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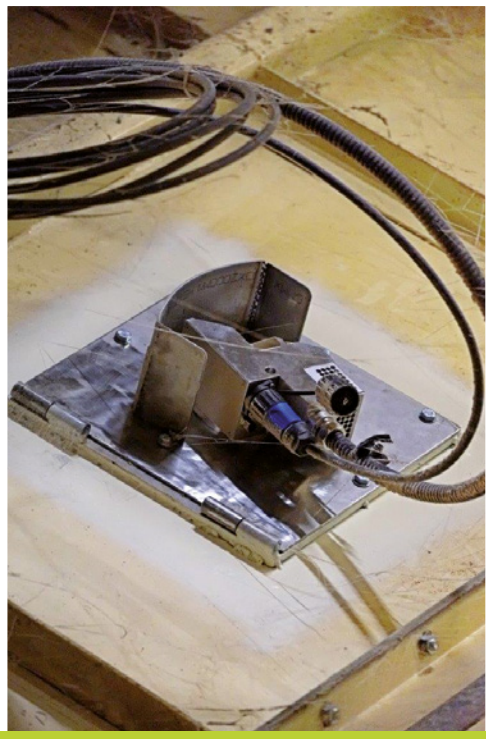

INFRARED SPECTROMETRY FOR ON-SITE INSPECTION OF FEED PRODUCTION

TO MEET ITS NEED FOR MONITORING OF ITS PRODUCT MANUFACTURING AND QUALITY CONTROL PROCESS THE FIRM OF DUMOULIN CONSULTED CRA-W BECAUSE OF ITS EXPERTISE IN DEVELOPING ANALYTICAL SOLUTIONS BASED ON NEAR INFRARED SPECTROSCOPY.

For the last ten years or so, Dumoulin has innovated in new products. Innovation notably involves marketing extruded and flaked feed for the animal sector and targeted markets in Belgium and abroad. As a result of a cooperative link-up between Dumoulin and CRA-W, an online quality control tool has been devised.

The first step was a feasibility study to develop a measuring method. A spectrometer covering the 850 to 1650 nm wavelength range was used in combination with a multiplexer. This permits alternating analyses using either a probe for laboratory measurements or a probe for measurements on the production line. An experimental design simulating feed flows was used for the measurements. Models were developed for different types of feed and a number of parameters including humidity, raw protein, fat, raw cellulose and ash.

After the calibration and laboratory validation phase, the spectrometer equipped with the two probes was installed at the production site. The probe used for online measurements can analyse all the product ranges which the company manufactures. A programming and automation phase was necessary in order to integrate the data into the company's production monitoring system. It was also necessary to update the models according to the type of product analysed (pre-compression meal or post-extrusion product). The models developed by CRA-W were used for the laboratory measurements.

The equipment, now installed at the Seilles site in Belgium, is used for online analysis of all the product ranges and supplies the firm with composition details for each batch. The analytical probe at the laboratory is used on the one hand for checking the quality of incoming raw materials and on the other hand for controlling finished product quality.

Two-year First Enterprise project financed by SPW-DGO6.

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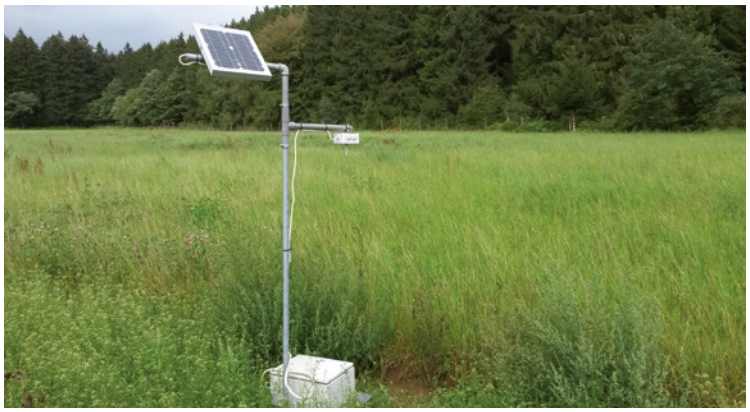
SPORE TRAP... FROM RESEARCH TO PRACTICAL APPLICATION

POTATO LATE BLIGHT *(PHYTOPHTHORA INFESTANS)* IS THE MAIN DISEASE AFFECTING POTATO CROPS. CHEMICAL CONTROL IS THEREFORE UNAVOIDABLE TO KEEP THE CROP HEALTHY; HOWEVER, USING SPORE TRAP COULD ALLOW FUNGICIDE APPLICATIONS TO BE REDUCED.



In Western Europe, its epidemic spread is due on the one hand to the extremely favourable weather conditions (cool, wet weather) during the growing period and, on the other hand, to the fact that susceptible varieties tend to be grown. During the growing season the regional advisory bodies determine the timing of fungicidal treatments according to the risks of the disease spreading. These risks are assessed using a network of stations that record weather data (rainfall, temperature and humidity), on the one hand, and a mathematical disease development model, on the other. This model detects the periods when infections are likely and enables the best time to protect the crop to be determined. At the beginning of the season the first treatments are triggered as soon as late blight is observed in the environment, notably on heaps of thinnings or volunteer plants.

Another way of assessing infection potential at regional level is to measure the quantity of late blight spores in the air, using spore trap. These work on the principle of two square section rods that are coated in grease and fixed to a horizontal axis which in turn is fixed to a vertical axis. The rods are rotated around their axis by a motor. Rotation generates a draught around the sensor, and whatever is present in the air is thus captured: not only spores but also dust, pollen and micro insects. The addition of a solar panel and rechargeable battery makes the spore trap a self-contained unit. During the season the rods are sampled in the field for laboratory analysis using molecular techniques to quantify the number of spores in the air.

Much valuable information could have been gained in 2015, when the growing season was hot and dry and thus completely unfavourable to late blight. However, in a desire to limit the risk, the farmers applied protection products to their potato crops, no doubt too frequently. In such conditions the spore trap could have provided a more accurate assessment of the risks of late blight developing in the crops. For instance, finding no spores on the sensors could indicate that there was no need to apply protection, despite periods of potential infection being identified by the conventional model. Furthermore, a more accurate assessment of the risk could have avoided unnecessary treatments detrimental to the profitability of the crop, the environment and the operators' health. However, let us wait for the data collected in the 2015 season to be gone through and analysed in full.

Project subsidised by the Department of Agriculture, Natural Resources and the Environment (DGARNE)/DGO3, agreement no. 7059.

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TRESOGEST FOR MORE EFFECTIVE PRODUCTION COST MANAGEMENT IN ORGANIC FARMING

AS PART OF THE BIO2020 PROGRAMME A TECHNICO-ECONOMIC MANAGEMENT TOOL CALLED TRESOGEST HAS BEEN DESIGNED BY CRA-W'S INTERDISCIPLINARY ORGANIC FARMING RESEARCH UNIT (CTRAB) TO HELP ORGANIC FARMERS TO DETERMINE THEIR PRODUCTION COSTS AND FARM PROFITABILITY MORE ACCURATELY.

Among the priorities identified by the producers, a common need emerging across all the sectors is for decision support tools to be developed to enable farmers to self-assess and position themselves in relation to the market. TresoGest is a cash flow management tool aimed at enabling farmers to establish their actual financial position. Based on a simple way of encoding bills and receipts along with the characteristics of the farm, the tool analyses the income generated by the farm as a whole and by each section. It also calculates the cost price of the main crops and provides a graphic analysis of the profitability and breakdown of expenses for each section of the farm.

Easy to use and realistic in terms of the farm's economics, this tool gives the farmer a better overview of the production cost and selling prices as a bargaining tool when selling. When linked with the technical data collected in parallel and the building of databases, these economic data will also contribute to developing the technico-economic specifications for production systems in organic farming.

Developed iteratively in cooperation with the farmers in the farm network, TresoGest is currently in use on pig and cattle farms. The aim is to extend it to farms specialising in field crops and possibly even market gardening as well.

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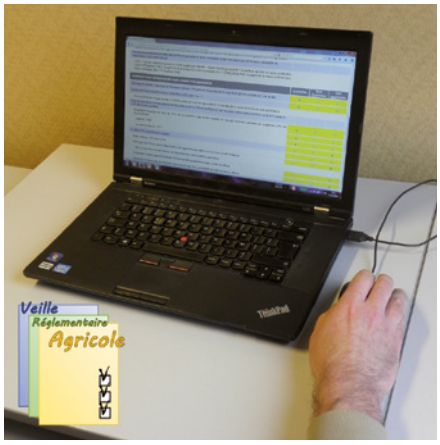
FOREWARNED IS FOREARMED

'IGNORANCE OF THE LAW IS NO EXCUSE', AS THE SAYING GOES. BUT YOU STILL NEED TO TAKE THE TIME TO FIND THE RELEVANT INFORMATION AND UNDERSTAND IT. IN VIEW OF THE MULTIPLICITY AND COMPLEXITY OF THE REGULATIONS, A SINGLE TOOL HAS BEEN DEVELOPED FOR WALLOON FARMERS.

Wallonia's farmers are faced with European, federal and regional legislation in their everyday lives. These regulations relate to nearly everything that happens on a farm and to all types of farming, and they change quickly! At present, a farmer wondering whether his farm complies with the regulations has to deal with a variety of bodies, depending on the activity concerned.



CRA-W's agricultural regulations monitoring project aims to provide a tool for assessing compliance with the regulations which is easy to understand and use, to enable farmers to make an overall assessment of their farm and thus to improve its management and to make the prospect of inspections less worrying. The tool used in a previous project, DurAgr'ISO 14001, has been updated and enhanced for this purpose.

This tool provides a series of operations that can be performed as a one-off, in order to obtain a snapshot of how well the farm complies at a given time, or repeated annually in order to monitor the trend. The series comprises four steps:

- Profiling in order to identify the activities carried on at the farm, so that only the relevant aspects are reviewed;
- Self-diagnosis with the aid of forms organized by subject for assessing compliance with the regulations. The content is broken down into simple sentences which the farmers can use to determine whether or not they comply;
- A summary produced automatically by the tool, showing the percentage compliance for each form and the list of nonconformities ;
- A plan of action which the farmer can complete and implement in order to schedule the upgrading of the farm by setting deadlines for resolving the nonconformities revealed.

By way of conclusion to the project, which is firmly forward-looking, various players gathered round the table to discuss a possible tool for Wallonia in terms of relevance, use, each party's involvement, etc. The comments and recommendations emerging from this meeting are available, along with the project results, on the CRA-W website.

Project subsidised by SPW, DGO3, Department of Development, Research and Development Section, agreement no. D31-7035.

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ASSESSING THE DIGESTIBILITY AND INTAKE BY GRAZING RUMINANTS THROUGH NEAR INFRARED ANALYSIS OF FAECES.

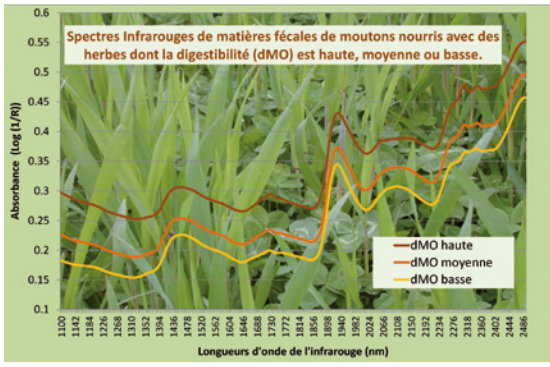
GRAZING IS OFTEN PERCEIVED AS DIFFICULT TO MANAGE PROBABLY DUE TO A LACK OF METHODS FOR ASSESSING THE AVAILABILITY AND QUALITY OF GRASS. NEVERTHELESS, THE SUSTAINABILITY OF RUMINANT FARMS, WHETHER DAIRY OR SUCKLING, DEPENDS ON MORE EFFECTIVE MONITORING OF PRODUCTION COSTS (FEED) AND, THEREFORE, A BEST GRAZING MANAGEMENT TURNS OUT TO BE EXTREMELY ECONOMICAL.

Near infrared reflectance spectroscopy (NIRS) is a rapid analysis method based on the absorption of infrared light by the matter. NIRS spectra can be related to chemical or biological characteristics of samples to develop NIRS calibrations then used as predictive models. The aim of the PhD thesis was to study the potential of NIRS applied to faeces (FNIRS) to predict the characteristics of the diet of grazing ruminants. The particular focus was on the *in vivo* organic matter digestibility, voluntary intake and botanical composition of ingested diets. Indeed, faeces contain residues of the diet and thus can be considered as an indicator of the feed use efficiency.

Our results indicate that faecal spectral databases can be developed to characterise the grazing ruminants' diet: digestibility and intake and botanical composition of the intake. The precision of the models developed from faecal spectra is similar to or greater than that of other methods usually used to estimate these parameters. However, the intake composition, in terms of proportions of grasses or legumes, appears less easy to predict by faecal NIRS analysis.

Faecal NIRS analysis therefore enables the digestibility and intake levels in grazing ruminants to be estimated with a good precision. The prediction is sufficiently repeatable in view of the difficulty of obtaining such data with the procedure using the reference method.

One of the future developments of this estimating method lies in utilising it in decision support tools aimed at improving grazing management and, more generally, herd feed management. This prediction method, which will be rapid and inexpensive once the databases have been developed, could be applied to a wide set of faecal spectra and thus contribute to improving forage utilisation and taking account of ruminants' individual variability, these being important factors in precise herd management.



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EXPOPESTEN: EXPOSURE OF WALLONIA'S POPULATION TO ENVIRONMENTAL PESTICIDES

UNLIKE WATER AND FOOD, THE AIR IN WALLONIA IS NOT REGULARLY MONITORED FOR PESTICIDE LEVELS. HOWEVER, STUDIES CARRIED OUT IN NORTH AMERICA AND SEVERAL EUROPEAN COUNTRIES HAVE REVEALED THE PRESENCE OF PESTICIDES IN THE AMBIENT AIR, BOTH IN TOWNS AND IN THE COUNTRYSIDE AND IN OUTDOOR AND INDOOR AIR.

For many years now, scientific studies have linked pesticide exposure to serious health effects such as cancer, neurological disorders, impacts on reproductive functions and development and endocrine disruption.

The EXPOPESTEN project sets out to assess the average qualitative and quantitative exposure of urban and rural populations to pesticides in Wallonia.

The first aim is to assess pesticide exposure via the respiratory tract on the basis of pesticide measurements in the outdoor air with the aid of sampling stations throughout Wallonia (in urban areas, in 'zero' pesticide use areas and near to agricultural areas).

The second aim is to compare environmental and overall exposure (by inhalation, through the skin and via food) to pesticides in two child populations, one subject to low exposure and the other living in a geographical area where agricultural spreading is frequent. Lastly, the internal exposure will be assessed from urine and hair samples, for example, using exposure biomarkers. Data will also be collected with the aid of questionnaires designed to record the sources, durations and personal exposure frequencies for each child. Finally, the health risk will be assessed on the basis of exposure measurements and pesticide toxicology data.

Launched in 2014, this EXPOPESTEN project brings together four Walloon partners: ISSEP, the project's initiator and coordinator, CRA-W, Liège University Hospital Toxicology Department and the Regional Phyto Committee (CRP). CRA-W's involvement is mainly in the analysis part of the project. It's in charge of developing, refining and validating the determination of more than twenty pesticides by GC-MS/MS within the environmental component of the project. CRA-W is also contributing its expertise in the fields of physicochemical and toxicological properties of pesticides and pesticide use and registration.

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WORKSHOP ON DEVELOPING BIOPESTICIDE SPECIFICATIONS

On 21 and 22 January 2016 CRA-W, in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), held a workshop on developing FAO/WHO specifications for biopesticides (biocontrol products). This workshop brought together experts from the JMPS (Joint Meeting on Pesticide Specifications) and industry (Agrocare, CropLife International, International Biocontrol Manufacturers Association) with the aim of developing guidelines for biopesticide specifications and revising the biopesticide specifications section of the FAO/WHO Manual. The discussions mainly focused on microorganisms (bacteria, fungi, viruses and yeasts), covering topics like taxonomy, terminology, the parameters to be specified (identity, biological activity, relevant impurities, physico-chemical characteristics), stability in storage and the minimum data required for this type of product. Further meetings will deal with other types of biopesticide, such as botanical extracts and semiochemical compounds.

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Workshop on developing biopesticide specifications