

It is no longer «sprayer monitoring», rather... «inspection of sprayers»



The Walloon Agricultural Research Centre (CRA-W) has been carrying out and organising obligatory monitoring of agricultural sprayers in the French-speaking and German-speaking areas in Belgium since 1995. This periodic «technical» monitoring (every 3 years) has enabled application equipment used for plant protection products to be significantly improved. Every year, two permanent monitoring teams check the functioning of more than 2000 sprayers, in accordance with a method and a protocol developed within CRA-W. Belgium is regarded as one of the forerunners in this area. The Belgian example has been used as a reference at a European level, and by our direct neighbours (Framework Directive on the sustainable use of pesticides, CEN, ISO, ...).

To date, CRA-W and the Institute for Agricultural and Fisheries Research (ILVO) near Melle were the two operators appointed by a ministerial order to ensure the checking of sprayers throughout the national area, under the aegis of the FASFC (Federal Agency for the Safety of the Food Chain).

On January 1st 2011 the allocation rules for compulsory monitoring are to be altered slightly. Checking should be carried out by bodies who are recognised and approved by the Federal Ministry, whose area of expertise is in agriculture, and who also hold ISO 17020 accreditation, on the basis of a series of criteria (capacity, location, impartiality, etc.). This system

of reference is specifically intended for bodies carrying out inspections. Operators will have to adapt accordingly. At CRA-W level, the ISO 17020 accreditation process for the service control of sprayers was launched at the beginning of this year, and an initial application is to be introduced shortly by BELAC, the Belgian accreditation body.

Essentially, the work will not change. All activities carried out before, during and after monitoring must be recorded, described, documented and archived. This preparatory work will take time, and we hope to obtain ISO 17020 accreditation in the course of 2011. Certain practices will also need to change. As of now we are asking you to modify your vocabulary, replacing 'monitoring of' with 'inspection of' sprayers, 'monitor' with 'inspector' and 'sprayer owner' with 'client' ...

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Potato production in RDC, a key component in food security



The potato is an adaptable crop species, being able to adapt to very diverse growing conditions. It is found just as much in Finland and Russia, as it is in the extreme south of Africa, or America, passing through the Middle East, Pakistan and Australia. In Africa, its cultivation is very much developed in the Maghreb (Algeria, Morocco, Egypt, etc.), in altitude regions of South Africa and Central Africa (Rwanda, Uganda, Burundi, Kenya, Cameroon, Guinea-Conakry, Ethiopia and the east of the Democratic Republic of Congo). China and India are the driving forces in the development of cultivation in terms of surface area covered. Cultivation is spreading in emerging and developing countries, whereas it is decreasing in the more industrialised countries. Today, more than half of the surface area of potatoes in the world is cultivated in developing countries (11 in 20 million hectares).

Beyond its adaptability and its good nutritional value, among the other advantages which it provides, mention could be made of its productivity and capacity to be integrated into trade routes which are revenue generating – a matter which is essential for small farmers in the South. It has the shortest growth cycle (3 months) of the edible Tuber species from the Tropics and the Equator (cassava, cocoyam, yam, sweet potato), which means it is suitable for cultivation, in some regions at least, several times a year, thus providing the best yields in terms of kilos produced per day, and per unit of surface area. While the potato is progressively becoming a staple food in countryside areas of some countries (in Rwanda, more than 70 000 ha of potatoes are cultivated, with each individual consuming around 130 kg/year), it nonetheless still often remains a luxury product to be consumed on special occasions, which means very profitable selling prices for the producer. The expansion of its cultivation, notably in central Africa, has an active part to play in development and in food security. The regions which are the most conducive to its cultivation in central Africa are traditionally located at altitude, with development now also spreading to the hotter regions, which have a marked dry season. The significant differential between day-time and night-time temperatures, combined with optimal photosynthesis during this continuous sunny season, are the two factors

contributing to high tuber yield, provided the crop can be irrigated. This is the case in the Sahel and also, for example, in the Democratic Republic of Congo, Bas Congo and Katanga.

The 'Potato' service at CRA-W provides support to farmers from the Democratic Republic of Congo in developing cultivation in both these regions.

In Bas Congo, through a project subsidised by Belgapom, DGARNE, Wallonie Bruxelles International and the non-profit making association FAR, and as part of the international year of the potato (2008), our service trained supervised groups of farmers in developing local production of potato plants. The supply of potato to farmers who want to produce ware potatoes in the Kinshasa market (10 million inhabitants) remains an issue since importing potato seeds from Europe is fraught with difficulties, such as the lack of quality transport, aggravation at customs and timing of delivery.

In Katanga, our service provide technical support to farmers who want to grow the crop on a larger scale. This technical support is made possible thanks to financing from the Centre for the Development of Entreprise (CDE), a joint institution of ACP states and the European Union. A variety trial has been carried out, indicating a potential advantage for production in the dry season, under irrigation (more than 30 t/ha for the best varieties). As well as identifying varieties adapted to the region, the support also relates to the designing of a whole set of cultural practices for optimal production and conservation.

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Opticroit: a management tool for the growth of young dairy herds

Monitoring the growth of heifers is an essential stage in improving the global economic efficiency of dairy farms. Rearing replacement heifers represents the second largest cost item after the feeding of production cows. It has been demonstrated that an initial calving of between 23.5 and 25 months maximises the profitability of the business, however the heifer must present a sufficient conformation to attain this objective without any danger. Sustained and controlled growth from birth is necessary from that time on to ensure harmonious development of a prospective dairy cow, without compromising its capacity for later production. In this context, measuring the thoracic perimeter is a simple, consistent monitoring tool which is not very expensive to put in place. This provides reliable indications on the developmental status of the young animal and, compared to the reference curve in France for early calving, determines the appropriateness of early insemination.

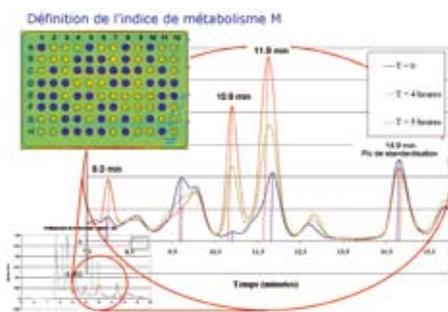
Opticroit software was developed in this context. It provides possibilities for the complete management of young dairy cattle. It will enable the growth performance of the prepubertal heifers to be recorded and provides a visual display of potential delays in early calving. The collection of milk production data will contribute to making it a complete management tool. Collaboration with the AWE (Walloon Breeders' Association) is also envis-

aged in this context. Opticroit will also make it possible for comprehensive reports to be created, which will enable multiple comparisons inter- and intra-herds, and show, if needed, the outcomes of management strategies developed by the breeder. The automatic transfer of this information to CRA-W will ensure that a complete data base can be compiled, linking growth performances and their impact to later milk production. After processing, this data will be an ideal tool for the development of different extension activities. It seems that most Walloon breeders are not aware of the economic potential of early calving, yet they demonstrate the genuine technical capacity to take it up.

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Financing: Department of Agriculture, Natural Resources and the Environment, Development and Extension Section.

Potentialities of microbial tests and infrared spectrometry in the search for antibiotics in milk



Since his arrival at the Walloon Agricultural Research Centre (CRA-W) in 1994, Jean-Michel Romnee has been endeavouring to look at the detection of antibiotics in milk. The presence of these residues constitutes non-quality criteria which is especially significant for the dairy industry,

and is penalised with an appreciable financial sanction for the producer. It was through an applicability study of commercial detection tests for antibiotics available for farms that research work began, summarized in a doctoral thesis, which was defended publicly on 8 September 2009. This initial study enabled potential interferences from disinfectants used in milking to be shown. Moreover, it emphasised the difficulty of controlling the raw material tested: false positive results have appeared further to modifications in feed. The conclusions drawn from these initial works has lead to research being carried out on other methods of providing evidence of bacterial inhibition, used to detect antibacterial residues. The use of infrared spectrometry as a means of detection has required the development of analytical tools which, on the one hand, enable a quick count of the test bacterium (*Geobacillus stearothermophilus* var. *calidolactis* - GSC), and on the other, ensure analytical monitoring using liquid chromatography of bacterial metabolism. This physico-chemical monitoring of bacterial growth has been optimised by the development of a metabolic index based on various organic acids, the main

one being lactic acid. These analytical tools (bacterial count, metabolism index, pH, infrared spectrometry) have been applied to samples of spiked milk, or not, with antibiotics. Infrared spectrometry has been shown to have the potential to detect bacterial growth in the absence of antibiotic residues in the mid and near infrared regions.

Indeed, it was possible to show the metabolism of GSC when using a transmission measuring cell (mid infrared spectrometry) by calculating a *Delta spectrum* corresponding to the initial spectrum T_0 minus the spectrum T_T , measured after a T time of incubation. The variations observed in the *Delta spectrum* correspond predominantly with the appearance of lactic acid, the principal compound which is the result of metabolism of a strain (positive variations), and the diminishing of glucose, the main compound metabolised (negative variations). Different effects (synergy, complexation, etc.) could be analysed during the monitoring of bacterial kinetics in spiked milk. Therefore, the synergy obtained for the trimethoprim-sulfonamides association was clearly identified for milks which contain especially low levels of both molecules, whose individual effect was not perceptible.

Distinguishing samples containing antibiotics from non-spiked samples has been made possible through the analysis of images taken by near infrared camera.

More information available at <http://bictel-fusagx.ulg.ac.be/ETD-db/collection/available/FUSAGxetd-11242009-094120/>

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Kefir grains under the microscope

For a number of years the Walloon Agricultural Research Centre (CRA-W) has developed genuine expertise in dairy microbiology. In this sector, the competencies of Véronique Ninane were publicly sanctioned on 03 April 2009, on the occasion of the defence of her doctoral thesis, which focussed on the characterisation of the microbial consortium present in kefir grains.

Kefir grains are starter cultures composed of a complex and diversified microflora. The microflora of a kefir grain, chosen for the quality of kefir which it produces and named KJ, was characterised using a conventional methodological approach, based on the isolation of microbes on selective culture media and, for lactic acid bacteria, using a culture-independent approach. The latter consisted of the sequence analysis of the V1 and V2 regions of the 16S rDNA, amplified from a grain DNA extract. The sensitivity of the method was increased on this occasion by the dissociation of gene amplifications from minority and majority populations of lactic acids in the grain. The flora identified in the KJ grain was an everyday, common flora



exclusive to kefir grains: it comprised *Acetobacter* sp., *Kazachstania exigua*, *Lactobacillus kefiranofaciens* subsp. *kefirgranum*, *Lb. kefiri*, *Lb. parakefiri*, *Lactococcus lactis* subsp. *lactis* and *Leuconostoc mesenteroides*, and was deficient in *Micrococcus* sp., *Pediococcus* sp., *Weissella viridescens*, bacteria which are indicative of a lack of hygiene, *Salmonella* sp., as well as *Listeria monocytogenes*. In order to verify the complete character of species revealed, regeneration of the grain from micro-organisms which have been isolated from it was envisaged. Experimental conditions favourable to the formation of grains in a milk substrate were searched for using extracts of the KJ grain containing a microbial consortium *a priori* complete. These attempts at reconstitution did not lead to the formation of kefir grains, but one of them led to the formation of biofilms. This event has been reproduced in milk repeatedly using consortiums reconstituted from individual micro-organisms isolated from KJ grain.

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Pierre Dardenne has been elected as Chairman of the International Council for Near Infrared Spectroscopy for the period 2010-2013

The International Council for Near Infrared Spectroscopy (ICNIRS) is a global organisation established to encourage the development of the technical knowledge and practical applications of this spectroscopic technique, to



disseminate the knowledge and applications throughout the world and to generate and promote related educational tools for educators. It aims to achieve these goals through its sponsorship of the biennial International Conference on Near Infrared Spectroscopy and through its associated publications (*Journal of Near Infrared Spectroscopy* and *NIR News*).

ICNIRS works with researchers from all continents involved in NIRS, to meet a wide range of challenges.

During the 14th International Conference of Near Infrared Spectroscopy held in Bangkok (<http://www.nir2009.com>), attended by 500 researchers from 36 countries, Dr Pierre Dardenne was elected as Chairman of the ICNIRS for the period 2010-2013. Dr Dardenne is Head of the Agricultural Product Valorisation Department at CRA-W.

For details visit <http://www.icnirs.org>

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CRA-W AGENDA

5 - 07 May 2010

Namur, l'Arsenal
SYSTEM BIOLOGY AND OMIC APPROACHES
Joint meeting:
Groupe de Contact FNRS Protéomique
& COST action: Plant proteomics in Europe
Contact : Sergio Mauro,
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23-26 July 2010

Foire agricole de Libramont
CRA-W stand at Walexpo
27 July 2010
Mowing demonstrations
Contact : Olivier Miserque,
miserque@cra.wallonie.be

13 October 2010

Gembloux, Espace Senghor
10th Pork and Poultry Products Seminar
Contact : Geneviève Minne,
minne@cra.wallonie.be