CRA-W NEWS

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Potato starch as an alternative to piglet castration

Male piglets are castrated to prevent an odor and flavor problem commonly called “boar taint” in the cooked meat that would make approximately 25% of entire male pig carcases unacceptable to Belgian consumers. The substances that cause this organoleptic problem are skatole and, to a lesser extent, indole and androstenone, which build up in the fat. Nowadays, surgical castration is commonly practised in Europe. It is authorised under European legislation (Directive 2001/93/EC) without anaesthesia for piglets aged up to seven days. Above that age, anaesthesia together with prolonged analgesia administered by a vet is required. Despite these safeguards, the practice is still at the centre of considerable ethical debate and there is wide demand for alternatives to be found. Possible alternatives include chemical castration, immunocastration, inhibition of the gonadotrophic axis, slaughter at lower weight, sperm sexing, genetic selection or feed additives.

The feed-based approach has been studied at CRA-W in partnership with FUSAGx. Sixty-four entire male pigs were fattened to a weight of 105 kg. Half of them were given a diet made of 30% of potato starch (“starch” diet) for ten days prior to slaughtering.

It shows that the pigs fed the starch diet presented:

- a significant decrease in serum skatole during the first 5 days ($P < 0.001$),
- serum concentrations of skatole and indole to day 5 and 10 lower than those of pigs controls ($P < .001$),
- a concentration skatole significantly lower in the dorsal fat from the slaughterhouse ($P = 0.01$).

These results confirm that skatole is rapidly eliminated once its production in the colon is reduced. The butyrate produced from fermentation of resistant starch brought by the potato starch used in this study inhibits apoptosis of the colon crypt cells, the debris of which are the main base for skatole production. A gas test performed on both diets also showed that the starch diet produced more gas. These results demonstrate the effectiveness of the feed-based alternative in controlling skatole. However, the olfactory sensory test conducted with a naïve panel involving fat samples from 12 pigs from each of the two diets did not show a significant relationship between the diet and the assessment of 96 panel members.

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Four new interdisciplinary research projects launched by CRA-W

Within the framework of the Research and Development lever of the Moerman Act (use of funds from allowance of the deduction at source granted to research institutions), the Government has decided to promote research. In this context CRA-W is working on four projects based on innovative topics involving several research departments.

PESTEAUX: Development of a geographical information system, at plot scale, for assessment of the water pollution risk from pesticide use
Partners: Three CRA-W departments and FUSAGx
The novelty of this system is that it will generate maps enabling the risks of diffuse transfer of plant protection products to water resources to be identified at plot level. Plots will be classified according to the potential contamination risk they present to water. This risk will be assessed from a study of three "layers" of information: anthropic pressure, plot characteristics and climate. A risk value will be assigned to each plot on the basis of a decision-making grid taking into account the key factors of these information layers and their relative significance. This plot-based classification will enable at-risk areas to be mapped and plots of farm land which on their own could cause wider-scale pollution to be targeted. This system can be used in many ways to predict, assess and explain pollution risks. Potential users will therefore be Wallonia's public administration (Department of Agriculture, Natural Resources and the Environment), federal public services (Public Health), etc.

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MIMOSA: Analysis of methods for integrating multi-sensor modelling and satellite information techniques into decision support systems
Partners: Three CRA-W departments and two UCL sections
The many challenges facing agriculture and tomorrow's farm are such that they increasingly require the setting up and use of decision support systems that favour integrated crop management at farm or area level. Ideally, such tools should be based on a number of information sources including satellite imaging, which has become an essential component. Taking into account recent improvements in earth observation at both technical (spatial, temporal and spectral resolution) and methodological level (image analysis, modelling, etc.), the MIMOSA project has three main aims:

(i) To improve forage area monitoring capacity by integrating grassland growth data supplied by a multi-sensor, multi-model approach into the OptiMAE decision support system developed by CRA-W;
(ii) To identify the decision-making rules, in terms of forage resource management on grazing farms, and implement them in the OptiMAE model to facilitate grassland management and to quantify and qualify available winter supplies;
(iii) To link satellite information with the nitrogen status of potato and winter wheat crops and to integrate it into decision support systems studied at CRAW and applied in Wallonia for crop nitrogen fertilisation management.

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POMINNO: Research into new and rapid selection methods for new apple varieties of differentiated quality suitable for sustainable agriculture
Partners: Three CRA-W departments, FUSAGx and INRA
Belgium's apple market is dominated by very few varieties (Jonagold and its mutants account for 70% of the market). Most of the commercial apple cultivars are extremely susceptible to diseases, especially scab. Research indicates that using varieties less susceptible to disease is the only way to cut down the application of plant protection products. Fruit growers must be offered new commercial varieties for renewal and diversification of the present range of varieties. One aim of the project is to innovate in the selection of new resistance genes in parents and their progeny using molecular biology techniques for identification. New rapid, non-destructive methods will also be developed (spectroscopy, chromatography, etc.). A further aim of the project is to develop the health aspects of the apple (antioxidant, Vitamin C, specific sugars, etc.) by selecting dietary and nutritional properties, promoting them and integrating them into new commercial concepts.

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BIOETHA2: Contribution to development of the second generation bioethanol production sector
Partners: Five CRA-W departments and SEED-ULg
This project is discussed below.

MILKINIR: Support for future dairy herd management

New technologies need to be developed to make up for the growing labour shortage and increasing workload on dairy farms. In this context, CRA-W has just launched a new project which aims to develop a rapid, non-destructive milk measuring method for use in the milking parlour.

To meet this aim, the possibility of using infrared spectrometry will be investigated for both milk composition and milk quality criteria. Then, daily automatic acquisition of measurements directly from milking will be managed by powerful software. This ought to facilitate management of some areas that become especially complex as farm sizes increase. In the longer term, study of integration of these parameters ought to lead to an improvement in the nutritional quality of the milk and in herd feeding, genetics, health and fertility.

The project kicked off on 1st March 2008 and is entitled "Development of an automatic system for measuring milk composition and quality in the milking parlour", or MILKINIR for short. It is subsidised by the Department of Agriculture, Natural Resources and the Environment of the Regional Government of Wallonia and will create three jobs, two of them full-time.

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Energy autonomy and second generation bioethanol production sector

A proposal for a European Directive aims to set a restrictive overall target of 20% renewable energy sources in energy consumption and a 10% share for biofuels by 2020, and also lays down environmental sustainability criteria for biofuels. Defining alternatives to the use of non-renewable energy sources therefore remains a political priority despite the criticisms made in food, energy or environmental debates. As regards bioethanol the answer may lie in production of what are called second generation biofuels, which make use of the whole plant and specifically the lignocellulose fractions (wood polyose, cellulose, etc.), with the aim of making production more efficient.

Against this background, in April 2008 CRA-W launched the BIOETHA2 project, financed by funds released by the Moerman Act. This project has just been widened and extended by participation in the ENERBIOM 'Large Region' INTERREG IV cross-border project.

These interdepartmental, cross-border projects follow three main lines.

The first aims to establish benchmarks in terms of crop husbandry and the eco-balance of dedicated crops. In this context a "systems" trial involving green energy crops and different crop protocols has been set up at Libramont and Gembloux. The species studied are Miscanthus, switchgrass and cocksfoot as perennial crops, along with hemp, energy maize, rye and sorghum as annual rotation crops. Different levels of fertilisation and different weed control methods (chemical, mechanical, combined) are being trialled.

The second line of research concerns developing characterisation of the parietal constituents of these cellulose and wood polyose resources. This approach should facilitate biomass processing by homogenising the composition of the processed blends. Once the parietal constituents have been characterised, the next step will be to optimise hydrolysis by enzymatic methods followed, at a later stage, by processing into ethanol by mobilising the most useful microorganisms.

At the same time, the recovery potential of these biomasses, obtained not only in Wallonia but also in Germany and France, for biogas production or as biofuels will be assessed for comparison.

Finally, based on the knowledge thus gained and data from the literature, holistic and systemic approaches have been initiated with the aim of defining the possible role of a second generation bioethanol production sector in Wallonia, in order to meet the European targets. This work started with a literature review and establishing numerous contacts, in particular with ULg and UCL, who are now partners in this project.

Initial experimental and methodological approaches resulted in a workshop held in June 2008 entitled "The exploration of the territorial stakes linked to the development of biofuel production" and, in September 2008, a half-day seminar under the title "Biofuel and dedicated crops".

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European management of fruit tree genetic resource collections

An international meeting of managers of four European databases for the species *Prunus* (cherries, peaches, apricots and almonds), *Vitis* (vines), *Malus* (apples) and *Pyrus* (pears), as well as a meeting of European experts in the synonymy of fruit tree varieties, were organised by CRA-W in Gembloux from 23 to 25 June 2008.

The aim of the ***Ad hoc*** **Fruit Database Managers & Synonyms meetings** in the context of the **European Cooperative Programme for Plant Genetic Resources (ECPGR)** was to attempt to harmonise and share progress made in European fruit tree collection management.

First of all, the managers of the European Central Crop Databases, namely '*Vitis*' (Julius Kühn Institute, Siebeldingen, Germany), '*Prunus*' (INRA, Bordeaux, France), '*Malus*' (University of Reading, Whiteknights, United Kingdom) and '*Pyrus*' (CRA-W, Gembloux, Belgium), compared their management software for the four databases and assessed progress made. Exploring the scope for technical harmonisation and comparing the different managers' experience enabled a vision of the future development of the databases as a network to be built up. Some of the modules of the SynoPyrus program created by CRA-W will, among other things, be shared within Network Fruits.

Many fruit tree varieties are known by a large number of names within a single region or in different countries (some varieties have more than 70 synonyms!). This synonymy creates considerable problems both for collection management and for database design and operation.

Fruit experts from Germany, Belgium, France, Hungary, Italy, Macedonia, the Netherlands, Romania, Switzerland and the United Kingdom then analysed a sample of accessions to the *Malus/Pyrus* and *Prunus* databases in order to validate the lists of synonyms against the best pomological reference works and identify the most appropriate accessions for inclusion in the European Collection on the initiative of '**A** **E**uropean **G**enebank **I**ntegrated **S**ystem' (AEGIS). They also checked the traceability of the encoded bibliographical references.

In addition, each accession was also assigned a historical country of origin, a date of accession, if applicable, a "euonym (name permitting cross searches of databases)" and a "preferred (historical or commonest)" name.

More than 1,400 pear accessions and 600 cherry accessions were dealt with in this way.

Finally, the participants established the main lines of a common methodology for introducing fruit photographs into the databases.

The meeting ended with a tour of CRA-W's fruit tree collections. The cherry trees were particularly popular due to the opportunity for seasonal tasting of fruit straight from the tree.

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New accreditation for one of our laboratories

Since 8 April 2008, CRA-W's Department of Biological Control and Plant Genetic Resources has been ISO 17025 accredited for the following tests:

- Detection of two fungi (Phytophthora ramorum and Monilinia fructicola) in plant tissues by real time PCR and conventional PCR, respectively;
- Detection of two viruses (Pepino mosaic virus on tomatoes and Tomato spotted wilt virus on chrysanthemums) by a DAS-ELISA test;
- Screening for deoxynivalenol, a mycotoxin present in milled wheat grains, by semi-competitive ELISA test.

This accreditation enables the Mycology and Virology laboratories to perpetuate their AFSCA agreement to carry out analyses in the area of plant quarantine diseases and to take advantage of the improvements in traceability, reliability, transparency, organisation and customer satisfaction made possible by a Quality Management System.

This is all the more important given that CRA-W, together with its counterpart, the ILVO Plant Protection Department, forms the National Reference Laboratory for plant diseases.

Also, due to accreditation of screening for deoxynivalenol by the ELISA method, CRA-W offers acknowledged expertise to all the players in the cereal sector (farmers, merchants, millers, processing industries, etc.) wishing to have analyses carried out for self-monitoring purposes.

For the Department of Biological Control and Plant Genetic Resources, this ISO 17025 accreditation is an addition to the GLP certificate which the Ecotoxicology laboratory has held since 1997 to carry out toxicity studies of plant protection products on beneficial arthropods.

Far from being a one-off for CRA-W, this accreditation is therefore concrete expression of CRA-W's determination to invest in setting up and maintaining Quality Management Systems (http://www.cra.wallonie.be) as part of a continuous improvement drive.

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CRA-W Open Day

The CRAW Quality of Agricultural Products Department welcomed around 600 people to the fifteenth Business Open Doors Day, held this year on Sunday 5 October.

The laboratories in the Department's three sections were transformed into classrooms for the general public, with arrows marking the route for visitors to follow. All along the route, the public were able to see the work of the Department and taste some products relevant to the research undertaken, such as kefir, yoghurt, apple juice, apple crisps, and so on. Children's competitions and activities were also laid on and proved a big hit.

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The Minister, Mrs Laruelle, seen here with Messrs Meeùs and Dardenne, showed great interest in the laboratory tour.

14th Animal Production Forum

The Cattle Sectors in Turmoil – Producing More and Better with Less

11 février 2009

Espace Senghor, Gembloux

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Training in infrared spectroscopy and chemometrics

CRA-W will be holding its annual training course in infrared spectroscopy and chemometrics at Gembloux from 16 to 20 February 2009 in the context of the European TRACE project.

Please contact us for a brochure, or visit http://www.cra.wallonie.be

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Second international conference on hyperspectral imaging organised by the European Association for Spectral Imaging (EASIM)

EASIM – 09
(Hyperspectral imaging)

CRA-W is hosting the second EASIM conference, to be held in Gembloux on 3 and 4 March 2009. The aim of the conference is to provide insight into the various applications, integration of chemometrics and data processing as well as the latest scientific and industrial progress in near infrared imaging. Oral presentations and poster sessions and demonstration sessions will also take place. For further details and registration, visit http://www.cra.wallonie.be.

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