-169.

Steel H., de la Peña E., Fonderie P., Willekens K., Borgonie G. en Bert W. (2009) Nematode succession during composting and the potential of the nematode community as an indicator of compost maturity. Pedobiologia, doi:10.1016/j.pedobi.2009.09.003.

Trinh P. Q., de la Peña E., Nguyen C. N., Nguyen H. X. en Moens M. (2009) Plant-parasitic nematodes associated with coffee in Vietnam. Russian Journal of Nematology, 17 (1): 73-82.

Trinh, P.Q., Waeyenberge, L., Nguyen, C.N., Baldwin, J.G., Karssen, G., Moens, M. (2009) *Apratylenchus vietnamensis* gen. n., sp. n. and *A. binhi* gen. n., sp. n., sedentary Pratylenchidae (Nematoda: *Tylenchida*) from coffee in Vietnam, with proposal of Apratylenchinae subfam. n. Nematology, 11 (4): 565-581.

Van Beneden S., Pannecoucque J., Debode J., De Backer G. en Höfte M. (2009) Characterisation of fungal pathogens causing basal rot of lettuce in Belgian greenhouses. European Journal of Plant Pathology, 124 (1): 9-19.

Vandecasteele B., Quataert P., Genouw G., Lettens S. en Tack F. M. G. (2009) Effect of willow stands on heavy metal concentrations and top soil properties of infrastructure spoil landfills and dredged sediment-derived sites. Science of the Total Environment, 407: 5289-5297.

Vandepitte K., Roldán-Ruiz I. en Honnay O. (2009) Reproductive consequences of mate quantity versus mate diversity in a wind-pollinated plant. Acta Oecologica, 35: 548-553.

Vandepitte K., Honnay O., De Meyer T., Jacquemyn H. en Roldán-Ruiz I. (2009) Patterns of sex ratio variation and genetic diversity in the dioecious forest perennial *Mercurialis perennis*. Plant Ecology, 206: 105-114.

Vandepitte K., Roldán-Ruiz I., Leus L., Jacquemyn H. en Honnay O. (2009) Canopy closure shapes clonal diversity and fine-scale genetic structure in the dioecious understorey perennial *Mercurialis perennis*. Journal of Ecology, 97: 404-414.

Van Laere K., Dewitte A., Van Huylenbroeck J. en Van Bockstaele E. (2009) Evidence for the occurrence of unreduced gametes in interspecific hybrids of *Hibiscus*. Journal of Horticultural Science en Biotechnology, 84 (2): 240-247.

Van Laere K., Leus L., Van Huylenbroeck J. en Van Bockstaele E. (2009) Interspecific hybridisation and genome size analysis in *Buddleja*. Euphytica, 166: 445-456.

Van Leeuwen T., Witters J., Nauen R., Duso C. en Tirry L. (2009) The control of eriophyoid mites: state of the art and future challenges. Experimental and Applied Acarology, DOI 10.1007/s10493-009-9312-9.

Van Ranst G., Fievez V., Vandewalle M., De Riek J. en Van Bockstaele E. (2009) Influence of herbage species, cultivar and cutting date on fatty acid composition of herbage and lipid metabolism during ensiling. Grass and Forage Science, 64 (2): 196-207.

Van Ranst G., Fievez V., De Riek J. en Van Bockstaele E. (2009) Influence of ensiling forages at different dry matters and silage additives on lipid metabolism and fatty acid composition. Animal Feed Science and Technology, 150 (1-2): 62-74.

Van Ranst G., Fievez V., Vandewalle M., De Riek J. en Van Bockstaele E. (2009) *In vitro* study of red clover polyphenol oxidase activity, activation and effect on measured lipase activity and lipolysis. Journal of Agricultural and Food Chemistry, 57 (15): 6611-6617.

Waeyenberge L., Viaene N. en Moens M. (2009) Species-specific duplex PCR for the detection of *Pratylenchus penetrans*. Nematology, 11 (6): 847-857.

Yilmaz H., Waeyenberge L., Demir I., Moens M. en Demirbag Z. (2009) A new entomopathogenic nematode species for Turkey, *Heterorhabditis megidis* Poinar, Jackson en Klein 1987 (Rhabditida: Heterorhabditidae). Turkish Journal of Agriculture an Forestry, 33: 385-391.

Technology & Food Science Unit

Baert L., Vandekinderen I., Devlieghere F., Van Coillie E., Debevere J. en Uyttendaele M. (2009) Efficacy of sodium hypochlorite and peroxyacetic acid to reduce murine norovirus 1, B40-8, *Listeria monocytogenes*, and *Escherichia coli* O157:H7 on shredded iceberg lettuce in residual wash water. Journal of Food Protection, 72: 1047-1054.

Baert L., Uyttendaele M., Stals A., Van Coillie E., Dierick K., Debevere J. en Botteldoorn N. (2009) Reported foodborne outbreaks due to noroviruses in Belgium: the link between food and patient investigations in an international context. Epidemiology and Infection, 137: 316-325.

Baetens K., Ho Q. T., Nuyttens D., De Schampheleire M., Melese Endalew A., Hertog M. L. A. T. M., Nicolaï B., Ramon H. en Verboven P. (2009) A validated 2-D-diffusion-advection model for prediction of drift from grond boom sprayers. Atmospheric Environment, 43: 1674-1682.
Bollaerts K. E., Messens W., Delhalle L., Aerts M., Van der Stede Y., Dewulf J., Quoilin S., Maes D., Mintiens K. en Grijspeerdt K. (2009) Development of a quantitative microbial risk assessment for human salmonellosis through household consumption of fresh minced pork meat in Belgium. Risk Analysis, 29 (6): 820-840.

Boone I., Van der Stede Y., Bollaerts K., Messens W., Vose D., Daube G., Aerts M. en Mintiens K. (2009) Expert judgement in a risk assessment model for *Salmonella* spp. in pork: the performance of different weighting schemes. Preventive Veterinary Medecine, 92 (3): 224-234.

Boone I., Van der Stede Y., Bollaerts K., Vose D., Maes D., Dewulf J., Messens W., Daube G., Aerts M. en Mintiens K. (2009) NUSAP Method for Evaluating the Data Quality in a Quantitative Microbial Risk Assessment Model for *Salmonella* in the Pork Production Chain. Risk Analysis, 29 (4): 502-517.

Braekman P., Foqué D., Messens W., Van Labeke M.-C., Pieters J. G. en Nuyttens D. (2009) Effect of spray application technique on spray deposition in greenhouse strawberries and tomatoes. Pest Management Science, 66 (2): 203-212.

Braekman P., Foqué D., Van Labeke M.-C., Pieters J. G. en Nuyttens D. (2009) Influence of spray application technique on spray deposition in greenhouse ivy pot plants grown on hanging shelves. Hortscience, 44 (7): 1921-1927.

Brusselman E., Moens M., Steurbaut W. en Nuyttens D. (2009) Evaluation of hydraulic, pneumatic and mechanical agitation for the spray application of Steinernema carpocapsae (Rhabtida: Steinernematidae) 677. Biocontrol Science and Technology, Doi.: 10.1080/09583150903484144.

Brusselman E., Nuyttens D., Steurbaut W., Messens W., de Sutter N., Viaene N. en Moens M. (2009) An image processing technique for the observation of the viability of Steinernema carpocapsae in spray application research. Nematology, 12 (1): 105-113.

Cardoen S., Van Huffel X., Berkvens D., Quoilin S., Ducoffre G., Saegerman C., Speybroeck N., Imberechts H., Herman L., Ducatelle R. en Dierick K. (2009) Evidence-based semi-quantitative methodology for prioritization of foodborne zoonoses. Foodborne Pathogens and Diseases, 6: 1-13.

De Brabander H. F., Noppe H., Verheyden K., Vandenbussche J., Wille K., Okerman L., Vanhaecke L., Reybroeck W., Ooghe S. en Croubels S. (2009) Review. Residue analysis: future trends from a historical perspective. Journal of Chromatography A, 1216: 7964-7976.

Delhalle L., Saegerman C., Messens W., Farnir F., Korsak N., Van der Stede Y. en Daube G. (2009) Assessing interventions by quantitative risk assessment tools to reduce the risk of human salmonellosis from fresh minced pork meat in belgium. Journal of Food Protection, 72 (11): 2252-2263.

Delhalle L., Saegerman C., Farnir F., Korsak N., Maes D., Messens W., De Sadeleer L., De Zutter L. en Daube G. (2009) *Salmonella* surveillance and control at post-harvest in the Belgian pork meat chain. Food Microbiology, 26 (3): 265-271.

De Reu K., Rodenburg B., Grijspeerdt K., Messens W., Heyndrickx M., Tuyttens F., Sonck B., Zoons J. en Herman L. (2009) Bacteriological contamination, dirt, and cracks of eggshells in furnished cages and noncage systems for laying hens: An international on-farm comparison. Poultry Science, 88: 2442-2448.

De Schampheleire M., Nuyttens D., Dekeyser D., Verboven P., Spanoghe P., Cornelis W., Gabriels D. en Steurbaut W. (2009) Deposition of spray drift behind border structures. Crop Protection, doi. 10.1016/j.cropro.2009.08.006 (28): 12-1061.

De Schampheleire M., Nuyttens D., Baetens K., Cornelis W., Gabriels D. en Spanoghe P. (2009) Effects on pesticide spray drift of the physicochemical properties of the spray liquid. Precision Agriculture, 10 (5): 409-420.

Ghedira R, Papazova N, Vuylsteke M, Ruttink T, Taverniers I en De Loose M (2009) Assessment of primer/template mismatch effects on real-time PCR amplification of target taxa for GMO quantification. Journal of Agricultural and Food Chemistry, 57 (20): 9370-9377.

Logan N. A., Berge O., Bishop A. H., Busse H.-J., De Vos P., Fritze D., Heyndrickx M., Kämpfer P., Rabinovitch L., Salkinoja-Salonen M. S., Seldin L. en Ventosa A. (2009) Proposed minimal standards for describing new taxa of aerobic, endospore-forming bacteria. International Journal of Systematic and Evolutionary Microbiology, 59: 2114-2121.

Marchand S., Merchiers M., Messens W., Coudijzer K. en De Block J. (2009) Thermal inactivation kinetics of alkaline phosphatase in equine milk. International Dairy Journal, 19: 763-767.

Marchand S., Heylen K., Messens W., Coudijzer K., De Vos P., Dewettinck K., Herman L., De Block J. en Heyndrickx M. (2009) Seasonal influence on heat-resistant proteolytic capacity of *Pseudomonas lundensis* and *Pseudomonas fragi*, predominant milk spoilers isolated from Belgian raw milk samples. Environmental Microbiology, 11 (2): 467-482.

Marchand S., Vandriesche G., Coorevits A., Coudijzer K., De Jonghe V., Dewettinck K., De Vos P., Devreese B., Heyndrickx M. en De Block J. (2009) Heterogeneity of heat-resistant proteases from milk *Pseudomonas* species. International Journal of Food Microbiology, 133: 68-77.

Messens W., Herman L., De Zutter L. en Heyndrickx M. (2009) Multiple typing for the epidemiological study of contamination of broilers with thermotolerant *Campylobacter*. Veterinary Microbiology, 138 (1-2): 120-131.

Missotten J. A. M., Goris J., Michiels J., Van Coillie E., Herman L., De Smet S., Dierick N. A. en Heyndrickx M. (2009) Screening of isolated lactic acid bacteria as potential beneficial strains for fermented liquid pig feed production. Animal Feed Science and Technology, 150: 122-138.

Nuyttens D., Taylor W. A., De Schampheleire M., Verboven P. en Dekeyser D. (2009) Influence of nozzle type and size on drift potential by means of different wind tunnel evaluation methods. Biosystems Engineering, 103 (3): 271-280.

Nuyttens D., De Schampheleire M., Verboven P. en Sonck B. (2009) Comparison between indirect and direct spray drift assessment methods. Biosystems Engineering, doi:10.1016/j.biosystemseng.2009.08.004.

Nuyttens D., De Schampheleire M., Verboven P., Brusselman E. en Dekeyser D. (2009) Droplet size-velocity characteristics of agricultural sprays. Transactions of the ASABE, 52 (5): 1471-1480.

Nuyttens D., Braekman P., Windey S. en Sonck B. (2009) Potential dermal exposure pesticide exposure affected by greenhouse spray application technique. Pest Management Science, 65 (7): 781-790.

Rasschaert G., Vanderhaeghen W., Dewaele I., Janez N., Huijsdens X., Butaye P. en Heyndrickx M. (2009) Comparison of Fingerprinting Methods for Typing Methicillin-Resistant *Staphylococcus aureus* Sequence Type 398. Journal of Clinical Microbiology, 47 (10): 3313-3322.

Smet K., De Block J., De Campeneere S., De Brabander D., Herman L., Raes K., Dewettinck K. en Coudijzer K. (2009) Oxidative stability of UHT milk as influenced by fatty acid composition and packaging. International Dairy Journal, 19: 372-379.

Stals A., Baert L., Botteldoorn N., Werbrouck H., Herman L., Uyttendaele M. en Van Coillie E. (2009) Multiplex real-time RT-PCR for simultaneous detection of GI/GII noroviruses and murine norovirus 1. Journal of Virological Methods, 161: 247-253.

Stals A., Werbrouck H., Baert L., Botteldoorn N., Herman L., Uyttendaele M. en Van Coillie E. (2009) Laboratory efforts to eliminate contamination problems in the real-time RT-PCR detection of noroviruses. Journal of Microbiological Methods, 77: 72-76.

Uyttendaele M., Baert K., Grijspeerdt K., De Zutter L., Horion B., Devlieghere F., Heyndrickx M. en Debevere J. (2009) Comparing the effect of various contamination levels for *Salmonella* in chicken meat preparations on the probability of illness in Belgium. Journal of Food Protection, 72 (10): 2093-2105.

Van Nuffel A., Sprenger M., Tuyttens F. A. M. en Maertens W. (2009) Cow Gait scores and kinematic gait data: can people see gait irregularities? Animal Welfare, 18: 433-439.

Van Pamel E., Daeseleire E., De Boever J. L., Heyndrickx M., Herman L., Verbeken A. en Vlaemynck G. (2009) Dichloran rose-bengal chloramphenicol agar: preferred medium for isolating mycotoxingenic fungal contaminants in silage. World Mycotoxin Journal, 2 (4): 419-427.

Werbrouck H., Vermeulen A., Van Coillie E., Messens W., Herman L., Devlieghere F. en Uyttendaele M. (2009) Influence of acid stress on survival, expression of virulence genes and invasion capacity into Caco-2 cells of *Listeria monocytogenes* strains of different origins. International Journal of Food Microbiology, 134: 140-146.

7.2 Other scientific articles

Social Sciences Unit

Lauwers L. en Van Meensel J. (2009) Het materialenbalansprincipe en de grenslijnmethoden voor het bepalen van eco-efficiëntie. Nieuwsbrief Milieu en Economie, 23 (3): 13-15.

Plant Sciences Unit

Carlier L., Rotar I. en Vidican R. (2009) La fixation du Dioxyde de Carbone: bon pour le rendement des cultures et bien pour l'environnement. ProEnvironment ProMediu, 2 (3): 8-18.

Carlier L., Rotar I., Vlahova M. en Vidican R. (2009) Importance and functions of grasslands. Notulae Botanicae Horti Agrobotanici Cluj-Napoca, 37 (1): 25-30.

Desmet E. M., Maes M., Van Vaerenbergh J., Verbaeken L. en Baets W. (2009) Sensitivity screening of commonly grown strawberry cultivars towards angular leaf spot caused by *Xanthomonas fragariae*. Acta Horticulturae, 842 (275): 278.

Maloukh L., De Keukeleire J., Matousek J., Matthews P. D., Schwekendiek A., Heyerick A., De Keukeleire D., Van Bockstaele E. en Roldán-Ruiz I. (2009) Isolation and transformation of full-length cDNA sequences of some Hop (*Humulus lupulus* L.) candidate genes of prenylflavonids pathway. Acta Horticulturae, 848 (81): 88.

Matousek J., Kocábek T., Patzak J., Skopek J., Maloukh L., Orctova L., Krofta K., Heyerick A., Fussy Z., Roldán-Ruiz I. en De Keukeleire D. (2009) Cloning and molecular analysis of hop transcription regulation factors. Acta Horticulturae, 848: 41-48.

7.3 Books and chapters in books

Animal Sciences Unit

Dalmau A., Velarde A., Van Steenbergen L., Hautekiet V. en Geverink N. (2009) Inter-observer variability of the indicators of fear during loading and unloading at slaughter of pigs. In: B. Forkman en L. Keeling (Eds.) Welfare Quality Reports 10, Assessment of Animal Welfare Measures for Sows, Piglets and Fattening Pigs (Chapter 20): 199-205.

De Campeneere S., Millet S. en De Brabander D. L. (2009) Proceedings 34th Animal Nutrition Research Forum. ILVO-Dier. Melle (BE): 61 p.

Geverink N., Meuleman M., Van Nuffel A., Van Steenbergen L., Hautekiet V., Vermeulen K., Lammens V., van Reenen C. G. en Tuyttens F.A.M. (2009) Repeatability of a lameness score measured on farm. In: B. Forkman en L. Keeling (Eds.) Welfare Quality Reports 10, Assessment of Animal Welfare Measures for Sows, Piglets and Fattening Pigs (Chapter 6): 73-78.

Geverink N., Meuleman M., Van Nuffel A., Van Steenbergen L., Hautekiet V., Vermeulen K., van Reenen C. G. en Tuyttens F. A. M. (2009) Repeatability of a lameness score at slaughter. In: B. Forkman en L. Keeling (Eds.) Welfare Quality Reports 10, Assessment of Animal Welfare Measures for Sows, Piglets and Fattening Pigs (Chapter 7): 79-82.

Geverink N., Dalmau A., Velarde A., van Reenen C. G. en Tuyttens F. A. M. (2009) Repeatability of a slipping score at slaughter. In: B. Forkman en L. Keeling (Eds.) Welfare Quality Reports 10, Assessment of Animal Welfare Measures for Sows, Piglets and Fattening Pigs (Chapter 8): 83-87.

Maertens L. (2009) Feeding rabbits. In: R. Kellems en D. C. Church (Eds.) Livestock feeds and feeding. Prentice Hall, Pearson Education, Upper Saddle River, NJ (US): 488-508.

Tuyttens F. A. M., Maes D., Geverink N., Koene P. en Rodenburg T. B. (2009) Animal Welfare. Proc. 4th Int. Workshop on the Assessment of Animal Welfare at Farm and Group Level. Universities Federation for Animal Welfare - Science in the Service of Animal Welfare: 208 p.

Vandendriessche S., Vincx M. en Degraer S. (2009) Ephemeral Islands, Biology. In: R. G. Gillespie en D. A. Clague (Eds.) Encyclopedia of Islands. University of California Press. Berkeley and Los Angeles, California (US): 258-259.

Vandendriessche S., Hostens K. en Wittoeck J. (2009) Monitoring of the effects of the Thorntonbank and Bligh Bank windmill parks on the epifauna and demersal fish fauna of soft-bottom sediments: Thortonbank: status during construction (T1), Bligh Bank: reference condition (T0). In: S. Degraer en R. Brabant (Eds.) Offshore wind farms in the Belgian part of the North Sea. State of the art after two years of environmental monitoring. Royal Belgian Institute for Natural Sciences, Management Unit of the North Sea Mathematical Models. Marine ecosystem management. MUMM. Brussels (BE): 93-150.

Social Sciences Unit

Dessein J., Hassink J., Vadnal K., van Elsen T., Mc Gloin A. en Di Iacovo F. (2009) A critical reading from cases and emerging issues. In: F. Di Iacovo en D. O'Connor (Eds.) Supporting policies for Social Farming in Europe. Progressing multifunctionality in Responsive Rural Areas. Arsia. Pisa (IT): 131-150.

Overloop S., Gavilan J., Bergen D., Van Gijseghem D., Gobin A., Vander Vennet B. en Hens M. (2009) Landbouw. In: M. Van Steertegem (Ed.) Milieuverkenning 2030. Milieurapport Vlaanderen, VMM. Aalst (BE): 109-127.

Wauters E. en Mathijs E. (2009) Adoption of soil conservation practices in Belgium. In: U. Pacsual, A. Shah en U. Bandyopadhyay (Eds.) Water, agriculture, and sustainable well-being. Oxford University Press. New Delhi (IN).

Plant Sciences Unit

Leus L. en Van Huylenbroeck J. (2009) Developping resistance to powdery mildew (*Podosphaera pannosa* (Wallr.: Fr.) de Bary): a challenge for rose breeders. Roses.Floriculture and Ornamental Biotechnology 3 (Special Issue 1): 131-138.

Technology & Food Science Unit

Lequeux R., Bruneau E., Reybroeck W. en Jacobs F. (2009) Guide de bonnes pratiques Apicoles. CARI. Louvain-la-Neuve (BE): 80 p.

Reybroeck W., Jacobs F., Lequeux R. en Bruneau E. (2009) Gids voor goede bijenteeltpraktijken. Informatiecentrum voor Bijenteelt. Gent (BE): 80 p.

Van Droogenbroeck B., De Wilde K. en Depicker A. (2009) Production of Antibody Fragments in *Arabidopsis* Seeds. In: Loïc Faye and Veronique Gomord (Ed.) Methods in Molecular Biology, Recombinant Proteins From Plants. Springer.

7.4 PhD theses

Social Sciences Unit

Rogge E. (2009) About landscape perception and the ability to communicate. Can landscape perception research provide a tool for starting a dialogue between different users of the countryside? K.U.Leuven, 218 p. Promotoren: Prof. dr. ir. Gulinck H. en dr. ir. Dessein J.

Plant Sciences Unit

Dhooghe E. (2009) Morphological and cytogenetic study of ornamental Ranunculaceae to obtain intergeneric crosses. Universiteit Gent, 244 p. Promotoren: Prof. dr. ir. Reheul D. and Prof. dr. ir. Van Labeke M. C.

Vandepitte K. (2009) Genetic diversity and fitness of forest herbs in anthropogenic landscapes. K.U.Leuven, 204 p. Promotoren: Prof. dr. Honnay O. and Prof. dr. ir. Roldán-Ruiz I.

Van Ranst G. (2009) Effect of ensiling on fatty acid composition and lipid metabolism in forages and the possible role of red clover polyphenol oxidase. Universiteit Gent, 245 p. Promotoren: Prof. dr. Ir. Van Bockstaele E. en Prof. dr. ir. Fievez V.

Technology & Food Science Unit

Marchand S. (2009) Identification and characterization of milk spoiling *Pseudomonas* spp. and their heat resistant proteases. Doctor in de Bio-Ingenieurswetenschappen. Universiteit Gent, 142 p. Promotoren: Dr. De Block J., Dr. Heyndrickx M., en Prof. dr. Ir. Dewettinck K.

7.5 Posterpresentations on congresses and symposia

Animal Sciences Unit

13 februari: Depestele J., Piet G. L., Robinson L., Polet H., Van Craeynest K. & Vincx M. (2009) Assessment of Technical Mitigation Measures in the Ecosystem Approach to Fisheries Management. Seventh Marine Biology Section Symposium 13, Gent (BE).

6 maart: VLIZ Young Scientist' Day, Brugge (BE).

- Bekaert K., Derveaux S. & Parmentier K. (2009) Improving the quality and price of fish by separate handling at sea and in the fish auction.
- Derveaux S., Bekaert K. & Parmentier K. (2009) Influence of fisheries method on fish quality.
- Vanderperren E., De Sutter R. & Polet H. (2009) Climate change: threat or opportunity for Belgian sea fisheries?
- Depestele J., Gerjan P., Robinson L., Polet H. & Vincx M. (2009) Do technical mitigation measures make sense in managing a fishery?
- Van Ginderdeuren K., Hillewaert H., Hostens K. & Vincx M. (2009) (Semi-)pelagic fisheries as an alternative within the Flemish fisheries sector, with special emphasis on the role of Zooplankton in the North Sea.
- Van den Eynde D., De Sutter R., Polet H., Verwaest T., Maes F., Volckaert A., Vanderperren E., Ozer J., Ponsar S., Van der Biest K. & Willekens M. (2009) CLIMAR - Evaluation of climate change impacts and adaptation responses for marine activities.
- Verhaegen Y., Smagghe G., De Coen W. & Parmentier K. (2009) Molecular markers for chronic toxicity of marine polluants in North Sea brown shrimp (*Crangon crangon* L.).
- Van Hoey G., Wittoeck J., Hillewaert H., Van Ginderdeuren K. & Hostens K. (2009) The monitoring and assessment of the quality element benthos at het Belgian coast for the water framework directive.
- Brabant R., Degraer S., Di Marcantonio M., Haelters J., Jacques T., Kerckhof F., Vigin L., Van den Eynde D., Vincx M., De Maersshalck V., Vanden Eede S., Reubens J., Hostens K., Wittoeck J., Cooreman K., Stienen E., Courtens W., Van de Walle M., Vanermen N., Henriet JP., Versteeg W., Staelens P., Vercruysse J. & Van Rooij D. (2009) Scientific monitoring of the impact of offshore windfarms on the marine environment.

11 maart: Bauwens M., Braeckman U., Coppejans E., De Blauwe H., De Clerck O., De Maersshalck V., Degraer S., Deprez T., Dumoulin E., Fockedey N., Hernandez F., Hostens K., Lescrauwaet A.-K., Mees J., Rappé K., Sabbe K., Seys J., Van Ginderdeuren K., Vanaverbeke J., Vandepitte L., Vanhoorne B., Verween A. & Wittoeck J. (2009) Non-indigenous species of the Belgian part of the North Sea and adjacent estuaries. Science facing aliens meeting, Brussels (BE).

3 april: 34th Animal Nutrition Research Forum (ANRF), Melle (BE).

- De Campeneere S., De Boever J. L. & De Brabander D. L. (2009) Evaluation of three wheat treatments for dairy cattle: whole wheat ensiled in brewers' grains, ensiled ground wheat and rolled wheat.
- Millet S., Meyns T., Aluwé M., De Brabander D. L. & Ducatelle R. (2009) The interaction between particle size and crude fibre content on performance of growing pigs.

13-14 mei: 16th International Symposium on Housing and Diseases of Rabbits, Furproviding Animals and Pet Animals, Celle (DE).

- Maertens L. & Buijs S. (2009) Influence of cage surface area and enrichment on the productive performances of growing rabbits housed in groups of 8.
- Van Poucke E., Buijs S. & Tuyttens F. (2009) Does stocking density affect bone strength of broiler rabbits?
- Maertens L., Van Poucke E. & Buijs S. (2009) Influence of cage size and enrichment on the productive performances of growing rabbits housed in groups of 8.

20-22 mei: Millet S., Meyns T., Aluwé M., De Brabander D. L. & Ducatelle R. (2009) Effect of particle size and crude fibre content on performance results and gastric mucosa integrity of growing-finishing pigs. XI International Symposium on Digestive Physiology of Pigs, Montbrió del Camp (ES).

6-10 juli: Tuyttens F., Sprenger M., Van Nuffel A., Maertens W. & Van Dongen S. (2009) Reliability of categorical versus continuous scoring of welfare indicators: lameness in cows as a case study. 43rd Congress of the International Society for Applied Ethology, Cairns (AU).

24-27 augustus: De Campeneere S., De Boever J. L. & De Brabander D. L. (2009) Protected protein sources may reduce nitrogen excretion of dairy cattle and soybean meal import. 60th Annual Meeting of the European Association for Animal Production, Barcelona (ES).

6-9 september: De Campeneere S., Vanacker J. M. & De Brabander D. L. (2009) Effect of roughage diet type and NaCl addition on the milk urea content in dairy cows. International Symposium on Ruminant physiology, Clermont-Ferrand (FR).

7 september: Pecceu E., Van Hoey G., Wittoeck J., Hillewaert H., Van Ginderdeuren K., Derweduwen J., De Backer A., Vandendriessche S. & Hostens K. (2009) The monitoring and assessment of macrobenthos at the Belgian coast for the water framework directive. Marine Biology in Time and Space. Abstracts from the 44th European Marine Biolgy Symposium, Liverpool (UK).

8 oktober: Tuyttens F. A. M., Verhille B., Vanhonacker F., Van Oeckel M. J., Isebaert S. & De Brabander D. L. (2009) Attitude of Belgian pig producers concerning alternatives for the surgical castration of piglets. Studiedag "Imago van vlees en vleesproducten", Melle (BE).

8 oktober: Aluwé M., Bekaert K., Tuyttens F. A. M., Vanhaecke L., De Brabander D. L. & Millet S. (2009) Influence of soiling on boar taint in entire male pigs. Studiedag "Imago van vlees en vleesproducten" Studienamiddag "IPVS Belgian branch", Melle (BE).

27 november: VLIZ Young Scientist' Day, Oostende (BE). In: Mees J., Seys J. (Eds.) An overview of marine research in Belgium anno 2009.

- Zenner A., Torreele E., Moerman M. & Maertens I. (2009) How old are you?
- Moreau K., Vanhee W. & Torreele E. (2009) From fish to quota.
- Zenner A., Torreele E., Moerman M. & Maertens I. (2009) The procedure of determing age in fish.
- Vandemaele S., Leirs H. & Torreele E. (2009) Assessment of discarding rates for commercial species of fish in the Belgian beam trawl fishery, within the framework of the European Common Fisheries Policy.
- Cooreman K., Roose P., Windal I. & Parmentier K. (2009) How do persistent organic pollutants behave in cold-blooded non-hibernating fish?
- Vandamme S., Moreau K., Maes G. & Volckaert A. (2009) Connectivity of turbot and brill populations in European waters as a basis for sustainable management.
- Verschueren B. (2009) HOVERCRAN - Hovering pulse trawl for selective *Crangon* fishery.
- Stouten H., Heene A., Gellynck X. & Polet H. (2009) Learning from microworlds: evidence from a fisheries simulation game.
- Depestele J., Desender M., Polet H., Van Craeynest K. & Vincx M. (2009) Mortality of fish discards in beam trawl fisheries.
- Vanderperren E., De Sutter R. & Polet H. (2009) Development and evaluation of long-term adaptation strategies for the Belgian sea fisheries sector.
- Vandendriessche S., Derweduwen J., Hostens K. & Wittoeck J. (2009) Monitoring the effects of the Thorntonbank and Bligh Bank windmill parks on the epifauna and demersal fish fauna of soft-bottom sediments.
- De Backer A., Hostens K., Vandendriessche S., Van Hoey G. & Wittoeck J. (2009) Prospective sand extraction on the Hinderbanken: monitoring strategy for future impact assessment.
- Pecceu E. (2009) The monitoring and assessment of macrobenthos at the Belgian coast for the water framework directive.
- Van Hoey G., Pecceu E., Vanaverbeke J., Hostens K. & Vincx M. (2009) Monitoring of the macrobenthos on the Belgian continental shelf in the framework if the OSPAR eutrophication assessment.
- Van Hoey G. & Hostens K. (2009) How to measure the impact degree of different anthropogenic pressures?
- Wittoeck J., Van Hoey G., Hillewaert H., De Backer A., Derweduwen J. & Hostens K. (2009) Effects of the Disposal of Dredged Material on Benthic and Demersal Fauna.
- Van Ginderdeuren K., Hostens K. & Vincx M. (2009) Zooplankton in the southern North Sea and the link with (semi-) pelagic fish and fisheries.
- Vandendriessche S., De Backer A., Wittoeck J. & Hostens K. (2009) Natural VS. anthropogenically induced variability wthin communities of demersal fish and epibenths in the Belgian part of the North Sea: implications for impact monitoring.
- Van Nieuwenhove K., Rousseau V., Parent J.-Y. & Lancelot C. (2009) The influence of *Phaeocystis* blooms on offshore mussels.
- Degraer S., Brabant R., Braeckman U., Coates D., Courtens W., Derweduwen J., Di Marcantonio M., Haelters J., Hostens K., Jacques T., Kerckhof F., Norro A., Reubens J., Stienen E., Vanaverbeke J., Van Colen C., Vandendriessche S., Van den Eynde D., Van de Walle M., Vanermen N., Van Hoey G., Vigin L., Vincx M. & Wittoeck J. (2009) Monitoring the impact of offshore wind farms on the marine environment: An obligate multidisciplinary and integrated programme.
- Depestele J., Courtens W., Degraer S., Derous S., Haelters J., Hostens K., Moulaert I., Polet H., Rabaut M., Stienen E., Vandendriessche S. & Vincx M. (2009) An integrated impact assessment of trammel net and beam trawl fisheries.

Social Sciences Unit

25 februari: Kader M. A., Sleutel S., D'Haene K. & De Neve S. (2009) Evaluating physical and chemical fractionation of soil organic matter to predict nitrogen mineralization in silty arable soils. Day of the Young Scientist, Brussels (BE).

28 juni: D'Haene K. & De Mey K. (2009) Towards higher farm N efficiency based on an integrated monitoring tool for sustainable farming. 16th nitrogen workshop "Connecting scales of nitrogen use in agriculture", Torino (IT): http://www.nitrogenworkshop2009.org.

6 juli: Taragola N., Van Lierde D. & Gelb E. (2009) ICT adoption constraints in horticulture: Comparison of the ISHS and ILVO questionnaire results to the EFITA baseline data sets. Joint International Agricultural Conference, Wageningen (NL): http://www.jiac2009.nl/.

Plant Sciences Unit

8 februari: International Conference on Plant abiotic stress tolerance, Wenen (AT).

- Devacht S., Lootens P., Roldán-Ruiz I., Baert J., Van Waes J. & Van Bockstaele E. (2009) Using chlorophyll fluorescence imaging to develop a screening method for cold sensitivity in industrial chicory (*Cichorium intybus* L. partim).
- Razavi F., De Keyser E., De Riek J. & Van Labeke M. C. (2009) Candidate gene approach to identify genes underlying drought stress tolerance and development of markers in strawberry.

25 februari: Willekens K., De Neve S. & Carlier L. (2009) Nitrogen Utilization and Crop Quality in function of Soil Condition. Day of Young Soil Scientists 2009, Brussel (BE).

8 maart: qPCR2009 symposium, Munchen (DE).

- Baeyen S. (2009) Real-time PCR assays based on the multi-copy rDNA ITS region and the single-copy beta-tubulin gene for detection and quantification of the strawberry pathogen *Colletotrichum acutatum*.
- De Jonghe K. (2009) Utilization of FTA (R) cards combined with one-step real-time PCR for rapid detection of quarantine viroids, viruses and phytoplasmas.

5 april: Van Huylenbroeck J. & Calsyn E. (2009) Cryopreservation of an azalea germplasm collection. 1st International Symosium Cryopreservation in Horticultural Species, Leuven (BE).

28 april: Van Poucke K., Monbaliu S., Munaut F., Heungens K., Van Hove F. & De Saeger S. (2009) Identification and mycotoxin spectrum of four new *Fusarium* populations from bell pepper. 3th symposium Mycotoxins: threats and risk management, Gent (BE).

11 mei: XVIIIth Meeting of the Eucarpia Fodder Crops and Amenity Grasses Section: Sustainable use of genetic diversity in forage crops and turf breeding, La Rochelle (FR).

- Cnops G., Rohde A., Malengier M. & Roldán-Ruiz I. (2009) Morphological and molecular diversity of branching in red clover (*Trifolium pratense*).
- Saracutu O., Cnops G., Roldán-Ruiz I. & Rohde A. (2009) Phenotypic assessment of variability in tillering and early development in ryegrass (*Lolium* spp.).
- Studer B., Asp T., Jensen L. B., Frei U., Barth S., Muylle H., Roldán-Ruiz I., Barre P., Skot L., Dolstra O., Kölliker R., Roulund N., Nielsen K. K. & Lübberstedt T. (2009) A framework genetic linkage map of *Lolium* based on EST derived SSR markers.
- Van Hulle S., Roldán-Ruiz I., Van Bockstaele E. & Muylle H. (2009) Functional analysis of genes involved in cell wall biosynthesis of the model species *Brachypodium distachyon* to improve saccharification.
- Baert J. & Ghesquiere A. (2009) Selection of spaced plants of perennial ryegrass in association with white clover.
- Ghesquiere A., Baert J., Malengier M. & De Riek J. (2009) Botanical and genetic change in grass-clover based systems.
- Van Ranst G., Vandewalle M., Baert J., De Riek J., Fievez V. & Van Bockstaele E. (2009) Influence of forage species, cultivar and cut on lipid metabolism during the ensiling process.
- Vandewalle M., Van Ranst G., Fievez V., De Riek J. & Baert J. (2009) Variability of the rumen escape protein and fatty acid composition of grass and clover species and cultivars.
- Baert J. (2009) F1 ² performance of tetraploid perennial ryegrass on the basis of the composition of a synthetic variety.

17 mei: International conference on polyploidy, hybridisation and biodiversity, Saint Malo (FR).

- Van Laere K., Leus L., Van Huylenbroeck J. & Van Bockstaele E. (2009) Interploidy crosses and occurence of unreduced gametes in *Buddleja*.

- Leus L., Van Huylenbroeck J. & Famelaer I. (2009) Genome sizes and ploidy levels in interspecific hybrids of *Arabidopsis thaliana* and A. *lyrata*.

19 mei: 61st International Symposium on Crop Protection, Gent (BE).
- Tahzima R., Hoedekie A., De Paepe B., Maes M. & Van Vaerenbergh J. (2009) Genetic characterisation of the *Ralstonia solanacearum* population in Flanders based on genes involved in host plant association.
- Spiridonov S. E., Waeyenberge L., Sturhan D. & Moens M. (2009) A new steinernematid nematode species from "*monticolum*"-group found in Europe.
- Casteels H., Witters J., De Bondt G. & Desamblanx J. (2009) Validation of the Berlese-funnel technique for thrips extraction.
- Yilmaz Z. C., Deeren A., De Sutter N. & Viaene N. (2009) Species of *Heterodera cysts* in cereal fields in Flanders.
- Alaei H., Maes M., Höfte M. & Heungens K. (2009) Real time PCR-mediated monitoring of *Puccinia horiana* development in *Chrysanthemum x morifolium*.
- Blindeman L., Heungens K., Goossens F. & Gobin B. (2009) Efficacy of fungicides against *Phytophthora cactorum* on *Viola*.
- Rijckaert G. (2009) The effect of fungicides on seed yield and disease control in Italian ryegrass.
- Steel H., de la Peña E., Fonderie P., Willekens K., Borgonie G. & Bert W. (2009) Nematode Community as potential indicator of compost maturity and quality.

19 mei: De Ruyck H., De Ridder H., Van Royen G., Merchiers M., Van Waes C. & De Block J. (2009) Screening van zuivelpoeders met nabij infrarood spectroscopie (NIRS). KVCV Symposium: Trends in Food Analysis VI, Gent (BE).

24 mei: Hosseini Moghaddam H., Leus L., Van Huylenbroeck J., Van Bockstaele E. & De Riek J. (2009) Pathotype Dependent Resistance Mapping for Powdery Mildew in a Diploid Rose Population. Fifth International Symposium Rose research and cultivation, Gifu (JP).

21 juni: Maloukh L. (2009) Gene expression and Identification of Full-length cDNA sequences of hop (*Humulus lupulus* L.) candidate genes of the phenylpropanoid pathway. International Hop Growers' Convention (IHGC) Scientific commission, Leon (ES).

25 juni: Cottyn B. Kwaliteit en gewasbescherming. ILVO actueel. Flanders Fruit Research, Leuven (BE).

7 juli: Van Hulle S., Van Waes C., Roldán-Ruiz I., Van Bockstaele E. & Muylle H. (2009) Saccharification potential of harvest 2009 of 5 grass energy crops. EU COST E50 Workshop "systems biology for plant design", Wageningen (NL).

8 juli: Muylle H., Van Hulle S., Van Waes C. & Roldán-Ruiz I. (2009) Estimation of yield potential in a collection of 26 *Miscanthus* genotypes. EU COST E50 Workshop "systems biology for plant design", Wageningen (NL).

1 augustus: Muylle H., Van Hulle S., Van Waes C. & Roldán-Ruiz I. (2009) Differences in cell wall composition observed in 26 genotypes of *Miscanthus*. Gordon REsearch Conference: Plant Cell Wall, Smithfield (US).

16 augustus: Brusselman E., Nuyttens D., De Sutter N., Steurbaut W. & Moens M. (2009) Observing the viability of entomopathogenic nematodes using image processing. International Symposium, Nematodes in tropical ecosystems, Hanoi (VN).

31 augustus: 23rd International Eucarpia Symposium Section Ornamentals "Colourful breeding and genetics", Leiden (NL).
- De Keyser E., Christiaens A., Van Labeke M. C., Pauwels E., De Riek J. & Gobin B. (2009) Regulation and quality of flowering in Belgian pot azalea: interaction between genetics, physiology and culture conditions.
- Dhooghe E., Reheul D. & Van Labeke M. C. (2009) Production and Characterization of Intergeneric Hybrids between *Anemone coronaria* and *Ranunculus asiaticus*.
- Eeckhaut T. & Van Huylenbroeck J. (2009) Optimization of chrysanthemum protoplast culture systems
- Van Laere K., Khrustaleva L., Van Huylenbroeck J. & Van Bockstaele E. (2009) GISH/FISH as a tool to characterise hybrids with small genomes and chromosomes.
- Pipino L., Leus L., Giovannini A., Scariot V. & Van Labeke M. C. (2009) Pollen characteristics affect seed production of rose cultivars.

9 september: Van Poucke K., Monbaliu S., Munaut F., Heungens K., Van Hove F. & De Saeger S. (2009) Identification and mycotoxin spectrum of four new Fusarium populations from bell pepper. Worldwide Mycotoxin Reduction in Food and Feed Chains, Tulln/Vienna (AT).

4 november: De Ruyck H., De Ridder H., Merchiers M., Van Waes C., Vandecasteele B. & De Block J. (2009) Determination of the internal quality of sugar beet using near-infrared reflectance spectroscopy (NIRS). 14th Internal Symposium on recent advances in food analysis, Praag (CZ).
6 november: 15th PhD Symposium on Applied Biological Sciences, Leuven (BE).
- Devacht S., Lootens P., Baert J., Van Waes J., Van Bockstaele E. & Roldán-Ruiz I. (2009) Influence of anthocyanin on the photosynthetic performance of industrial chicory under cold stress.
- Van Hulle S., Van Waes C., Stals I., Roldán-Ruiz I., Van Bockstaele E. & Muylle H. (2009) Saccharification potential of harvest 2009 of 5 grass energy crops.
- Deryckere D., Eeckhaut T., Van Huylenbroeck J. & Van Bockstaele E. (2009) Plant regeneration from leaf mesophyll protoplasts of *Cichorium intybus sativum*.

13 november: Deryckere D., Eeckhaut T., Van Huylenbroeck J. & Van Bockstaele E. (2009) Plant regeneration from leaf mesophyll protoplasts of *Cichorium intybus sativum*. BPBA Symposium "plant hormones: new insight for Biotechnology, Gembloux (BE).

Technology & Food Science Unit

10 februari: Braekman P., Foqué D. & Nuyttens D. (2009) Improving spray application in Flemish greenhouses. In: Bush M., Cussans J., Foster V., Freer B., Knight S. (Eds.) Crop Protection in Southern Britain, Peterborough (UK).

17 maart: Duquenne B., De Ville W. & Coudijzer K. (2009) TAD Zuivel - Advies voor melkveehouders, hoevezuivelproducenten en kleine KMO's in de zuivelsector. Creatief valoriseren, Gent (BE).

27-29 april: Broekaert K., Heyndrickx M., Hoffman S., Devlieghere F., Herman L. & Vlaemynck G. (2009) Identification of spoilage micro-organisms of brown "Purus" shrimps (*Crangon crangon*). The Safe Consortium International Congress on Food Safety - Second International Congress: Novel Technologies and Food Quality, Safety and Health, Girona (ES).

7 mei: Demeyer R., De Buck S., De Paepe A., De Wilde K., Virdi V., Depicker A., De Loose M. & Van Droogenbroeck B. (2009) From the lab to the greenhouse: evaluation of *Arabidopsis* as a production platform. Knowledge for Growth 2009, Gent (BE).

19 mei: KVCV Symposium: Trends in Food Analysis VI, Gent (BE).
- De Ruyck H., De Ridder H., Van Royen G., Merchiers M., Van Waes C. & De Block J. (2009) Screening van zuivelpoeders met nabij infrarood spectroscopie (NIRS).
- De Ruyck H. & Herman L. (2009) Dienstverlening: Voedselveiligheid en Productkwaliteit en -innovatie.

2 juni: Co-Extra International Conference, Paris (FR).
- Papazova N, Ruttink T, De Loose M & Taverniers I (2009) Core collections for specificity testing of reference assays for GMO-quantification.
- Papazova N, Ruttink T, De Loose M & Taverniers I (2009) Nucleotide sequence uniformity of maize reference assays.

15 juni: Van Pamel E., Vlaemynck G., Heyndrickx M., Verbeken A. & Daeseleire E. (2009) Development of an UPLC-MS/MS multimycotoxin analysis and application for analyzing the mycotoxin production of pure fungal cultures. 31st Mycotoxin Workshop, Münster (DE).

16 juni: Plant based vaccines and antibodies PBVA 2009, Verona (IT).
- De Wilde K., Sack M., Van Droogenbroeck B., De Buck S., Van Lerberge E.. & Depicker A. (2009) Production and characterization of an anti-HIV single-chain Fc antibody in *Arabidopsis* seeds.
- Loos A., Castilho A., Stadlmann J., Van Droogenbroeck B., Hilmer S., Cao J., Depicker A. & Steinkellner H. (2009) Characterization of glycoforms of Anti-hepatitis A Antibodies produced in *Arabidopsis* seeds.
- Demeyer R., De Buck S., De Paepe A., De Wilde K., Virdi V., Depicker A., De Loose M. & Van Droogenbroeck B. (2009) From the lab to the greenhouse: *Arabidopsis* as a production platform.

18-19 juni: Fourteenth Conference on Food Microbiology, Luik (BE).
- De Jonghe V., Coorevits A., De Vos P. & Heyndrickx M. (2009) Influence of storage conditions on the growth and proteolytic spoilage of *Pseudomonas* species in refrigerated raw milk.

- Verstraete K., Robyn J., De Zutter L., Herman L., Heyndrickx M. & De Reu K. (2009) Validation of a detection and isolation method for shiga toxin-producing *Escherichia coli* O26, O103, O111, O145 and sorbitol positive O157 in food.
- Dewaele I., Van Meirhaeghe H., Vanrobaeys M., Ducatelle R., Rasschaert G., Herman L., Heyndrickx M. & De Reu K. (2009) Environmental monitoring of *Salmonella Enteritidis* on positive layer farms.
- Werbrouck H., Vermeulen A., Herman L., Devlieghere F., Uyttendaele M. & Van Coillie E. (2009) Expression of virulence genes of *Listeria monocytogenes* after growth on vacuum-packed cold-smoked salmon, stored at 7°C.
- Stals A., Baert L., Van Coillie E. & Uyttendaele M. (2009) Validation of a Norovirus detection methodology in soft red fruits.
- Broekaert K., Heyndrickx M., Hoffman S., Devlieghere F., Herman L. & Vlaemynck G. (2009) Analysis of the microbiota of "Purus" shrimps (*crangon crangon*) from catch to consumer.

19 juni: Platteau C., Taverniers I., Daeseleire E. & De Loose M. (2009) Different methods to detect allergens in food. KVCV: Trends in Food Analysis VI, Gent (BE).

21-25 juni: De Reu K., Renders K., Reybroeck W., Ooghe S. & Herman L. (2009) A market study on the quality of eggs from different housing systems. XIXth European Symposium on the Quality of Poultry Meat & XIIIth Symposium on the Quality of Eggs and Egg Products, Turku (FI).

22 juli: Verbist B., Van Weyenberg S., De Vliegher S. & Van Nuffel A. (2009) Does cleanliness, body condition or gait score effect udder health? - An observational study. In: Briese A., Clauss M., Hartung J., Springorum A. (Eds.) Vechta (D).

13-17 augustus: Marchand S., Vandriesche G., Coorevits A., Coudijzer K., De Jonghe V., Dewettinck K., De Vos P., Devreese B., Heyndrickx M. & De Block J. (2009) Heterogeneity of heat resistant proteases from milk spoiling *Pseudomonas* spp. *Pseudomonas* 2009, Hannover (DE).

16 augustus: Brusselman E., Nuyttens D., de Sutter N., Steurbaut W. & Moens M. (2009) Observing the viability of entomopathogenic nematodes using image processing. International Nematology Symposium, Hanoi (VN).

23 augustus: Hakze-van der Honing R., Van Coillie E. & van der Poel W. H. M. (2009) First discovery of HEV genotype 4 in swine in Europe by characterization of swine sequences, the Netherlands and Belgium. 8th International Congress of Veterinary Microbiology, Boedapest (HU).

22 september: Methicillin-resistant Staphylococci in animals: Veterinary and Public Health implications, Londen (UK).
- Rasschaert G., Vanderhaeghen W., Dewaele I., Janez N., Huijsdens X., Butaye P. & Heyndrickx M. (2009) Comparison of Fingerprinting Methods for Typing Methicillin-Resistant *Staphylococcus aureus* Sequence Type 398.
- Verhegghe M., Pletinckx L., Vandersmissen T., Arijs D., Haesebrouck F., Butaye P., Heyndrickx M. & Rasschaert G. (2009) Prevalence of methicillin-resistant *Staphylococcus aureus* (MRSA) ST398 on Belgian pig farms and pig farms with other livestock.

23 september: Van Royen G., Dubruel P. & Daeseleire E. (2009) Development and evaluation of a molecularly imprinted polymer for penicillin G in milk. IDF World Dairy Summit 2009, Berlijn (DE).

30 september: Dewaele I., Van Meirhaeghe H., Vanrobaeys M., Ducatelle R., Rasschaert G., Herman L., Heyndrickx M. & De Reu K. (2009) Environmental monitoring of *Salmonella Enteritidis* on positive layer farms. XIXth European Symposium on the Quality of Poultry Meat & XIII th Symposium on the Quality of Eggs and Egg Products, Turku (FI).

5 oktober: 3rd ASM Conference on *Salmonella*: Biology, Pathogenesis & Prevention, Aix-en-Provence (FR).
- Dewaele I., Ducatelle R., Herman L., Heyndrickx M. & De Reu K. (2009) Evaluation of bacterial indicators for monitoring the *Salmonella Enteritidis* status of layer farms.
- Dewaele I., Van Meirhaeghe H., Vanrobaeys M., Ducatelle R., Rasschaert G., Herman L., Heyndrickx M. & De Reu K. (2009) Environmental monitoring of *Salmonella Enteritidis* on positive layer farms.

13 oktober: Morandini F. (2009) *Arabidopsis* seeds: small and efficient biofactories for plant-made pharmaceuticals. Plant based vaccines and antibodies PBVA 2009, Verona (IT).

23 oktober: 3rd European Workshop on Standardised Procedure for the Inspection of Sprayers in Europe - SPISE, Brno (CZ). Declercq J., Nuyttens D. & Huyghebaert Bruno (2009) An overview of the defects on the tested sprayers in Belgium.

23 oktober: Dewaele I., Van Meirhaeghe H., Vanrobaeys M., Ducatelle R., Wildemauwe C., Rasschaert G., Herman L., Heyndrickx M. & De Reu K. (2009) A longitudinal study of environmental *Salmonella Enteritidis* on persisting layer farms. 17th Annual Conference of the Flemish Society for Veterinary Epidemiology and Economics: Epidemiological tools as corner stone for policy making and good practice, Tervuren (BE).

28-31 oktober: 6th Balkan Congress of Microbiology, Ohrid (MK).
- Dewaele I., Van Meirhaeghe H., Vanrobaeys M., Ducatelle R., Rasschaert G., Herman L., Heyndrickx M. & De Reu K.: A longitudinal study of environmental *Salmonella Enteritidis* on persisting layer farms.
- Werbrouck H., Vermeulen A., Herman L., Devlieghere F., Uyttendaele M. & Van Coillie E. (2009) Expression of virulence genes of *Listeria monocytogenes* after growth on vacuum-packed cold-smoked salmon, stored at 7°C.
- Verstraete K., Robyn J., De Zutter L., Herman L., Heyndrickx M. & De Reu K. (2009) Validation of a detection and isolation method for shiga toxin-producing *Escherichia coli* O26, O103, O111, O145 and sorbitol positive O157 in food.

5 november: RAFA 2009: 4th International Symposium on Recent Advances in Food Analysis, Praag (CZ).
- De Ruyck H., De Ridder H., Merchiers M., Van Waes C., Vandecasteele B. & De Block J. (2009) Determination of the internal quality of sugar beet using near-infrared reflectance spectroscopy (NIRS).
- De Ruyck H. & Herman L. (2009) ILVO's food-related research services: powerful tools for food safety, food product quality and food product innovations.

6 november: Leleu S., Herman L., Heyndrickx M., De Reu K., Michiels C., De Baerdemaeker J. & Messens W. (2009) Selection of a chitosan type for eggshell coating and its effect on shell contamination and trans-shell penetration by *Salmonella enterica* serovar Enteritidis. 15th PhD Symposium on Applied and Biological Sciences, Leuven (BE).

13 november: Demeyer R., De Buck S., De Paepe A., De Wilde K., Virdi V., Depicker A., De Loose M. & Van Droogenbroeck B. (2009) From the lab to the greenhouse: *Arabidopsis* as a production platform. Plant hormones: New insights for biotechnology, Gembloux (BE).

11 december: BSM-symposium: Analyzing complex microbial communities and their host micrtobe interactions, Brussel (BE).
- De Jonghe V., Coorevits A., De Vos P. & Heyndrickx M. (2009) Proteolytic spoilage of *Pseudomonas* species throughout the dairy chain.
- Broekaert K., Heyndrickx M., Devlieghere F., Herman L. & Vlaemynck G. (2009) Differences in the dominant microbiota present on various growth media applied in fish analysis.

8 Communication

8.1 Press contacts and visits of Belgian and foreign delegations

15 januari: VTM. Interview met bijdrage van Bart Verschueren "Pulskor".

21 januari: Focus TV. Interview met bijdrage van Bart Verschueren en Hans Polet "Alternatieve visserijtechnieken".

21 januari: VRT. Polet, H. Voorbereiding "Toespraak door Kris Peeters" op VRT Nieuws.

21 januari: Polet, H. Keerpunt in de visserij - Persbericht. Oostende (BE).

21 januari: Radio 1. Interview met bijdrage van Bart Verschueren "Pulskor".

21 januari: VRT. Interview met bijdrage van Bart Verschueren "Alternatieve visserijtechnieken".

21 januari: Het Laatste Nieuws. Interview met bijdrage van Hans Polet "Alternatieve visserijmethodes meer dan ooit de toekomst. Visserij staat voor keerpunt".

21 januari: VILT. Interview met bijdrage van Polet Hans "Alternatieve visserij is rendabel".

21 januari Het Nieuwsblad. Interview met bijdrage van Polet Hans "Dit is een keerpunt voor Vlaamse vissers".

22 januari: De Standaard. Interview met bijdrage van Hans Polet "Vissers staan voor ecologisch keerpunt. Visserij kan ook duurzaam".

22 januari: Het Nieuwsblad (Oostende Westhoek). Interview met bijdrage van Hans Polet "Alternatieve methodes. Keerpunt voor Noordzee".

22 januari: Het Nieuwsblad. Interview met bijdrage van Hans Polet "Ze noemen mij de Don Quichot van de vissers".

22 januari: VILT. Interview met bijdrage van Hans Polet "Alternatieve visserij is rendabel".

23 januari: De Zeewacht. Interview met bijdrage van Hans Polet "Visserij laat zich niet dwingen".

27 januari: VILT. Interview met bijdrage van Bart Verschueren "Garnaalvistechniek vermindert bijvangst met 35 %".

29 januari: Tips. Interview met bijdrage van Hans Polet - Persconferentie "Bootje duurzame vis voor Vlaams minister-president".

2 februari: Control en Automation Magazine. Interview met Willem Maertens. Sensor-array spoort kreupelheid bij runderen vroegtijdig op.

27 februari: Landbouw en Techniek. Interview met bijdrage van Jürgen Vangeyte "ILVO is een nuttige partner bij uitwerken van ideeën".

1 maart: Interview "De duurzaamheidsster" (Karen De Mey, Fleur Marchand, Joost Dessein), Nieuwsbrief Vlaams Ruraal Netwerk, 2 (1): 1-4.

27 maart: Landbouw en Techniek. Rassenlijst bundelt beste cichoreirassen voor 2009. Interview met Johan Van Waes.

16 april: De Morgen. Interview met bijdrage van Hans Polet "Quota zijn niet zuiver op de graat".

17 april: De Metro. Interview met bijdrage van Hans Polet "Quota zijn noodzakelijk kwaad".

5 mei: Polet, H. De Visquota: een ingewikkeld verhaal - Reaktie op artikel in Het Nieuwsblad "Er stroomt zeewater door onze aderen".

7 mei: Het Nieuwsblad. Interview met bijdrage van Polet Hans "Alternatieve visserij nog niet voor morgen" - Reactie op artikel in Het Nieuwsblad "Ik bewijs al 21 jaar dat het ook anders kan".

7 mei: Landbouw en Techniek. Muylle, H. and Van Waes, J. Samenwerking en visie: twee sleutelbegrippen binnen het ILVO-onderzoek. Interview Landbouw&Techniek, 14 (9).

8 mei: Boer en Tuinder. Interview met bijdrage van Veerle Van linden. Het off-road energieverbruik van landbouwmachines in beeld.

15 mei: Landbouw en Techniek. Interview "Duurzaamheid is geen modewoord" (Karen De Mey), Landbouw & Techniek, 14 (9).

17 juni: ZDF. Interview met bijdrage van Bart Verschueren "Meere in Not - Die Nordsee".

19 juni: Groene Kring Tijdschrift. Artikel "Multifunctionele landbouw en regionale identiteit: een succesvolle tandem?" over MUSICAL project met oproep om mee te doen aan internetenquête. Groene Kring Tijdschrift 360: 22-23.

6 & 17 juli: Landbouw en Techniek. Artikelenreeks "Met focus op bijen als (bij)verdienste', Landbouw en Techniek, 14 (13), perscontact Wim Reybroeck met dhr. J. Van Outryve.

11 juli: Focus. Interview met bijdrage van Daan Delbare "Pizza en pita met vis".

11-12 juli 2009 – open vlootdagen (aan boord van de Belgica in Zeebrugge)

17 juli: Landbouw en Techniek. Reybroeck, Perscontact met dhr. J. Van Outruyve. Focus op bijen als (bij)verdienste voor Landbouw enTechniek 14 (13).

7 augustus: Boer en Tuinder. Greet Ruysschaert. Biochar een wondermiddel?

7 augustus: Boer en Buiten. Nicole Viaene. Ongewenste gasten-aaltjes, reportage Boer&Buiten.

25 augustus: Focus TV. Interview met bijdrage van Kris Van Craeynest "Dag van de Garnaal".

25 augustus: VRT. Interview met bijdrage van Kris Van Craeynest "Dag van de Garnaal".

29 augustus: Het Nieuwsblad online. Mega Mindy komt naar Melle.

25 augustus: VRT. Interview met bijdrage van Kris Van Craeynest "Dag van de Garnaal".

13 augustus 2009: Kenniskring Nederlandse pulsvissers, inclusief zeereis met O.191

3 september 2009: Gouverneur Paul Breyne en enkele leden van de Bestendige Deputatie van West Vlaanderen, samen met enkele directieleden van ILVO.

17 september: Het Nieuwsblad. Interview met bijdrage van Annemie Zenner "Wetenschappers zoeken naar de leeftijd van vissen".

17 september: Krant van West-Vlaanderen. Interview met bijdrage van Annemie Zenner "Wetenschappers zoeken naar de leeftijd van vissen".

17 september: VILT. Interview met bijdrage van Ilse Maertens en Martine Moerman "ILVO onderzoekt leeftijd van duizenden vissen".

17 september: VILT. Interview met bijdrage van Bart Verschueren "ILVO wint tweede prijs WWF Smart Gear Competition".

17 september: VILT. Interview met bijdrage van Hans Polet "Steeds meer reders kiezen voor duurzame visserij".

17 september: VILT. Interview met bijdrage van Kelle Moreau "Rog met uitsterven bedreigd door foute naamgeving".

18 september: HortiNews online. Bloeit Mega Mindy binnenkort in uw tuin?

18 september: Landbouwleven. Interview met bijdrage van Willem Maertens. Automatisering van kreupelheidsdetectie bij melkvee.

18 september: Landbouwleven. Interview met bijdrage van Bart Eloot. Aandacht voor rooibeschadiging bij aardappelen.

18 september: Boer en Tuinder. Mega Mindy is nu ook een pluimhortensia. Johan Van Huylenbroeck.

18 september: Boer en Tuinder. Nuyttens, D., Dekeyser, D., Hannes, L. en Latré, J. (2009) Goed afgestelde, stabiele spuitbomen. Boer en Tuinder, 18 september 2009: p.38.

24 september: Het Nieuwsblad. Interview met bijdrage van Bart Verschueren "Internationale erkening voor Ilvo-project".

24 september: Het Nieuwsblad. Interview met bijdrage van Hans Polet "Dit is een keerpunt voor Vlaamse vissers".

24 september: Het Nieuwsblad. Interview met bijdrage van Bart Verschueren "Internationale erkening voor Ilvo-project".

2 oktober: De Zeewacht. Interview met bijdrage van Bart Verschueren "ILVO wint 10.000 dollar".

9 oktober: interview Winy Messens voor Inspecteur De Caluwé, Radio 2, "Houdbaarheid en bewaring van eieren".

16 oktober: Landbouw enTechniek. Focus op graslandonderzoek binnen ILVO. Alex De Vliegher

23 oktober: Varkensbedrijf. Interview met Frank Tuyttens en Suzy Van Gansbeke. Onzekere toekomst zet rem op omschakeling naar groepshuisvesting.

28 oktober: Bezoek leerlingen Landbouw van het KAHO St Lieven van St Niklaas.

9 november: Panelgesprek voor Landgenoten 2009/20. Daniël De Brabander, An Schellekens en P. De Ceuster. "Nichemarkten als gangmaker".

19 november: Radio 1. Intervieuw met bijdrage van Kelle Moreau "Zeg nooit *dipturus batis* tegen een *dipturus intermedia*".

23 november 2009: de vereniging radio amateurs (aan boord van de Belgica in Zeebrugge)

30 november 2009: het Agentschap Marketing en Inkomensbeheer van het Departement Landbouw en Visserij van de Vlaamse overheid

3 december: Rondleiding Poolse delegatie "Organic food and farming research at ILVO in a national and international context" (Lieve De Cock).

8-9 december: onderzoekers en vissers uit Duitsland

16 december: studenten MARELAC en EMBC van de Universiteit Gent

28 december: VILT. Robin De Sutter. Te weinig aandacht voor veiligheid in landbouw.

8.2 Activities, workshops and courses organised by or in cooperation with ILVO

Animal Sciences Unit

14 januari: De Campeneere S. Eigen vervangers voor perspulp en krachtvoeder in de melkveevoeding. Melkveehouderij: actueel, Oostmalle, Bree, Beervelde (BE).

21 januari: Polet H. Organisatie persconferentie "Keerpunt in de visserij". Oostende (BE).

5 februari: Fiems L. ILVO-onderzoek met Belgisch Witblauw dikbilvleesvee. Studiedag: Keizersnedeproblematiek en het onderzoek bij BWB in Vlaanderen Aalter (BE).

9 februari: De Boever J. L. en Millet S. Permanentie Agriflanders. Agriflanders, Gent (BE).

12 februari: De Campeneere S. Aanpassingen aan het DVE-systeem en de praktische gevolgen. Studienamiddag Voedergewassen en Melkveehouderij, Geel ten Aard (BE).

13 februari: De Campeneere S. Eigen vervangers voor perspulp en krachtvoeders. Studienamiddag Veehouderij, Breendonk (BE).

24 februari: Polet H., Vanderperren E., Verschueren B., Vanden Berghe C. en Van Craeynest K. Organisatie "Infonamiddag rond duurzame visserijtechnieken en bijhorende steunmaatregelen onder het Europees Visserijfonds", Oostende (BE).

12 maart: Fiems L. O. Vruchtbaarheid bij vleesvee: van vaarskalf tot kalfvaars. CRV-Themajongerendag 2009, Temse (BE).

24 maart: De Brabander D. L. Valeur nutritive des sous-produits du bioéthanol. Protéines végétales: Quelles alternatives au soja dans nos exploitations, Gembloux (BE).

3 april: De Campeneere S. en Millet S. Organisatie 34th Animal Nutrition Research Forum, Melle (BE).

10 april: Stouten H. De Visserijproblematiek. Natuurstudiecongres Kust en Mens, De Panne (BE).

23 april: Verelst J. en Aerts J. M. LIMS en de norm NBN en ISO/IEC 17025. Studiedag voor laboratoria, Sint-Niklaas (BE).

7 mei: Studienamiddag Samen naar rationeel energiegebruik in land- en tuinbouw, Melle (BE), met bijdragen van De Boever J., De Campeneere S., Fiems L., De Brabander D.

12 mei: Maertens L. Pluimveeonderzoek aan het ILVO in Melle. Onderzoek ten dienste van de veehouderij, Beervelde (BE).

20 mei: Maertens L. Voederbeperking bij gespeende konijnen. Recente ontwikkelingen in het konijnenonderzoek, Merelbeke (BE).

9 juni: Fiems L. O. Voedermiddelen en rantsoenen voor het afmesten van stieren. Afmesten van stieren - Een economische en voedertechnische benadering, Jabbeke (BE); Lier (BE).

11 juni: Studiedag: Castratie van biggen: Afgerond en opgestart ILVO-onderzoek, Melle (BE), met bijdragen van Isebaert S., Aluwé M., De Brabander D., Bekaert K., Millet S., Tuyttens F., Langendries K.

26 juni: Maertens L. Is vroeger slachten en gescheiden afmesten een optie bij vleeskuikens? Hoe vleeskuikens in de toekomst houden? Geel (BE).

13 augustus: Polet H. en Verschueren B. Ontmoetingsdag: Pulsvisserij op garnaal. Oostende (BE).

17 september: Verschueren B. 2009 Runner-up: The HOVERCRAN. Vigo (PT).

29 september: Infonamiddag ILVO-Dier "Actuele onderzoeksresultaten bij rundvee", Melle (BE), met bijdragen van De Boever J., De Campeneere S., Fiems L., De Brabander D.

29 december: Van Craeynest K. Workshop "Innovatiesteun in de visserijsector en prijsvorming in de visserijsector". Oostende (BE).

Social Sciences Unit

13 februari, 2 april, 15 mei, 27 november: Verguts V. en Messely L. CoPKO lezingenreeks: "Van landdegradatie naar duurzaam landgebruik: Wat is de rol van kwalitatief onderzoek?" (Francis Turkelboom), "Opening up the agricultural policy community: The Dutch case of debating the CAP" (Katrien Termeer), "Begrijpen is ingrijpen. Uitdagingen voor beleidsrelevant kwalitatief onderzoek: lessen uit de praktijk" (Jeroen Bryon), "Over kwalitatief onderzoek in managementliteratuur: filosofie en best practices" (Jan Lepoutre), Merelbeke (BE).

25-26 maart: Verguts V. KWALON cursus "Kwalitatief Interviewen: theorie, design, interviewtechnieken, reflectie, tijdsplanning" (Jeanine Evers & Frank van Gemert), Merelbeke (BE).

28-30 september: Dessein J. Green care for health and well being: adressing research needs and policy challenges. 4th European COST 866 Workshop in Green Care in Agriculture, Antalya (TR).

30 september: BVLE met Lauwers L. The milk price crisis, Brussel (BE), www.bvle-aber.be.

4 december: BVLE met Lauwers L. Prijsvolatiliteit en inkomensrisico in de landbouw: hoe kunnen landbouwers zich hiertegen wapenen?, Agribex, Brussel (BE), www.bvle-aber.be.

Plant Sciences Unit

24 februari: Willekens K. Compost, Compostthee en Bodemmanagement. Compost, Compostthee en Bodemmanagement, Melle (BE).

23 maart: Pyck N. In de spotlights: licht en fotosynthese, Melle (BE).

7 mei: Studienamiddag Samen naar rationeel energiegebruik in land- en tuinbouw, Melle (BE), met bijdragen van Muylle H.

18 juni: De Vliegher A. Grassen, smaken verschillen. NVWV studiedag "Grassen, smaken verschillen", Lelystad (NL).

14-28 augustus: Roldàn-Ruiz I. IPBO summer course 2009: Modern breeding techniques for improvement of leguminous plants. Gent (BE).

31 augustus: Van Huylenbroeck J. 23rd EUCARPIA SYMPOSIUM - Section Ornamentals "Colourful Breeding and Genetics", Leiden (NL).

9 oktober: Viaene N. Euphresco-Globodera project - Final Meeting. Euphresco-Globodera project - Final Meeting, Gent (BE).

15 oktober: Studienamiddag Grasland, een mooie toekomst tegemoet?, Melle (BE), met bijdragen van De Vliegher A.

20 oktober: De Vliegher A. Voedselproductie in Vlaanderen. Voedselproductie in Vlaanderen, Melle (BE).

8 november: Rohde A. 4th International Plant Symposium on Plant Dormancy. 4th International Plant Symposium on Plant Dormancy, Fargo (US).

13 november: Eeckhaut T. BPBA Scientific meeting: "Plant hormones: new insights for biotechnology". Gembloux (BE).

26 november: Dhooghe E. Databeheer in de plantenveredeling. Databeheer in de plantenveredeling, Melle (BE).

2 december: de Vliegher A., Willekens K. Research topics on sustainable and organic agriculture. Bezoek Poolse Delegatie, Merelbeke (BE).

2 december: De Campeneere S., De Vliegher A. en Peiren N. Determination of nitrogen and phosphorus excretion by organic dairy cattle. Bezoek Poolse Delegatie, Merelbeke (BE).

17 december: Willekens K. Studiedag Kleinschalig composteren van beheerresten: kansen voor samenwerking tussen landbouwers en natuurbeheerders, Melle (BE).

Technology & Food Science Unit

24 januari: Reybroeck W. Workshop "Determination of the quality of honey". Addis Abeba (ET).

30 januari: Demeyer R. Scientists@work, GGO's: de volgende generatie. Merelbeke (BE).

19 februari: Heyndrickx M. Campylobacter problematiek bij varkens. Afsluitend begeleidingscomité GROPORC, Melle (BE).

3 april: Demeyer P. en Van Ransbeeck N. Environmental technologies for agricultural production (stakeholder contribution). International meeting on environmental technologies for agricultural production, Utrecht (NL).

7 april: Vangeyte J. Cooperation between Technology and Food Unit and Delaval. Merelbeke (BE).

20 april: De Reu K. Workshop Stectrack, Brussel (BE).

24 april: Reybroeck W. The screening of antimicrobials in milk. Schering-Plough Distributors Meeting, Paris (FR).

24 april: Reybroeck W. The detection of cefalonium in milk by different microbiological and receptor tests, Paris (FR).

29 april: Heyndrickx M., De Block J., Dewettinck K. en Marchand S. Predoctoraal Internationaal Symposium: Houdbaarheid en stabiliteit van zuivelproducten, Gent (BE).

5 mei: Coudijzer K. Piloottesten voor voeding- en voederindustrie. Een essentiële innovatiestap. Researchmeeting @ Breakfast, Kortrijk (BE).

5 mei: De Ruyck H., Daeseleire E. en Reybroeck W. NRL Melk en Melkproducten Workshop "The use of LC-MS/MS for the determination of residues of veterinary drugs in milk", Brussel (BE).

7 mei: Studienamiddag Samen naar rationeel energiegebruik in land- en tuinbouw, Melle (BE), met bijdragen van Muylle H., Van Hulle S., Van Daele I., De Boever J., Ruysschaert G., Fiems L., D'Haene K., Vander Vennet B., Van linden V., De Paepe M., Demeyer P., Bronchart F., Van Waes J.

11 mei: De Reu K. Eggshell quality in furnished cages and non-cage systems. Scientific delegation meeting Ministry of Agriculture, Israel, concerning "Housing of laying hens according the EU directive 99/74", Merelbeke (BE).

19 mei: Daeseleire E. KVCV: Trends in Food Analysis VI, Gent (BE).

19 mei: Daeseleire E. Voedselveiligheid: heden en toekomst. KVCV Lustrumviering, Gent (BE).

5 juni: Dekeyser D. Technieken voor een duurzame en efficiëntere onkruidbestrijding in bieten. Demodag Vlaamse overheid, Melkwezer (BE).

9 juni: De Ruyck H. Activiteitenverslag eerste halfjaar 2009. Communicatiegroep NRL Melk en Melkproducten - FAVV, Brussel (BE).

9 juni: De Reu K. *Staphylococcus aureus* en enterotoxines, Communicatiegroep NRL Melk en Melkproducten - FAVV, Brussel (BE).

9 juni: Van Coillie E. Coagulase-negatieve stafylokokken, opduikende mastitispathogenen. Communicatiegroep NRL - FAVV, Brussel (BE).

15-17 juni: Heyndrickx M. International Congress "Spore-forming bacteria in food". Spore 2009, Quimper (FR).

18 juni: Herman L. Fourteenth Conference on Food Microbiology, Luik (BE).

24 juni: Nuyttens D. en Dekeyser D. Bayer CropScience demoplatform. Houtain Le Val (BE).

25 juni: Herman L. Genetically Modified Micro-organisms - Update Guidance document - Summary of technical issues. Workshop Guidance document,Parma, EFSA. Genetically Modified Microorganisms, Parma (IT).

30 juni: Demeyer P. Een nieuw emissiemodel ammoniak voor Vlaamderen (EMAV). Algemene Vergadering van het Belgisch Comité van de International Dairy Federation (IDF), Brussel (BE).

2 september: Van Brandt L. *Mycobacterium avium* subsp. *paratuberculosis*: problem statement and detection. Leuven (BE).

8 september: Maertens W. en Van Nuffel A. Studienamiddag "scoren van melkvee" i.s.m. ADLO. Melle (BE), Geel (BE).

10 september: De Reu K. Samenstelling, eigenschappen en kwaliteit van rauwe melk. BCZ Basiscursus zuiveltechnologie voor arbeiders, Gierle (BE).

22 september: Zwertvaegher I., Baert J., Sonck B. en Van Nuffel A. Ontwikkelen van een meetmethode ter bepaling van de gemiddelde speengrootte als objectieve parameter bij de tepelvoeringskeuze voor een melkveestapel. Studiedag Control, VRV Vlaanderen, Oosterzele (BE).

24 september: Herman L. The use of taxonomy in risk assessment of micro-organisms: bacteria, Brussels. Genetically Modified Microorganisms-Technical issues, Workshop EFSA, Brussel (BE).

25 september: Messens W. Het Metzoon model. Project Metzoon stakeholders meeting, Tervuren (BE).

25 september: Herman L. Detection recombinant DNA in products produced by genetically modified microorganisms . Genetically Modified Microorganisms-Technical issues – Workshop EFSA, Brussel (BE).

26 september: Dekeyser D. en Nuyttens D. Demo spuitboomstabiliteit. Werktuigendagen 2009, Oudenaarde (BE).

30 september: De Reu K. Achtergrond, principes, aandachtspunten en praktijken van reiniging en desinfectie. Hygiene For Food Seminarie - Hygiëne, reiniging en ontsmetting, Gent (BE).

1 oktober: Zwertvaegher I., Baert J., Sonck B. en Van Nuffel A. Rapport entre la taille des trayons et le choix des manchons trayeurs. Journée d'étude Control, Recogne (BE).

14 oktober: Vangeyte J. en Van Weyenberg S. Workshop on mapping of current ICT research and preparation of joint trans-national call. Workshop on mapping of current ICT research and preparation of joint trans-national call, Merelbeke (BE).

15 oktober: De Ville W. KVLV Basiscursus zuivelbereiding: kaasbereiding, Bever (BE).

19 oktober: Duquenne B. Basiscursus zuivelbereiding: ijsbereiding, i.s.m. Steunpunt Hoeveproducten, Velzeke (BE).

17 november: De Reu K. NRL Milk workshop "Incidence, pathogenesis and detection of shigatoxin producing *E. coli* (STEC) in food, including *E. coli* O157", Melle (BE).

17 november: Vangeyte J. Seminar Embedded Systems in precision agriculture - Technologie: een meerwaarde voor je bedrijf. Merelbeke (BE).

24 november: Coudijzer, K. BCZ Basiscursus zuiveltechnologie: Kaas, Gent (BE).

1 december: Van Royen G. Piloottesten voor voeding- en voederindustrie. Een essentiële innovatiestap. Infovergadering organisatie ringonderzoeken industrie, Melle (BE).

1 december: Reybroeck W. Validation of the TwinExpress Milk for the detection of beta-lactams and tetracyclines in milk. Workshop Belgian Dairy Industry, Melle (BE).

1 december: Ooghe S. en Reybroeck W. Bespreking resultaten ringonderzoeken 2009. Workshop Belgische Zuivelindustrie, Melle (BE).

1 december: Werbrouck H. Bespreking resultaten ringonderzoeken en voorstelling kalender 2010. Infovergadering organisatie ringonderzoeken door ILVO-T&V voor de zuivelbedrijven, Melle (BE).

1 december: Werbrouck H., Ooghe S. en Reybroeck W. Infovergadering organisatie ringonderzoeken door ILVO-T&V voor de zuivelbedrijven. Infovergadering organisatie ringonderzoeken door ILVO-T&V voor de zuivelbedrijven, Melle (BE).

1 december: Vlaemynck G. BCZ Basiscursus zuiveltechnologie: Room, boter en roomijs, Gent (BE).

10 december: Van Nuffel A., Bahr C. en Maertens W. Infonamiddag "kreupelheidsdetectie bij melkvee". Merelbeke (BE).

15 december: De Ruyck H. BCZ Basiscursus zuiveltechnologie: Contaminanten en residuen in zuivelproducten, Gent (BE).

16 december: Leleu S. Chitosan: The application of this antimicrobial agent as an eggshell coating. Leuven (BE).

8.3 Lectures and educational lectures

Animal Sciences Unit

14 januari: Buijs S. Influence of stocking density on corticosteroid metabolites, bursa weight en tonic immobility of broiler chickens. Interpretation of animal stress responses, Aarhus (DK).

16 januari: Fiems L. O. Van vaarskalf tot kalfvaars. Tollembeek (BE).

19-21 januari: Buijs S., Keeling L. en Tuyttens F. A. M. Spatial distribution and behaviour of broiler chickens at different densities. 21st Nordic Symposium of the International Society for Applied Ethology. Bjerringbro (DK).

21 januari: Polet H. Keerpunt in de visserij, Oostende (BE).

22 januari: Millet S. Vroeg spenen: voeding en manier van werken. Infoavond, Ieper (BE).

23 januari: Verschueren B. Ontwikkeling en demonstratie van een selectieve pulskor voor de visserij op grijze garnalen met het oog op een reductie van de teruggooi en de milieu impact. Kenniskring Duurzame Garnaalvisserij, Den Oever (NL).

5 februari: Fiems L. O. ILVO-onderzoek met Belgisch Witblauw dikbilvleesvee. Studiedag: Keizersnedeproblematiek en het onderzoek bij BWB in Vlaanderen, Aalter (BE).

10 februari: Fiems L. O. Voeding van dikbilvleesvee. Geel (BE).

12 februari: Verschueren B. Ontwikkeling en demonstratie van een selectieve pulskor voor de visserij op grijze garnaal met het oog op een reductie van de teruggooi en de milieu-impact. TPO Garnalendagen, Fintel (DE).

13 februari: Depestele J. Assessment of Technical Mitigation Measures in the Ecosystem Approach to Fisheries Management. Seventh Marine Biology Section Symposium 13, Gent (BE).

17 februari: De Campeneere S. Voeding: wijziging DVE-systeem, nieuwe voedermiddelen (krachtvoervervangers). Hoe inpassen in rantsoen? Optimalisatie in de melkveehouderij, Roeselare (BE).

18 februari: Polet H. Keerpunt in de Vlaamse visserij - Voordracht. Duurzaam vissen, Oostende (BE).

20 februari: ICES Benthos Ecology Working Group, Askø (SE).
- Van Hoey G., Wittoeck J., Hillewaert H., Van Ginderdeuren K. en Hostens K. Macrobenthos monitoring at the Belgian Coast in relation to the Water Framework Directive
- Van Hoey G., Ysebaert T., Herman P., Deneudt K., Bonne W. en Hostens K. Environmental Quality Assessment: The Benthic Ecosystem Quality Index (BEQI).

24 februari: Polet H., Vanderperren E., Verschueren B., Vanden Berghe C. en Van Craeynest K. Voorstelling alternatieve visserijtechnieken. Infonamiddag rond duurzame visserijtechnieken en bijhorende steunmaatregelen onder het Europees Visserijfonds, Oostende (BE).

25 februari: De Campeneere S. Het aangepaste DVE/OEB systeem 2007 … en de gevolgen voor melkveerantsoenen. Eigen alternatieven voor krachtvoeder en perspulp, Hasselt (BE).

16 maart: Fiems L. O. Voeding van Witblauw fokvee. Gent (BE).

3 april: 34th Animal Nutrition Research Forum (ANRF), Melle (BE).
- Langendries K. C. M., Aluwé M., Isebaert S. S. M., De Paepe M., De Brabander D. L. en Millet S. Compensatory growth in piglets after a dietary protein restriction for 10 days after weaning.
- De Boever J. L., Van Schooten H. en De Brabander D. L. Nutritive value of grass-clover silages as compared with grass silage.
- Delezie E., Aerts J. M., Maertens L. en Huyghebaert G. Effect of age and type of basal fat on fatty acid content in breast and thigh meat of turkeys.

3 april: Delezie E., Maertens L. en Huyghebaert G. The effect of maternal dietary n-3 fatty acids on hatch, chick quality and growth of the off-spring. XXI International Poultry Symposium PB WPSA "Science for Poultry Practice - Poultry Practice for Science", Wrocla-Szklarska Poreba (PL).

3 april: Maertens L. Possibilities to reduce the feed conversion ratio in rabbit meat production. Giornate di Coniglicoltura ASIC 2009, Forli (IT).

6 april: Torreele E. en Vandemaele S. Ecosystem Indicators, Dublin (IE).

20 april: Van Nieuwenhove K. en Delbare D. Mosselkweek biologisch bekeken. Overdracht van Mosselkweek, Oostende (BE).

23 april: Maertens L. Expérimentations réalisées en poulets de chair avec l'Ovocrack® et en lapins avec le Greencab® dans la station de recherche d'ILVO-Merelbeke. Le triple effet des Greencab® / Ovocrack® (butyrate de calcium encapsulé): stratégie intestinale, Rennes (FR).

11 mei: Verhaegen Y., De Coen W., Smagghe G., Parmentier K. en Cooreman K. *Crangon* genetics in ecotoxicology, Kopenhagen (DK).

13-14 mei: Buijs S., Keeling L. en Tuyttens F. A. M. Fearfulness in meat type rabbits at different stocking densities. 16e Internationale Tagung über Haltung und Krankheiten der Kaninchen, Pelztiere und Heimtiere, Celle (DE).

18-22 mei: Buijs S., Keeling L., Baert J. en Tuyttens F. A. M. Clustering versus dispersal: spatial preferences of broiler chickens studied at different densities. 8th European Symposium on Poultry Welfare, Cervia (IT).

27 mei: Van Craeynest K. Duurzaam Vissen – voordracht, Duinbergen (BE).

27 mei: Derveaux S. Kwaliteitsnormen en ketenmanagement. Vis van het jaar, Duinbergen (BE).

2 juni: Van Poucke E. en Tuyttens F. A. M. Effects of calcium, phosphorus and 25-hydroxyvitamin D3 on broiler leg health. 8th European Symposium on Poultry Welfare, Cervia (IT).

11 juni: Horst K. (bijdrage Karen Bekaert, D-VI) WEFTA Working Group Fat determination 2. ring trial Preliminary results, Hamburg (DE).

8 juli: Torreele E., Moreau K. en Vanhee W. ICES adviezen voor het beheer van de visbestanden in 2010, Brussel (BE).

23 juli: Vanhee W. State of the EU stocks: Irish Sea en West of Scotland. Seminar on State of Fish Stocks in European Waters, Brussel (BE).

23 juli: Vanhee W. State of the EU stocks: Celtic Sea en English Channel. Seminar on State of Fish Stocks in European Waters, Brussel (BE).

13 augustus: Verschueren B. "De Garnalenpulskor" "Duurzaam vissen op grijze garnaal met minder teruggooi en minder bodemcontact", Oostende (BE).

14 augustus: Vandamme S. Molecular comparative connectivity of two commercial marine fishes: Evolutionary enlighted management of turbot and brill. European Meeting of PhD students in Evolutionary Biology, Schoorl (NL).

24-27 augustus: 60th Annual Meeting of the European Association for Animal Production, Barcelona (ES).
- De Campeneere S., Vanacker J. M. en De Brabander D. L. Evaluation of three wheat treatments for dairy cattle: rolled wheat, ensiled ground wheat and ensiled whole wheat in brewers' grains.
- Fiems L. O. en De Brabander D. L. Relation between calf birth weight and dam weight in Belgian Blue double-muscled cattle.

25 augustus: Van Craeynest K. Dag van de Garnaal, Oostende (BE).

17 september: Verschueren B. Hovercran. World Fishing Exhibition, Vigo (PT).

24 september: Vanhee W. Hoe van vis naar quota? Oostende (BE).

24 september: Vanhee W. en Moreau K. ICES adviezen voor het beheer van de visbestanden in 2010, Oostende (BE).

24 september: Vanhee W. Virtual population analysis (VPA) (a brief explanation), Oostende (BE).

8 oktober: Tuyttens F. A. M. Vlees en dierenwelzijn. Studiedag BAMST "Imago van vlees en vleesproducten, Melle (BE).

21 oktober: Polet H. What makes a fleet sustainable? Environmental aspects. Conference Towards sustainable European fisheries: The double challenge of restructuring and reducing the fishing fleet, Brussel (BE).

25 oktober: Torreele E. ICES adviezen voor het beheer van de visbestanden in 2010 en "Management by effort". Brussel (BE).

2 november: Van Hoey G., Ysebaert T., Herman P. en Hostens K. The integration of biological and physial ecosystem characteristics in the BEQI index (Bentic Ecosystem Quality Index) to evaluate the ecological status of coastal and estuarine systems. Estuaries and Coasts in a changing world, Portland (US).

3 november: Aluwé M. Praktijkstudie van alternatieven voor onverdoofde castratie: projectrichtlijnen. Melle (BE).

6 november: Verschueren B. HOVERCRAN - HOVERing pulse trawl for selective *CRANgon* fishery. Fisheries Innovation Conference, Rotterdam (NL).

12 november: Van Craeynest K. SumWing - Eerste resultaten in de Belgische vloot. Oostende (BE).

17 november: Aluwé M. Castratie van biggen: stand van zaken, alternatieven en economische implicaties. Sint-Niklaas (BE).

25 november: Vanderhasselt R. Assessment of the welfare of broiler chickens - the use, development, testing and validation of an evaluation protocol for the welfare of broilers. PhD workshop "Designing experiments in behavioural research", Dalfsen (NL).

27 november: VLIZ Young Scientist' Day, Oostende (BE).
- Depestele J., Courtens W., Degraer S., Haelters J., Hostens K., Polet H., Rabaut M., Stienen E., Vandendriessche S. en Vincx M. Are trammel net fisheries a cure for the disease called fisheries impact? or..."the WAKO story".
- Verschueren B. HOVERCRAN - Hovering pulse trawl for selective *Crangon* fishery.

8 december: Van Nieuwenhove K. Mosselkweek., Leuven (BE).

10 december: Tuyttens F. Locomotiescore: een indicator van het welzijn van rundvee in het Welfare Quality protocol. Studienamiddag "Lameness in dairy cattle", Merelbeke (BE).

14 december: Van Nieuwenhove K. en Delbare D. AMORE III - WP2 Impact of Phaeocystis colonies on offshore mussel farming, Brussel (BE).

15 december: Delezie E. De pluimveehouderij en -voeding. Gent (BE).

15 december: Delbare D., Derveaux S., Hostens K., Moreau K., Torreele E., Van Craeynest K. en Vanderperren E. LATIVIS, Oostende (BE).

15 december: Vandemaele S. en Nimmegeers S. Pilot Project2: Development of a fishery information report for demersal fisheries in the Celtic Sea and western Channel. Project Coordination Meeting: Joint data collection between the fishing sector and the scientific community in Western Waters, Lisbon (PT).

Social Sciences Unit

10-12 maart: AgSAP 2009 Conference. Integrated Assessment of Agriculture and Sustainable Development. Setting the Agenda for Science and Policy. Egmond aan Zee (NL): http://www.conference-agsap.org/PDFs/1-Final-Proceedings-AgSAP2009.pdf.
- Lauwers L., Everaert P., Van Meensel J. en Bryon K. Using time driven activity-based costing data for modelling complex innovations: The case of batch farrowing.
- Wustenberghs H., Wauters E. en Van Passel S. Measuring sustainability at a supra-farm level: Evaluation of methods.
- Van Meensel J., Lauwers L., Van Huylenbroeck G. en Van Passel S. Exploring productiontheoretical insights for economic-environmental trade-off analysis.
- Van der Straeten B., Buysse J., Nolte S., Marchand F., Lauwers L., Claeys D. en Van Huylenbroeck G. Spatial planning of livestock production and manure abatement.
- Marchand F., Claeys D., Lauwers L., Buysse J., Van der Straeten B. en Van Huylenbroeck G. Introducing flat rate direct payments taking into account social concerns and ecological non-commodities.
- De Mey K., D'Haene K. en Meul M. Application of an integrated monitoring tool for sustainable dairy farming in Flanders.

23 maart: D'Haene K. Ecologisch melkveecafé: Indicatoren voor N en P. Melkveecafé van Afdeling Monitoring en Studie (AMS) en ILVO, Roborst (BE).

22 april: De Mey K. MOTIFS: concept en praktijkimplementaties. Innovatiecentra Vlaanderen, Leuven (BE).

23 april: Kerselaers E. A value tree for prioritising agricultural land preservation: the case of Flanders. 11th ABER-BVLE workshop for young agricultural economists, Brussels (BE).

7 mei: Verhoeve A. Schone schijn. Over hoe onzichtbare economische dynamiek op het platteland zichtbaar wordt en het beleid confronteert. Plandag 2009. Tussen droom en werkelijkheid, Brussel (BE): www.plandag.org.

7 mei: ILVO-studiedag "Samen naar rationeel energiegebruik in land- en tuinbouw", Merelbeke (BE).
- D'Haene K. en De Mey K. Doorlichting van het energieverbruik van landbouwbedrijven met de duurzaamheidsster.
- Vander Vennet B. Milieuscenario's voor de glastuinbouw 2030.
- Vander Vennet B. Vergelijking lokale en internationale productiesystemen in de varkenshouderij.

29 mei: Messely L. Regionale identiteit als mobiliserende factor voor plattelandsontwikkeling. CAG studiedag "Platteland en identiteit in Vlaanderen en Nederland, na de Tweede Wereldoorlog", Heverlee-Leuven (BE).

2 juni: Segers K., Dessein J., Develtere P., Hagberg S., Haylemariam G., Haile M. en Deckers J. Farmers' appropriation of microcredit programs and informal institutional change in Tigray, Ethiopia. European Research Conference on Microfinance, Brussels (BE): https://lirias.kuleuven.be/bitstream/123456789/239848/1/Segersenal_2010_Microcredit_farmers_and_informal_institutions_abstract_Open_access.pdf.

4 juni: Segers K., Dessein J., Hagberg S., Develtere P., Haile M. en Deckers J. The politics of mobilizing farmers for development in Tigray, Ethiopia. AEGIS 2nd European conference on African studies, Leipzig (DE): https://lirias.kuleuven.be/handle/123456789/229998.

26 juni: D'Haene K. en De Mey K. Monitoring Tool for Integrated Farm Sustainability: MOTIFS. Begeleidingscomité Interreg project DurAgr'ISO14001, Tielt (BE).

28 juni: XVIth International Symposium on Horticultural Economics and Management, Chiang Mai (TH).
- Taragola N., Van Lierde D. en Gelb E. Information and Communication Technology (ICT) adoption in horticulture: Comparison of the EFITA, ISHS and ILVO questionnaires. http://www.actahort.org/books/831/831_8.htm.
- Van Lierde D., Taragola N., Vandenberghe A. en Cools A.-M. Factors influencing the introduction of reduction techniques for pesticides and nutrients by ornamental plant growers.

6 juli: De Cock L., Lauwers L. en De Wit J. Hectaresteun voor biologische landbouwproductie in Vlaanderen: Nieuwe wegen en denkwijze nodig? Vlaamse Gemeenschap, Departement Landbouw en Visserij, Brussel (BE).

16 augustus: Van Meensel J., Lauwers L., Van Huylenbroeck G. en Van Passel S. Exploring production-theoretical insights for analyzing trade-offs between economic performance and environmental pressure at firm level. XXVII International Conference of Agricultural Economists, Beijing (CN): http://purl.umn.edu/51725.

17 augustus: Vander Vennet B., Dessein J. en Lauwers L. Peasants, entrepreneurs and empire searching for sustainability strategies. XXIII European Society for Rural Sociology congress, Re-Inventing the Rural: Between the Social and the Natural, Vaasa (FI).

28 september: Dessein J. Green care for health and well being: adressing research needs and policy challenges. 4th European COST 866 Workshop in Green Care in Agriculture, Antalya (TR): http://www.umb.no/statisk/greencare/meetings/antalyaprogramme_2_.pdf.

8 december: De Mey K. Monitoringsystemen voor duurzaamheid in de praktijk: leerprocessen bij de implementatie. Seminarie Hogeschool Gent, Dept. Biowetenschappen en Landschapsarchitectuur, Gent (BE).

9 december: Messely L., Dessein J. en Lauwers L. Branding regional identity as a driver for rural development. 113th EAAE Seminar - The role of knowledge, innovation and human capital in multifunctional agriculture and territorial rural development, Belgrado (RS).

Plant Sciences Unit

15 januari: ILVO-Programma voor Beleidsdomein Landbouw en Visserij, Brussel (BE).
- Heungens K. ILVO-Programma 1: duurzame plantaardige productie.
- Ruysschaert G. ILVO-Programma 6: landbouw in de natuurlijke omgeving. Voorstelling ILVO

16 januari: Kring volleveldgroenten Putte, Putte (BE).
- De Jonghe K. Virusproblemen in de volleveldsgroenten.
- Van Vaerenbergh J. Bacterieproblemen in de volleveldsgroenten.

29 januari: Muylle H. *Miscanthus*: teelt en verbranding. Kleinschalige houtverbranding, Wervik (BE).

29 januari: Heungens K. Recherche sur rouille blanche de chrysanthème en Flandres. Rouille blanche de chrysanthème, Saint-Pol-de-Léon (FR).

31 januari: Baert J. Cichoreiveredeling. Studienamiddag Werkgroep Eigen Zaad, Herent (BE).

4 februari: De Vliegher A. Voederbieten: teelttechnische tips en knelpunten. studieavond vleesveehouders West-Vlaanderen, Oostkamp (BE).

9 februari: De Vliegher A. Graslandvernieuwing: liever wat uitstel dan te snel. Studieavond LTCW Waasland en landbouwcomice St. Niklaas, Sint Niklaas (BE).

13 februari: De Vliegher A. Graslandvernieuwing. Studieavond Provinciale Vakgroep Melkvee Antwerpen, Geel (BE).

19 februari: De Vliegher A. Grasland vernieuwing en -uitbating. Studieavond POVLT Beitem en melkveehouders Kortrijk en Roeselare, Ingelmunster (BE).

24 februari: De Vliegher A. Klemtonen in de graslanduitbating en voederwinning. PCLT B-cursus melkveehouderij, Roeselare (BE).

25 februari: D'Hose T., Cougnon M., De Vliegher A., Haesaert G., Derycke V., Carlier L., Van Bockstaele E. en Reheul D. The influence of different agricultural management practices on earthworm abundance. Day of Young soil scientists 2009, Brussel (BE).

27 februari: Van Vaerenbergh J. Les Erwinia "jambe noire" dans les plants de pomme de terre. Assemblée Générale du GWPPPDT, Ciney (BE).

2 maart: Viaene N. Globodera cysten: identificatie. NRL en FAVV, vorming, Merelbeke (BE).

9 maart: De Vliegher A. Graslanduitbating en -vernieuwing. PCLT B-cursus melkveehouderij, Destelbergen (BE).

11 maart: Viaene N. Aardappelmoeheidonderzoek in België. Werkgroep Aardappelcysteaaltjeonderzoek, Wijster (NL).

12 maart: Muylle H. *Miscanthus*: teelt en opbrengst. Energie Info Dag, Oostmalle (BE).

12 maart: De Vliegher A. Grasland rendabel uitbaten. PCLT B-cursus melkveehouderij, Poperinge (BE).

13 maart: Studiedag azalea, Destelbergen (BE).
- Lootens P. Monitoren van fotosynthese tijdens de forcerie.
- Van Huylenbroeck J. Cryopreservatie van azaleacollectie.

23 maart: Lootens P. Fotosynthese: hoe functioneert het en wat kunnen we ervan leren? Sietenet, Melle (BE).

26 maart: Vercauteren A., Boutet X., Chandelier A., Maes M. en Heungens K. Onstabiele aneuploïde nakomelingen bij *Phytophthora ramorum*. KNPV werkgroep Pythium en Phytophthora, Delfgauw (NL).

3 april: Maes M. New and increased incidence in horticulture and green environment. International Conference "Climate change: challenges, risks and impacts on cropping systems", Gembloux (BE).

21 april: European Mycological Network Meeting, Wenen (AT).
- Maes M., Huvenne H., Moralejo E. en Heungens K. *Fusarium foetens* in Begonia, research data in support of PRA.
- Heungens K., Vercauteren A., De Dobbelaere I. en Maes M. Genotypes, spread, and survival of *Phytophthora ramorum*.

7 mei: ILVO-studiedag "Samen naar rationeel energiegebruik in land- en tuinbouw", Merelbeke (BE): Ruysschaert G. Biochar: bodemverbetering en koolstofopslag.

8 mei: Van Vaerenbergh J. Erwinia chrysanthemi in seed potatoes in Flanders. Dickeya workshop, Edinburgh (UK).

10 mei: EPPO Conference on Diagnostics, York (UK).
- Van Vaerenbergh J. Diversity of *Erwinia chrysanthemi* (*Dickeya* sp.) from seed potatoes: analysis of plant-pathogen interaction genes and assessment of virulence.
- Maes M. Reliable use of nucleic acid - based techniques for quarantine diagnostics.

11 mei: XVIIIth Meeting of the Eucarpia Fodder Crops and Amenity Grasses Section: Sustainable use of genetic diversity in forage crops and turf breeding, La Rochelle (FR).
- Rohde A., Cnops G., Baert J. en Roldán-Ruiz I. Plant architecture in ryegrass- an alternative route to more persistent perennial ryegrass varieties.
- Van Hulle S., Roldán-Ruiz I., Van Bockstaele E. en Muylle H. Comparison of different low-input lignocellulosic crops as feedstock for bio-ethanol production.
- Roldán-Ruiz I. en Kölliker R. Marker assisted selection in forage crops and turf: a review.
- Vleugels T., Baert J., Heungens K., Malengier M., Cnops G. en Van Bockstaele E. Resistance of red clover to broad spectrum of *Sclerotinia trifoliorum*.
- Chaves B., De Vliegher A., Van Waes J., Carlier L. en Marynissen B. Change in agronomic performance of *Lolium perenne* and *Lolium multiflorum* varieties in the past 40 years based on data from Belgian VCU trails.

19 mei: International Symposium on Crop Protection, Gent (BE).
- Boutet X., Vercauteren A., Heungens K. en Chandelier A. Functionality of the *Phytophthora ramorum* sexual system.
- Tahzima R., Hoedekie A., De Paepe B., Maes M. en Van Vaerenbergh J. Genetic and pathogenic diversity of *Erwinia chrysantemi* (*Dickeya* sp.) in seed potatoes from Flanders.
- Vercauteren A., Boutet X., Heungens K. en Chandelier A. Evidence of aneuploid genomic rearrangements in the progenies of *Phytophthora ramorum*.
- Wesemael W. en Moens M. Screening of common bean (*Phaseolus vulgaris*) for resistance against root-knot nematodes (*Meloidogyne* spp.).
- De Jonghe K., De Rooster L., Goossens D., De Vis R. en Maes M. Viral diseases in zucchini (*Cucurbita pepo*) in Flanders: occurrence and identification

- Bonte J., Casteels H., De Clercq P. en Maes M. Occurrence, ecology, impact and management of *Nysius huttoni* in Belgium (NYSHUT).
- Pauwelyn E., Cottyn B., Vanhouteghem K., Höfte M., De Vos P., Maes M. en Bleyaert P. Irrigation water as inoculum source for *Pseudomonas cichorii*, the causal agent of midrib rot in greenhouse butterhead lettuce.
- Van Hemelrijck W., Debode J., Heungens K., Maes M. en Creemers P. Presence and dynamics of Colletotrichum on weeds.
- Huvenne H., Debode J., Maes M. en Heungens K. Application of molecular detection technology in pest risk analysis of *Fusarium foetens*, a pathogen of *Begonia x hiemalis*.
- D'hondt L., Leus L., Van Vaerenbergh J., Cottyn B., Van Bockstaele E. en Höfte M. The use of flow cytometry for the detection of *Pseudomonas cichorii*.

20 mei: Wesemael W. Screening for nematode resistance: a challenge for plant breeders and nematologists. Seminar day PINC/EUMAINE, Gent (BE).

24 mei: Fifth International Symposium Rose Research and Cultivation, Gifu (JP).
- Pipino L., Leus L., Scariot V., Giovannini A. en Van Labeke M. C. Pollen diameter relates to seed production in cut roses.
- Leus L., Hosseini Moghaddam H. en Van Huylenbroeck J. Pathotype specific powdery mildew resistance in roses.

3 juni: Bobev S. G., Maes M., Crepel C., Van Vaerenbergh J., Llop P. en López M. M. Fire blight in Bulgaria: studies on the pathogen *Erwinia amylovora* and its epidemiology. COST Action 864: combining traditional and advanced strategies for plant protection in pome fruit growing, Valencia (ES).

8 juni: Rohde A. The many facets of bud set in poplar. Plenary lecture. 4th International Plant Symposium on Plant Dormancy, Fargo (US).

15 juni: Fourth Sudden Oak Death Science Symposium, Santa Cruz (US).
- Vercauteren A., De Dobbelaere I., Maes M. en Heungens K. Genetic diversity of *Phytophthora ramorum* in Belgium.
- Vercauteren A., Boutet X., Chandelier A., Heungens K. en Maes M. Unstable aneuploid progenies of *Phytophthora ramorum*.
- Boutet X., Vercauteren A., Heungens K. en Chandelier A. Mating of *Phytophthora ramorum*: functionality and consequence.
- Heungens K., De Dobbelaere I., Gehesquiere B., Vercauteren A. en Maes M. Within-field spread of *Phytophthora ramorum* on rhododendron in nursery settings.

18 juni: Baert J. Grassenveredeling vandaag voor de rassen van morgen. 155ste bijeenkomst NVWV: Grassen, smaken verschillen, Lelystad (NL).

19 juni: Wesemael W. Nematoden in de groenteteelt. Algemene vergadering AGORIS, Ardooie (BE).

28 juni: Willekens K., De Neve S., Vandecasteele B. en Carlier L. Nitrogen dynamics on horticultural land with a late season leek crop. 16th Nitrogen Workshop "Connecting different scales of Nitrogen Use in Agriculture", Turijn (IT).

30 juni: Van Vaerenbergh J. Plant pathogenic bacteria in seed potato certification. presentatie nav bezoek Egyptische aardappelproducenten (Farm Frites, Tradecorp), Merelbeke (BE).

9 juli: De Keyser E., Desmet L., Van Bockstaele E. en De Riek J. Development of a reliable protocol for qPCR analysis in azalea flowers. Quantitative PCR Techniques, Breda (NL).

17 juli: Saglam H. D., çobanoglu S., Wesemael W., Nicol M. J. en Viaene N. Penetration and development of the cereal cyst nematode *Heterodera filipjevi* (Madzhidov, 1981) Stelter, 1984 (Nemata: *Heteroderidae*), in resistant and susceptible wheat cultivars. National Plant Protection Congress, Van (TR).

17 augustus: Waeyenberge L., Blok V. en Viaene N. Optimalisation of a real-time PCR assay for the quantification of *Globodera rostochiensis* and G. *pallida*. International Symposium, nematodes in tropical ecosystems, Hanoi (VN).

14-28 augustus: IPBO summer course 2009: Modern breeding techniques for improvement of leguminous plants. Gent (BE).
- Roldán-Ruiz I., Muylle H. Molecular markers.
- Roldán-Ruiz I. Legal issues: markers to trace fraud.
- Cnops G. Breeding for new architectural types in red clover.
- Roldán-Ruiz I. Practical training on the generation of molecular markers in plant breeding.

23 augustus: D'Hose T., Cougnon M., De Vliegher A., Haesaert G., Derycke V., Carlier L., Van Bockstaele E. en Reheul D. The influence of different agricultural management practices on earthworm abundance. 19th National Soil Science Conference, Iasi (RO).

31 augustus: 23rd Int Eucarpia Symposium, Section Ornamentals "Colourful Breeding and Genetics, Leiden (NL).
- Eeckhaut T., Vanstechelman I., Vansteenkiste H., Van Huylenbroeck J. en Van Labeke M. C. Morphological and anatomical characterisation of chemically induced polyploids in *Spathiphyllum wallisii*.
- Leus L., Van Laere K., Dewitte A. en Van Huylenbroeck J. Flow cytometry for plant breeding. De Keyser E., Lootens P., De Riek J. en Van Bockstaele E. Flower colour as a model in azalea for integration of phenotype, genotype and gene expression.

7 september: De Vliegher A., latré J. en Carlier L. *Lolium multiflorum* as a catch crop in maize. 15th EGF Symposium on Alternative Functions of Grassland, Brno (CZ).

10 september: COST FP0801, 2nd working group meeting, Faro (PT).
- Gehesquiere B., Maes M. en Heungens K. Risk for fungicide resistance in *Phytophthora ramorum*.
- Vercauteren A., Maes M. en Heungens K. A method to detect *Phytophthora* species in root balls of potted nursery plants.

4 oktober: Danny Coyne D. L., Claudius-Cole B. en Waeyenberge L. Yes we have no Radopholus! 2nd International Congress of Tropical Nematology, Maceio, Alagoas State (BR).

8 oktober: The 8th International Symposium "Prospects for the 3rd Millennium Agriculture", Cluj-Napoca (RO).
- Carlier L. Forage quality evaluation.
- Carlier L. The value for agricultural use of grass seed mixtures of species and varieties in comparison with single varieties.

11 oktober: Vandecasteele B. Phytostabilisation as a management strategy for polluted sediment-derived soils. COST action 859 "Phyto2009" final conference: Phytotechnologies to promote sustainable land use and improve food safety, Ascona (CH).

15 oktober: Studienamiddag Grasland: een mooie toekomst tegemoet?, Melle (BE).
- Baert J. en Chaves B. Voedergrasrassen voor vandaag en morgen.
- De Vliegher A. Graslandvernieuwing in het voorjaar.

21 oktober: First Workshop of the International Cereal Cyst Nematode Initiative, Antalya (TR).
- Saglam D., Cobanoglu S., Wesemael W., Nicol M. J., Viaene N. en Dababat A. Preliminary investigation of resistance in winter wheat to *Heterodera filipjevi* under controlled conditions.
- Viaene N., çolak-Yilmaz Z., Deeren A., De Sutter N., Vandenbossche B. en Bert W. Cyst nematodes of the genus *Heterodera* in Belgium.
- Waeyenberge L., Viaene N., Subbotin S. en Moens M. Molecular identification of Heterodera spp., an overview of fifteen years of research.

22 oktober: Opleiding "Quarantaine organismen" voor controleurs FAVV, Melle (BE).
- Heungens K. Workshop: "detectie organismen uit de quarantaine lijst".
- Casteels H. *Agrillus planipennis, Anoplophora glabripennis, Anoplophora chinensis, Tuta absoluta*.
- Van Vaerenbergh J. Interactieve workshop: Bacteriën in fytosanitaire controle van aardappelen.

23 oktober: Opleiding "Quarantaine organismen" voor controleurs FAVV, Gembloux (BE).
- Casteels H. *Agrillus planipennis, Anoplophora glabripennis, Anoplophora chinensis, Tuta absoluta*.
- Van Vaerenbergh J. Atelier interactif: Les bactéries dans le controle phytosanitaire de la pomme de terre.

29 oktober: Ruysschaert G., Nelissen V., Boeckx P., Verstraete W., Vlaeminck S. en Bral J. Biochar, wat en hoe? Interreg IVB North Sea Region project "Biochar: climate saving soils". Contactnamiddag Center of Renewable Resources (CORR), Gent (BE).

28 oktober: Steyer S., Olivier T. en De Jonghe K. Molecular characterization of pospiviroid isolates in horticulture. EPPO meeting on tomato viroids/ Euphresco pilot project on viroids, Ljubljana (SI).

5 november: KNPV werkgroep Fytobacteriologie, Lisse (NL).
- Maes M. *Brenneria salicis* als endofiet in wilg en stikstof als trigger van pathogenese.
- Pauwelyn E., Cottyn B., Vanhouteghem K., Höfte M., De Vos P., Maes M. en Ieyaert P. Real-time PCR om *P. cichorii* in irrigatiewater aan te tonen.

6 november: Vercauteren A., Maes M. en Heungens K. Genotyping of *P. ramorum* in Europe: state of activities. COST FP0801, 3d working group meeting, Brussel (BE).

13 november: De Keyser E., Christiaens A., Pauwels E., Van Labeke M. C., De Riek J. en Gobin B. Regulation and quality of flowering in Belgian pot azalea: interaction beween genetics, physiology and culture conditions. BPBA Symposium "plant hormones: new insight for Biotechnology, Gembloux (BE).

16 november: Debode J., Van Poucke K., Franca S. C., Höfte M., Maes M. en Heungens K. Quantitative detection of multiple *Verticillium* species in soil using real-time PCR. 10th International Verticillium Symposium, Corfu Island (EL).

18 november: Wesemael W., Khan A. en Moens M. Invloed van temperatuur op penetratie en duur van de levenscyclus van *Meloidogyne chitwoodi* en *M. fallax* op maïs en aardappel. Najaarsvergadering Aaltjeswerkgroep, Wijster (NL).

24 november: Van Huylenbroeck J. Polyploidization: different strategies and what to do in ornamental breeding. Quito (EC).

25 november: Van Huylenbroeck J. Disease resistance breeding. Quito (EC).

26 november: Maes M., Witters J. Workshop Ziekten en plagen in openbaar groen en boombestanden, Melle (BE).
- Casteels H. Uitheemse plaaginsecten (exoten): Alert blijven is de boodschap.
- De Jonghe K. Virussen en fytoplasma's in bomen en heesters – alert organismen in openbaar groen
- Heungens K. Workshop ziekten en plagen in openbaar groen en boombestanden: deel mycologie (schimmels).
- Van Vaerenbergh J. Bacteriebladvlekkenziekte van Prunus (i.c. P*runus laurocerasus*).
- Viaene N. Nematoden in openbaar groen: van grasveld tot dennenboom.
- De Wael L. Voorstelling DiagnoseCentrum voor Planten.

2 december: De Vliegher A. en Willekens K. Research topics on sustainable and organic agriculture. bezoek poolse delegatie, Merelbeke (BE).

9 december: Van Huylenbroeck J. Bridging the gap: tools to overcome interspecific and intergeneric breeding in ornamentals. Hannover (DE).

11 december: Wesemael W. Nematoden in de groententeelt. Jaarvergadering telersvereniging Rijke Oogst, Postel (BE).

15 december: Advances in Nematology aab meeting at the Linnean Society of London, London (UK).
- Wesemael W., Khan A. en Moens M. Influence of temperature on the development of the temperate root-knot nematodes *Meloidogyne chitwoodi* and *M. fallax*.
- Valdes Y., Viaene N. en Moens M. Effect of green manure crops on hatching of the potato cyst nematode *Globodera rostochiensis*.

17 december: Kleinschalig composteren van beheerresten: kansen voor samenwerking tussen landbouwers en natuurbeheerders, Melle (BE).
- Vandecasteele B. en Willekens K. Kleinschalig composteren van beheerresten: kansen voor samenwerking tussen landbouwers en natuurbeheerders.
- Vandecasteele B., Willekens K., Van Waes C., Du Laing G. en Van Waes J. Kleinschalige compostering op rillen: ervaringen met boerderijcompostering op ILVO.
- Willekens K., D'Hose T., Vandecasteele B., Reheul, D., De Vliegher, A. en Van Waes J. Stikstofuitspoeling op de composteerterreinen en ervaringen met de toepassing van boerderijcompost en compost van beheerresten.

18 december: Adriaenssens E., Dunon V., Ceyssens P. J., Maes M., De Proft M. en Lavigne R. Bacteriophages of Dickeya spp. (*Erwinia chrysanthemi*): molecular characterisation and potential in Agricultural applications. 3th Symposium on Phages in Interaction, Leuven (BE).

23 december: De Vliegher A. Graslandvernieuwing. studienamiddag landbouwcomice, Aalst (BE).

Technology & Food Science Unit

13 januari: Van Coillie E., De Ville W., Reybroeck W. en De Block J. Microbiologische analyse en toepassing van de microbiologie in de zuivel. Demonstratiedag scientist@work, Melle (BE).

26 januari: Stals A., Werbrouck H., Baert L., Botteldoorn N., Wollants E., Herman L., Uyttendaele M. en Van Coillie E. Multiplex real-time RT-PCR for simultaneous detection of GI/GII noroviruses and murine norovirus 1. Rapid Methods Europe 2009, Noordwijk (NL).

26 januari: Eloot B. en Vangeyte J. Resultaten: Afstellen van aardappelrooiers en inschuurlijn. Nedato. Mijnsheerenland, Philipine, Bruinisse (NL).

4 februari: Declercq J. en Nuyttens D. Voordracht spuittechniek Poperinge (BE).

10 februari: Eloot B. en Vangeyte J. (Ledenvergadering: Afstellen van aardappelrooiers en inschuurlijn. Ledenvergadering. Goes, Heerle (NL).

10 februari: Vangeyte J. (2009) Voordracht outlook: mail, agenda en taken. Merelbeke (BE).

12 februari: Nuyttens D. Het belang van een correcte spuittechniek. Studieavond aardappelen (LCA). Kieldrecht (BE).

17 februari: Nuyttens D., D'hoop M., De Blauwer V., Hermann O., Hubrechts W., Mestdagh I. en Dekeyser D. Evaluation of biological efficacy of drift-reducing spray application techniques in various crops. Application efficacy vs.spray drift control. Peterborough (UK).

25 februari: Nuyttens D. Het belang van een correcte spuittechniek bij de toepassing van gewasbeschermingsmiddelen. Studieavond "Bestrijding aardappelziekte: een symbiose tussen spuittechniek en innovatieve fungiciden" (Bayer CropScience). Orsmaal en Mol-Postel (BE).

28 februari: Declercq J. (2009) Cursus spuittechniek voor tuinarchitecten-aanleggers. Mechelen (BE).

10 maart: Demeyer P. Landbouw en visserij in een wijzigend klimaat (programma 5 van ILVO2020). Infodag Departement L&V, Brussel (BE).

11 maart: Piessens V., Van Coillie E. en De Vliegher S. Different CNS species found in milk and environment: field study on six Flemish dairy herds. Mastitis Research Workers meeting 2009, Chicago (US).

18 maart: De Ville W. La reduction du sel dans le fromage. Réduction du taux de sel dans les produits alimentaires: quelles actions mener en tant qu'artisan ou PME? Gembloux (BE).

18 maart: Duquenne B. Zuiveltechnologie - Etikettering - Verpakking. Cursus NAC: "Landbouwverbreding: Hoevetoerisme", Ruddervoorde (BE) en Ieper (BE).

19 maart: Taverniers I, Papazova N, Ruttink T en De Loose M. Reference materials and reference genes. Co-Extra Stakeholders Open Session. Co-Extra Stakeholders Open Session, Buenos Aires (AR).

19 maart: De Loose M, Bernaert N. en Van Droogenbroeck B. Detection and identification of bioactive compounds in leek before and after processing. Mitofood COST Action FA0602: Bioactive food components, mitochondrial function and health. Palma de Mallorca (ES).

26 maart: Duquenne B. Praktisch gebruik van de excel-file voor de berekening van ijsmixen. Melle (BE).

28 maart: Reybroeck W. De sectorgids: leidraad tot succesvol imkeren. Roeselare (BE).

31 maart: 2nd FEED-SEG symposium on feed additives. Parma (IT).
- Taverniers I. Technical methods for GMO analysis and traceability.
- Van Droogenbroeck B. Innovation in GM applications for the feed industry.

1 april: Reybroeck W. Honingoogst en verzorging. Deinze (BE).

17 april: Reybroeck W. Honingkwaliteit en de kristallisatie van honing. Lembeke (BE).

18 april: Cursus Bijenproducten, PCLT, Roeselare (BE).
- Reybroeck W. Honing: kristallisatieproces, enten en verzorgen van honing en bepaling tetracyclineresiduen.
- Reybroeck W. Honing: definitie, kwaliteitscriteria, resultaten kwaliteitsanalyses.

21 april: Smet K., De Block J., Van Der Meeren P., Raes K., Dewettinck K. en Coudijzer K. Influence of milk fatty acid composition and process parameters on the quality of ice cream. 4th IDF Dairy Science and Technology Week, Rennes (FR).

21 april: Vangeyte J. Camera's en sensoren tussen veld en verwerking: Innovatie in landbouw, tuinbouw, veeteelt en visserij. Kortrijk (BE).

27 april: Second SAFE Consortium International Congress on Food Safety, Girona (ES).
- Leleu S., Herman L., Heyndrickx M., Delezie E., Bain M., Gautron J., Michiels C., De Baerdemaeker J. en Messens W. Penetration of *Salmonella Enteritidis* through the vitelline membrane of hen's eggs as affected by its strength during the laying period.
- Van Brandt L., Van Coillie E., Herman L. en Vlaemynck G. Detection methodology and survival of *Mycobacterium avium* subsp. *Paratuberculosis* (MAP) in dairy products . In: Flynn K., Garriga M., Hofstra H., Monfort JM. (Eds.)

28 april: Van Pamel E. en Daeseleire E. Development and optimalisation of a methodology for detection and identification of mycobiota and mycotoxins in maize silage. 3rd Symposium: Mycotoxins: Threats and risk management, Gent (BE).

29 april: De Block J. Intrinsic indicators for the heat treatment of milk. Internationaal Doctoraatssymposium: Houdbaarheid en stabiliteit van zuivelproducten, Gent (BE).

4 mei: Hijazi B., Cointault F., Dubois J., Villette S., Vangeyte J., Yang F. en Paindavoine M. New high speed image acquisition system and image processing techniques for fertilizer granule trajectory determination. Joint International Agricultural Conference, Wageningen (NL).

4 mei: Vangeyte J. en Van Weyenberghe S. ICT Agri: Coordination of European Research within ICT WP2 - Mapping and Analysis of Existing Research and Future Needs. Kick-off ICT-AGRI. Kopenhagen (DK).

4 mei: International Symposium on Drug Research en Development "From Chemistry to Medicine" and Educational Fair on "GLP and laboratory safety: New approaches", Ankara (TR).
- Taverniers I. From analytical method development to validation.
- Taverniers I. Quality assurance in the laboratory: quality control and accreditation.

5 mei: De Loose M. GGO-detectie en identificatie in voedselproductieketen. WPSA-België Studiedag. Odijk (NL).

7 mei: Demeyer R., De Buck S., De Paepe A., De Wilde K., Virdi V., Depicker A. en De Loose M. From the lab to the greenhouse: evaluation of *Arabidopsis* as a production platform. Knowledge for Growth 2009, Gent (BE).

7 mei: ILVO-studiedag "Samen naar rationeel energiegebruik in land- en tuinbouw", Merelbeke (BE): Van linden V. Code van goede praktijk voor het energie-efficiënt gebruik van mechanische ventilatie in de intensieve veehouderij.
- Van linden V. Model voor energieverbruik in de landbouw door niet voor de openbare weg bestemde mobiele machines (OFFREM).
- De Paepe M. Onderzoek nar het optimaal gebruik van natuurlijke ventilatie in agrarische gebouwen (NatVent).
- Demeyer P. Klimaatbeheersing en milieubeveiliging in agrarische gebouwen.
- Bronchart F. Onderzoek naar innovatieve technieken voor exergie-efficiënte kassystemen (ExeKas).

11 mei: Bernaert N., Van Droogenbroeck B. en De Loose M. Determination of bioactive compounds in leek (*Allium ampeloprasum* var. *porrum*). Murcia (ES).

16 mei: Reybroeck W. Producten van de bij. Lessenreeks "Beginnend imker", PCLT, Roeselare (BE).

18 mei: Reybroeck W. Het gebruik van de bijenteeltgids, Mortsel (BE).

19 mei: Stals A., Werbrouck H., Baert L., Botteldoorn N., Herman L., Uyttendaele M. en Van Coillie E. Multiplex real-time RT-PCR for simultaneous detection of GI/GII noroviruses and murine norovirus 1. KVCV Symposium. Trends in Food Analysis VI, Gent (BE).

19 mei: 61st International Symposium on Crop Protection, Gent (BE).
- Brusselman E., Beck B., Temmerman F., Spanoghe P., Moens M. en Nuyttens D. Development of an efficient application of entomopathogenic nematodes in vegetables.
- De Schampheleire M., Nuyttens D., Dekeyser D., Verboven P., Spanoghe P., Cornelis W., Gabriels D. en Steurbaut W. The wind tunnel as succesful tool to evaluate drift mitigation measures.
- Nuyttens D., D'hoop M., De Blauwer V., Hermann O., Hubrechts W., Mestdagh I. en Dekeyser D. Drift-reducing nozzles and their biological efficacy.
- Nuyttens D., Braekman P. en Foqué D. Optimization of the spray application technology in Bay Laurel (*Laurus Nobilis*).
- Spanoghe P., De Schampheleire M., Nuyttens D., Dekeyser D. en Steurbaut W. Pollution of the atmosphere by evaporation of pesticide active ingredients.
- Verboven P., Nuyttens D., De Schampheleire M., Baetens K., Ramon H. en Nicolaï B. Predictive modelling of drift from ground boom sprays: theory to practice.

19 mei: Bernaert N., Van Droogenbroeck B. en De Loose M. Determination of bioactive compounds in leek (*Allium ampeloprasum* var. *porrum*). Trends in de levenmiddelenanalyse, Gent (BE).

27 mei: Baert J. en Zwertvaegher I. Measuring teat dimensions. IDF Milking machine Action Unit, Gijon (ES).

29 mei: Maertens W. en Van Nuffel A. Lameness: Is it that easy to give a subjective score to a painful condition? 2nd Boehringer Ingelheim Expert Forum on Farm Animal Well-Being, Madrid (ES).

2 juni: Taverniers I, Van den bulcke Marc, Trapmann S, Brodmann P, Gruden K, Holst-Jensen A, Roth L, Allnutt T, Freyer R, Pla M, Zhang D, Kuznetzov B en Bertheau Y Reference materials and reference PCR assays for GMO quantification. Co-Extra International Conference, Paris (FR).

2 juni: Van Weyenberg S. (2009) Coordination of European Research within ICT. Merelbeke (BE).

19 juni: Heyndrickx M. De rol van bacteriën in het bederf of kwaliteitsverlies van melk en melkproducten. 14th Conference on Food Microbiology, Luik (BE).

22 juni: Dewaele I., Ducatelle R., Herman L., Heyndrickx M. en De Reu K. Evaluation of bacterial indicators for monitoring the *Salmonella Enteritidis* status of layer farms. XIXth European Symposium on the Quality of Poultry Meat en XIIIth Symposium on the Quality of Eggs and Egg Products, Turku (FI).

23 juni: Van Weyenberg S. en Vangeyte J. (Mapping and Analysis of Existing Research and Future Needs. ICT-Agri: Network Management Group. Bonn (DE).

23-24 juni: XIXth European Symposium on the Quality of Poultry Meat en XIIIth Symposium on the Quality of Eggs and Egg Products, Turku (FI).
- Messens W., Leleu S., De Reu K., De Preter S., Herman L., De Baerdemaeker J. en Bain M. Effect of egg washing on the cuticle of table eggs.
- Leleu S., Herman L., Heyndrickx M., Delezie E., Bain M., Gautron J., Michiels C., De Baerdemaeker J. en Messens W. Penetration of *Salmonella Enteritidis* through the vitelline membrane of hen's eggs as affected by its strength during the laying period.
- Leleu S., Herman L., Heyndrickx M., De Reu K., Michiels C., De Baerdemaeker J. en Messens W. Selection of a chitosan type for eggshell coating to reduce *Salmonella* shell contamination. De Reu K. Bacterial contamination of table eggs and the influence of housing systems.

25 juni: Herman L. Update guidance Documents – Summary of technical issues. EFSA GMM-GD werkgroep. Parma (IT).

29 juni: Reybroeck W. Residues of antibiotics and sulfonamides in honey. Conffidence, Liège (BE).

1 juli: Demonstratiedag: erosiebestrijding, spuittechniek en puntvervuiling, Tongeren (BE).
- Dekeyser D. Drift, driftreducerende technieken en bufferzones.
- Nuyttens D. Demonstratiedag: Erosiebestrijding, spuittechniek en puntvervuiling.

9 juli: Declercq J. Demodag-Voordracht spuittechniek Koksijde. Onderhoud van het spuittoestel, Koksijde (BE).

15 juli: Vangeyte J. Voordracht: veiligheid op Agrotechniek. Merelbeke (BE).

23 juli: Herman L. The application of molecular tools in microbiological food safety research. Food hygiene and safety: from EC directive to practical application. Symposium "Food Safety - Ahievements and Prospectives". Sofia (BG).

4 september: Vangeyte J. Overzicht onderzoek Oogst- en naoogsttechnologie op Agrotechniek. Voordracht voor het beleid. Merelbeke (BE).

6 september: Reybroeck W. Aspecten van kwaliteitshoning. Cursus "Bijenteelt" Scholingscentrum Ijzervallei Diksmuide, Wouwen (BE).

7 september: Vangeyte J. Agrotechniek: techniek tussen veld en verwerking. Voordracht inzet beeldverwerking voor visserijtoepassingen. Oostende (BE).

8 september: Reybroeck W. Kwaliteitsaspecten van honing en sectorgids goede bijenteeltpraktijken. Zoersel (BE).

17 september: Reybroeck W. Screening of antimicrobials in honey - new possibilities. The utilisation of Randox Evidence Investigator for the screening of antibiotic residues in honey, Montpellier (FR).

17 september: De Paepe M. A study on the optimal usage of natural ventilation in agricultural buildings ("NatVent"). Unesco Chair on Eremology: 20 years of activities at the International Centre for Eremology (ICE), Gent (BE).

30 september: Nuyttens D., Foqué D. en Braekman P. Comparison between novel and traditional spray application techniques in strawberries. 10th Workshop on Sustainable Plant Protection Techniques in Fruit Growing, Wageningen (NL).

5 oktober: Van Droogenbroeck B. COST FA0804: Molecular Farming – WG1 – strategic development of Molecular Farming. Transgenic plants for the production of high-value molecules, Praag (CZ).

6 oktober: Demeyer R., Verguts V., De Loose M. en Van Droogenbroeck B. Molecular Farming in Flanders: The opinion of Flemish greenhouse growers. COST FA0804 Meeting, Praag (CZ).

6 oktober: Course on spray droplet: Measurement, delivery, drift, adhesion and uptake, DPI, Attwood, Melbourne (AU).
- Nuyttens D. en Dorr G. Droplet measurement.
- Nuyttens D. Droplet drift: The most influential factors.

6 oktober: Vangeyte J. Bemonsteringstrategie. Fonds voor Landbouw en Visserij: Bestendig Comité Plant. Brussel (BE).

8 oktober: Coudijzer K. en Duquenne B. Basiscursus zuivelbereiding: theorie, Melle (BE).

12 oktober: Reybroeck W. Residues of anti-infectuous agents in food of animal origin. Drug residues in feed and food, Lansing, Michigan (US).

13 oktober: Nuyttens D. Belgian drift research and modelling. Data and modelling needs for spray drift exposure risk assessment and management for ground-based applications, Canberra (AU).

14 oktober: Van Weyenberg S. en Vangeyte J. Status, review and next steps of Work Package 2: Mapping and analysis of existing research and future needs. Workshop on Mapping of current ICT research and preparation of joint trans-national call. Merelbeke (BE).

20 oktober: Vangeyte J. Sensoren als ondersteuning van het management in de veeteelt. Afdeling Mechatronica, Biostatistiek en Sensoren. Leuven (BE).

22 oktober: Nuyttens D. Belgian bufferzone regulation and drift classification scheme. Meeting of European experts concerned with spray drift mitigation methods, Luton (UK).

23 oktober: Declercq J., Nuyttens D. en Huyghebaert B. An overview of the defects on the tested sprayers in Belgium. 3rd European Workshop on Standardised Procedure for the Inspection of Sprayers in Europe - SPISE, Brno (CZ).

29 oktober: Balkanica 2009, 6th Balkan Congress of Microbiology, Ohrid (MK).
- Herman L., De Reu K., Verstraete K., De Jonghe V. en Heyndrickx M. Implementation of EC directives for food hygiene and safety based on microbiological research.
- Herman L. Implementation of EC directives for food hygiene and safety based on microbiological research.

10 november: Dekeyser D. Mogelijkheden voor driftreductie. Studienamiddag "Gewasbeschermingsmiddelen in water: fictie of realiteit?", Sint-Truiden (BE).

10 november: Vangeyte J. en Nuyttens D. Voorstelling onderzoek op Agrotechniek met bezoek aan de testopstellingen. Merelbeke (BE).

12 november: Nuyttens D., De Schampheleire M., Baetens K. en Dekeyser D. Evaluation of different wind tunnel protocols for spray drift risk assessment. III International Scientific Symposium Farm Machinery and Process Management in Sustainable Agriculture, Gembloux (BE).

16 november: Duquenne B. IJsmixen, wat als je de samenstelling aanpast? Brugge (BE).

19 november: ICT-AGRI Network Management Group Meeting. St. Julians (MT).
- Vangeyte J. en Van Weyenberg S. Status, review and next steps of Work Package 2: Mapping and analysis of existing research and future needs.
- Van Weyenberg S., Thysen I. en Vangeyte J. Mapping and analysis of existing research and future needs: country report.
- Vangeyte J., Thysen I. en Van Weyenberg S. Mapping and analysis of existing research and future needs: detailed mapping.
- Thysen I., Van Weyenberg S. en Vangeyte J. Mapping and analysis of existing research and future needs: ICT-AGRI knowledge base on the internet.

1 december: Annual meeting Dutch Mastitis Research Workers 2009, Wageningen (NL).
- Piessens V. Different CNS species found in milk and cow environment: field study on six Flemish dairy herds.
- Verbist B., Piessens V., Braem G., Van Nuffel A., Heyndrickx M., De Vuyst L., De Vliegher S. en Van Coillie E. Klebsiella pneumoniae can be highly prevalent in the environment of cows without causing mastitis.

3 december: Marchand S., Vandriesche G., Coorevits A., Coudijzer K., De Jonghe V., Dewettinck K., De Vos P., Devreese B., Heyndrickx M. en De Block J. Heterogeneity of heat resistant proteases from milk spoiling *Pseudomonas* spp. BioMicroworld 2009, Lissabon (PT).

7 december: Vangeyte J. Kunstmeststofstrooien: de juist hoeveelheid op de juiste plaats. Leuven (BE).

8 december: Vangeyte J. Sensoren in de landbouw. Gent (BE).

10 december: Demeyer P. Methods to measure emissions from naturally ventilated animal housing systems: contribution from ILVO. International workshop on the use of flux chamber methods to measure emissions from naturally ventilated animal housing systems, Wageningen (NL).

14 december: Vangeyte J. GPS in de landbouw. Zellik (BE).

9 Theses and Training Reports

Educational Institution area of study	KaHo Sint-Lieven Sint-Niklaas	KaHo Sint-Lieven Gent	Hogeschool Gent	UGent	Katho Roeselare	K.U.Leuven	U.L.B.	KHBO Brugge	Erasmus Hogeschool Brussel	KH Kempen	Universiteit Tizi Ouzou (DZ)	University College Dublin (IR)	INIA Madrid	Haute Ecole Provinciale du Hainaut Occidental
Bachelor Agro- en biotechnologie	11	2	4		1									
Bachelor Chemie, Biochemie		3	2											
Bachelor Chemie		1												
Bachelor Biomedische laboratoriumtechnologie		1												
Bachelor in Voedings- en dieetkunde								3	1					
Bachelor Farmaceutische en biologische laboratoriumtechnologie		1												
Master in de biowetenschappen, landbouwkunde			2							1				
Master in de biowetenschappen, voedingsindustrie			1											
Master in de industrële wetenschappen, biochemie			1											
MSc biologie				3										
MSc mariene biologie				1										
Master in de diergeneeskunde				2										
Master in de geneesmiddelenontwikkeling				1										
Master in de industriële wetenschappen, elektromechanica		1								2				
MSc Nematology				4										
Master in de bioingenieurswetenschappen				2		1	1							
Ingénieur industriel en Science Agronomique														1
Master in de Zoötechnie											1			
Doctor of Philosophy												1		
PhD Animal Production													1	

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ir. Eva Brusselman
ing. Johan Declercq
ing. Donald Dekeyser
dr. ir. Peter Demeyer
lic. Merlijn De Paepe (since 01/01/09)
ing. Martijn D'Hoop (until 01/06/09)
lic. Dieter Foqué
ing. Els Goossens
ir. Willem Maertens
dr. ir. David Nuyttens
ir. Jürgen Vangeyte
dr. ir. Veerle Van linden
ing. Annelies Van Nuffel
ing. Philippe Van Overbeke (since 01/07/09)
ir. Nele Van Ransbeeck
dr. Stephanie Van Weyenberg (since 01/03/09)
dr. Bert Verbist
lic. Ingrid Zwertvaegher