CRA-W NEWS

PERIODICAL PUBLISHED BY THE WALLOON AGRICULTURAL RESEARCH CENTRE N°20 AUTUMN 08

CRA-W involved in malaria control

Between 300 and 500 million cases of malaria, causing one million deaths, are recorded around the world each year. Among available means of control, the use of insecticide-treated mosquito nets considerably reduces morbidity and mortality rates due to malaria.

Nets treated with insecticide are currently manufactured by mixing the insecticide (generally a pyrethrinoid active substance) with the polyethylene fibre before weaving, either by coating the polyester fibre with a polymer containing the insecticide, or by bonding an insecticide formulation to the fibre. These new generation products are usually called "long-lasting insecticidal mosquito nets", reflecting the longer time and greater number of washings for which biological efficiency is maintained, in comparison with conventional nets treated by soaking in an insecticide preparation at the point of use.

Analysis of treated nets and washing resistance test

CRA-W is currently investigating the physico-chemical properties of these new products. The research is concerned with the development and validation of analytical methods using gas chromatography and high performance liquid chromatography to identify and quantify the active substances in the treated nets, the accelerated storage stability of the products, the uniformity of the treatment, the release / retention characteristics of the active substance, the washing resistance and the persistence of the active substance. This work is being carried out on behalf of WHOPES (WHO Pesticides Evaluation Scheme) under a contract between the WHO and CRA-W (as a Collaborating Centre for pesticide quality control), on behalf of net manufacturers or other organisations. CRA-W specialises in the chemical characterisation of treated nets and is cooperating closely with other scientific institutions involved in other disciplines (biological activity, resistance problems, etc.). CRA-W is also involved in standardising analytical methods for treated nets through CIPAC (Collaborative International Pesticides Analytical Council) and in developing specifications for guaranteed quality products through the FAO/WHO JMPS (FAO/WHO Joint Meeting on Pesticides Specifications).

Contact : Olivier Pigeon
pigeon@cra.wallonie.be

Walloon Agricultural Research Centre

WALLOON AGRICULTURAL RESEARCH CENTRE (CRA-W)

Rue de Liroux, 9 - B – 5030 Gembloux

Tél : +32(0) 81/62.65.55 -Fax :+32(0) 81/62.65.59

cra@cra.wallonie.be - http://www.cra.wallonie.be

Reconciling the environment with grazing: a challenge?

The environmental risks caused by grazing, whether throughout the season or at the back end of the year only, chiefly in terms of nitrate leaching, are cause for concern. How far do stocking density or fertilizing affect the impact? What other factors should be taken into consideration?

To answer these questions the grazing practices of more than twenty dairy farms distributed through the Ardennes, the Upper Ardennes and Pays de Herve were analysed during the 2004 and 2005 grazing seasons. The average stocking was 413 big livestock units (BLU) per ha per day over the year and 94 BLU per ha per day in the late autumn. Total average fertilisation, including restoration fertilisation after grazing, was 300 kg N/ha, comprising 71.5% organic nitrogen. Analysis of the effects of the year, the region and the annual stocking density, defined in increments of 200 BLU per ha per day (0-199, 200-399, 400 and more) on the nitric nitrogen content in the 0-30 cm soil profile showed that the year was the only significant factor. This may be explained by weather differences between the two years. The 2004 season was characterised by strong grass growth throughout the season, allowing good uptake of the nitrogen present and producing low levels of back-end residues: 18.6 kg $N\text{-}NO_3^-$/ha on average. Moreover, conditions in the late autumn did not favour mineralization of organic matter. The late autumn of 2005, on the other hand, was relatively hot, leading to an increase in the nitric nitrogen content (25.6 kg $N\text{-}NO_3^-$/ha on average) due to mineralization. Plant growth was therefore slowed down.

Only 2005 saw a significant relationship (R=0.38*; N=40) between the $N\text{-}NO_3^-$ levels measured in the late autumn and stocking during the season, with increased stocking being accompanied by an increase in the soil $N\text{-}NO_3^-$ content. For instance, when the stocking increases by 100 BLU per ha per day (an additional 20 cows on a hectare for five days), the $N\text{-}NO_3^-$ content of the first 30 centimetres of soil rises proportionately by 5 kg/ha. This also means that grazing more than 550 BLU per ha per day results in over 35 kg N/ha, a level acknowledged to pose a potential risk of impairing ground water quality.

The results also indicate that stocking is not the only parameter to be considered. The risks are greater due to excessive fertilizing, especially when not accompanied by an increase in nitrogen exports through mowing.

In conclusion, this study of cropping methods on dairy farms, including the production of nitrogen profiles in order to establish a link between farming practices and risks to the environment, illustrates the complexity of this agricultural ecosystem and the need to develop a decision support tool enabling farmers to localize and adapt their methods in order to reduce the risks of adverse effects on the environment.

This project is jointly financed by the Regional Government of Wallonia – Department of Agriculture – Rural Areas Management Division, Agreement no. 2738/1.

Contact : Sylvain Hennart
hennart@cra.wallonie.be

CRA-W authenticates the Trappist beers

A study of Belgian beers has been undertaken at CRA-W as part of the TRACE project financed by the European Commission's Sixth Framework Programme. The project aims to develop analytical methods to determine and verify the origin of foodstuffs. In this context, workpackage WP 2 of the project is concerned with developing and validating fingerprinting methods for the authentication of foods that come from defined geographical areas or are made by specific production methods, such as PDO and PGI foods. Analytical methods to establish the authenticity of olive oil and honey were developed initially. The subject of study in WP2 is currently a cereal-based processed product. CRA-W proposed Belgian Trappist beers. The aim of this research is to authenticate Trappist beers, specifically Rochefort 8 beer. To this end, an experimental protocol has been set up including all the Belgian Trappist beers as well as a number of other special Belgian beers.

Trappist beer was selected because it is a top fermented beer brewed according to criteria laid down by the private association called Association Trappiste Internationale. To qualify for the '*Authentic Trappist product*' label and entitlement to display the Association's logo, several criteria must be met: the product must be made at a Trappist monastery, it must be made by or under the supervision of monks and most of the profits from marketing of the product must go to charity. Today there are only seven Trappist beers worldwide that qualify for the '*Authentic Trappist product*' logo. Six of these beers are Belgian (three in Wallonia: Chimay, Rochefort and Orval; three are Flemish: Achel, Westmalle and Westvleteren) and the seventh comes from the Netherlands (La Trappe).

Various strategies will be followed to ensure the reliability of the methods developed for authentication of these beers, such as building spectral databases (NIR, MIR, Raman, NMR, LC-MS-MS, Isotopic methods) for a wide range of beers and validating them with other sets of independent data. For more information : http://www.trace.eu.org

Contact: Juan Antonio Fernández Pierna, fernandez@cra.wallonie.be

Vegetables with nitrogen under their skin

Vegetable crops are often poor at recovering nitrogen from the soil: their root system is less efficient than that of a cereal or a beet, especially at depth. Their nitrogen requirements are nevertheless significant and really determine their yield potential. To compensate for their poorly developed root systems, the trend would be to over-fertilize in the hope of sufficient uptake by the plant. This can result in high post-harvest nitrogen residues in the soil as well as quality problems such as an increased nitrate content in the vegetable. These problems tend to be aggravated in intensive production systems.

CRA-W has been investigating this issue since 1998. The first research project looked at the topic of integrated nitrogen management in arable crops and nitric standards (SSTC project, 1998-2001); vegetable crops were an integral part of the study. The AZOBIL fertilisation recommendation software (INRA, Laon, France) was used to determine acceptable residue levels after growing certain vegetable crops. Another project launched in 2001 on optimizing nitrogen efficiency in rotations including industrial vegetable crops in Hesbaye (Regional Government of Wallonia project, financed by the Department of Agriculture from 2001 to 2004) continued this line of study looking at production aspects (crop yield and quality) in parallel to the environmental concerns arising from vegetable growing. This research was conducted in cooperation with Centre Maraîcher de Hesbaye and the firm of Hesbaye Frost s.a., a vegetable freezing specialist. It led to a summary publication in the Dossiers de la Recherche agricole published by the Regional Government (issue no. 1, 2007). Since 2005 CRA-W has been carrying out similar research into market garden vegetables for fresh sale (Regional Government of Wallonia project financed by the Department of Agriculture). The nitrogen fertilization aspect remains one of the trickiest issues to manage from a sustainable agriculture point of view. Growers are often powerless in the face of growth problems that can end in total crop failure, such as tipburn in the fine curly endive. Nitrogen fertilisation management in vegetable crops should be considered jointly with a return to balanced rotations (with vegetable crops alternating with deep-rooted crops) and intercropping management (nitrogen trap intercrops) in order to maintain the soil and safeguard the future of vegetable growing. By means of the research carried out over the past ten years we endeavour to work with the industry towards that aim, through the consistent, detailed work carried out by our staff on a daily basis which is greatly valued by our partners.

The project reports are available on application.

Contact :
Jean-Pierre Goffart,
Goffart@cra.wallonie.be

Salivary cortisol, a welfare indicator in sows?

The issue of farm animal welfare and animal-friendly farming practices is at the forefront of the debates between agriculture and society, and also of regulations and research programmes. Animal welfare assessment can serve various ends, according to the ultimate purpose: product certification, statutory inspections, system design and evaluation, advice to farmers and production of analytical findings. The tools used vary according to the purposes and their deployment will involve physical and organisational constraints imposed not only by the animals and the farmers but also by time and cost.

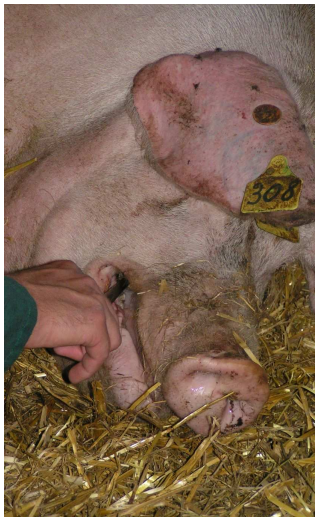
Animal welfare comprises several independent dimensions. Consequently, it cannot be assessed by means of a single indicator, but on the contrary necessitates a set of indicators to reflect all the dimensions of the concept. Among the indicators, the parameters based on the animals themselves could enable a more direct assessment to be made. Hence the value of the salivary cortisol approach in assessing variations in corticotropic activity in stressful situations in pregnant sows (dissertation rated as equivalent to a thesis undertaken at CRA-W).

The first step was to establish the methodology. The repeatability and internal reproducibility of sampling were determined in order to validate sampling by two operators. Likewise, the absence of a circadian rhythm for salivary cortisol was established and the effects of feeding times on grouped sows housed on straw and fed by a concentrate feeder were revealed.

Then, the “salivary cortisol” indicator was studied when the sows were regrouped. Regrouping unfamiliar sows after covering in fact leads to conflicts ultimately resulting in a stable social order. Salivary cortisol is able to provide an answer, in terms of sow welfare assessment, similar to the observed distribution of agonistic behaviour. Salivary cortisol sampling two hours before and two hours after regrouping reveals acute stress caused by regrouping, with new introductions perceiving regrouping as more stressful than resident sows.

Different comparative situations likely to cause stress were then used to corroborate, through 14 successive regroupings every five weeks, the finding that salivary cortisol provides a measurement that tallies with semiological and agonistic measurements.

The biological indicator can be used to identify a group of sows within a herd that are experiencing stress and thus impaired welfare. It then has to be made compatible for applicability in other farm situations and categories of animals and benchmarks need to be estab-



Contact : José Wavreille,
wavreille@cra.wallonie.be

Woody ecotype sector and renaturation of river and stream banks

ECOLIRI is an Interreg III WLL project financed by the ERDF. The team's activities included a seminar held in Luxembourg on 27 November 2007 which brought together nearly 60 people on the topic of "Woody ecotype sector and renaturation of river and stream banks".

River and stream management is currently based on the enforcement of European strategies for hydrology, maintaining water quality (surface water makes up 0.7% of the area of the region) and preserving biodiversity, which are translated into various Directives. These continually cut across the protection of human activities and the development of socio-economic activities. In Wallonia the Department of Natural Resources and the Environment, specifically the Department of Non-navigable Waterways, is applying the regulations with the backing of a number of research units in order to preserve and restore aquatic habitats while at the same time protecting people and property. An increasingly wide-ranging approach to stream and river banks is needed, with the identification of status indicators in order to define the existing diversity in greater detail and determine their capacity to accept biodiversity.

For reasons of efficiency the problem should be addressed at the level of the watersheds extending into adjoining regions. The aim of renaturation should be to preserve what already exists, avoid damage and rebuild biological capabilities. The priorities should be prevention, alternative management and re-establishing natural diversity. In some cases this requires large-scale undertakings (replacing structures, re-forming meanders, etc.) including revegetation (re-establishing structured vegetation), in some cases with investment by water authorities such as the Rhine-Meuse Water Authority, in order to achieve a satisfactory hydrological state, so ensuring a good biological state. Phytophthora disease of alder (a species which accounts for more than 50% of bank vegetation) is detrimental to the establishment of plant cover, however. Current epidemiological findings (25% of alders in Wallonia are diseased and 16% in Lorraine, with 70% of rivers being affected) clearly show the damage to be expected and the need for appropriate management (winter pruning, increasing the rate of flow, controlling rising water temperatures).

ECOLIRI has set up a production sector for woody alder plants and also for willows and ash, chosen because of their geographical location, state of health, etc. Simple vegetative propagation methods have been adapted and improved for these ecotypes. Tests for susceptibility to alder dieback (caused by Phytophthora alni) are available. However, compliance with the legislation must be ensured when distributing woody materials for permanent consolidation of river and stream banks. The production and marketing of reproduction forestry materials are already covered by such legislation. The Marche-en-Famenne Forestry Centre has therefore been appointed as manager. In view of the natural instability of riparian environments, the prospect of on-going adaptation of the composition of river-bank species needs to be considered (renewal and diversity of origins, introduction of complementary species like the aspen).

In the context of this increasingly complex management, maintaining and restoring river and stream banks in a sustainable way require, first and foremost, satisfactory availability of quality plants, and this is precisely why this certified origin woody ecotype sector was created. For further information visit http://ecoliri.cra.wallonie.be

Mr Kipgen (Water Management at the Luxembourg Department of the Interior and Town and Country Planning) and his staff welcome the audience at the Luxembourg seminar

Contact : Philippe Druart, druart@cra.wallonie.be

05 October 2008

CRA-W Open Day

Are you interrested into differentiated quality products, dairy products and cereal products? Are you concerned with issues like GMOs, Mad Cow Disease and mycotoxins? Come along and see us! The Quality of Agricultural Products Department at the Walloon Agricultural Research Centre (CRA-W) is holding an open day. Within the Department's three units you will see the different kinds of analysis that are used to check the quality of our food products and the research we are conducting in this area.

Children's activities

Address of the event: Département Qualité des Productions agricoles, Chaussée de Namur, 24, 5030 Gembloux

Contact: Cécile langelez, dptqual@cra.wallonie.be

15 October 2008
Pig and poultry production
Espace Senghor, Gembloux

8th Day Conference on Pig and Poultry Production

Contact: Geneviève Minne, minne@cra.wallonie.be