Research News

TheNewsletter of the « Laboratoire d'Etude des Résidus et Contaminants dans les Aliments » of the Veterinary School of Nantes N°5 - June 2007

Editorial

The first six months of 2007 have been extremely eventful for the LABERCA. The members of our dynamic team have initiated research work in new areas and set up innovative projects and new partnerships.

I won't say more and leave you to discover this 5th issue of our Research Newsletter…

Have a good read and enjoy the summer.

Bruno LE BIZEC

Important Dates

Evaluation of LABERCA by INRA

1st December 2006: application for the renewal of the status of LABERCA as an INRA Research Unit.
27th February 2007: audit of LABERCA by 3 independent experts.
3rd May 2007: LABERCA's Director met the INRA Commission (ENGREF, Paris).

Evaluation of LABERCA by the DGER

15th December 2006: application for the renewal of the status of LABERCA as « programme support » DGER Unit.
6th September 2007: audit of LABERCA by 2 independent experts.

Evaluation of LABERCA's Quality Management System

23rd and 24th January 2007: audit of LABERCA according to the ISO17025 standard (surveillance audit, flexible type B range).
15th May 2007: Decision of the COFRAC Scientific Committee Meeting to maintain LABERCA's accreditation.

1st June 2007: audit of LABERCA according to standard ISO9001 (surveillance audit).
2nd July 2007: Decision of the MOODY Certification Committee to maintain LABERCA's certification.

In Short

▪ **Continuous education**

The 9th SARAF Training Session is now over and we are actively preparing for the 10th one to take place from 8th to 19th October 2007. Information on http://www.saraf-educ.org.

▪ **They will be defending their PhDs and HDR**

Ms F. Courant on 22/10/07
Mr L. Bailly-Chouriberry on 23/11/07
M. J.P. Antignac will be taking his **HDR** on 05/10/07 (a diploma allowing the candidate to run research work)

ADIPOTOX or the risks of slimming fast

The LABERCA is committed to the ADIPOTOX project, financed by the national agency for research (ANR) in the framework of the national food research programme (PNRA).
This project aims at studying the redistribution and toxicity of Persistent Organic Pollutants (POPs) during severe slimming phases in patients. These slimming phases will constitute a unique model for the study of POPs redistribution in the circulation and the analysis of the genetic and toxic consequences of this redistribution.
POPs include dioxins, PolyChloroBiphenyls (PCBs)*, several organochlorine pesticides, some Polycyclic Aromatic Hydrocarbons (PAH) as well as some brominated flame retardant compounds (PBDE, TBBPA, HBCD), which contaminate human beings, partly via the diet. These lipophilic compounds accumulate predominantly in the adipose tissue, which constitutes a constant "stock" of pollutants suspected to contribute to a chronic toxicity. During severe slimming phases, they could be redistributed brutally in the body, thus exerting their toxicity on exposed organs and tissues. This study will therefore focus on measuring the presence of several POPs in the adipose tissue of severely obese patients as well as the variations of these POPs within a period of three months following the beginning of the slimming protocol. The functional consequences of the redistribution of these POPs will also be evaluated.
ADIPOTOX will be carried out as a partnership between the LABERCA and two INSERM units (UMR S 747 and UMR S 755). The study will follow a clinical protocol led by the nutrition Department of Hôtel-Dieu (Paris).

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AISQAL (Integrated Approach of food security and safety)

The research project « AISQAL » was selected following a bid for research projects from the Pays de la Loire Region in 2006. It is being coordinated by Dr. Monique AXELOS, of the « BIA » Unit of INRA in Nantes.

This study aims at providing the local industries with the necessary tools to guarantee the chemical and microbiological safety of food while safeguarding the associated food quality.

This 3-year project brings together eighteen teams from various research institutes (IFREMER, INSERM, CNRS and INRA), higher education establishments (ENV, ENITIAA, AUDENCIA, ESA) and Universities (Nantes, Angers and Laval).
The LABERCA is strongly involved in this project as regards chemical risk evaluation and will be contributing in the following three main areas:

- Evaluation of the consequence of industrial smoking processes on the qualitative and quantitative profile of PAHs;
- Development of a comprehensive dioxin measurement method in fish by studying dioxins binding to the AhR receptor and measuring the induced signal by quantitative PCR;
- Development of an ultra sensitive measurement method dedicated to perfluorinated contaminants (of PFOS- and PFOA-type) in food.

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Growth hormone and secretagogs: A new skill to be reckoned with

One of the PhDs conducted at LABERCA on the subject of growth hormone and the identification of its fraudulous use on animals will soon be over. Initiated in 2004 in partnership with the French Horseracing Laboratory (Laboratoire des Courses Hippiques), this PhD allowed for the development of two innovative methods for the detection of the fraudulous use of the equine recombinant form of the hormone in the world of horseracing. The first of these methods, dedicated to screening, is an ELISA test which can detect, over a long period of time, the antibodies produced by the animal in response to an administration of the proteic hormone. The confirmation technique consists in an elaborated extraction/purification of the hormone present at trace level (fentomoles) in the animal blood as well as the identification by Liquid Chromatography coupled to Mass Spectrometry on a linear trap of a peptide which is specific to the protein recombinant form. For the first time, this method, validated as per the European Decision 2002/657/EC criteria, enabled to detect the hormone in treated animals. In parallel, work is also being carried out together with a food producing company for the development of a detection method of recombinant bovine growth hormone residues in dairy products.

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The isotopic approach (IRMS): The natural steroids control method now validated

The ISOSTER Project from the 5th PCRD Programme – dedicated to the development of innovative methods for the identification of an illegal use of natural steroid hormones on cattle was recently finalised and the outcome was considered very positive. Tools for measurement and an analytical strategy are now available and their robustness has been proved via interlaboratory assays involving more than ten international laboratories. Today, LABERCA is accredited by the COFRAC on this method according to ISO 17025 standard, type B flexible range.

In parallel, a second project aiming at developing a method for screening cortisol in urine by GC-C-IRMS has been initiated. The strategy is based on the measurement of isotopic deviations of DHEA as ERC on the one hand and 5ß-androstane-3,11,17-trione, which is the oxydation product of cortisol metabolites on the other hand. After intramuscular injection of hydrocortisone on a bovine, a depletion of the targeted metabolites $^{13}C/^{12}C$ was observed several days later. This approach is the first of its kind in this context. Work was published in RCM.

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A new ß-agonists screening method using the transcriptomic approach: towards a drastic change in screening strategies

The LABERCA is developing alternative « indirect high throughput » analytical methods to ensure the salubrity of food of animal origin and, if the case arises, to detect the use of new anabolic substances. The new so-called « indirect » analytical approaches do not aim at identifying the screened molecule as such, but rather the effect that the latter can produce on the organism. The indirect testing would allow for a rapid discrimination between compliant and suspect samples as well as a « high throughput » result. The LABERCA will be coordinating this project with AFSSA Ploufragran as their main partner.

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Water and health: Endocrine disrupters and other emerging substances

The Ministry of Health has asked the national water agencies to set up a control of endocrine disrupters in water destined to consumption. Two water agencies (Seine Normandie and Adour Garonne) are working together with the LABERCA, providing the laboratory with samples taken from sites of their choice. LABERCA has suggested a list of pertinent compounds and will be carrying out the analyses, ensuring analytical performances which allow for the detection of some hundreds picograms per litre. The analysis bears on the screening of natural and synthetic estrogens, androgens and progestagens. The first results have allowed us to reduce down the list of molecules to be screened and to envisage the search for other compounds of endocrine disrupters-type.

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Latest Articles

- **H. DE BRABANDER, D. COURTHEYN, J.P. ANTIGNAC, G. PINEL, B. LE BIZEC B.**Past and future of mass spectrometry in the analysis of illegal growth promotors for meat production. Invitation Journal of Mass Spectrometry, 2006.

G. PINEL, D. MAUME, Y. DECEUNINCK, F. ANDRE, B. LE BIZEC. Unambiguous identification of thiouracil residue in urine collected in non-treated bovine by tandem and high-resolution mass spectrometry. Rapid communication in Mass Spectrometry (2006) 20,3183-3187.

- **G. PINEL, S. MATHIEU, N. CESBRON, D. MAUME, H.F. DE BRABANDER.** Evidence that urinary excretion of thiouracil in adult bovine submitted to a cruciferous diet can give erroneous indications of the possible illegal use of thyrostats in meat production. Food Additives and Contaminants, (2006) 23(10):974-980.

- **F. COURANT, JP. ANTIGNAC, D. MAUME, F. MONTEAU, AM. ANDERSSON, N. SKAKKEBAEK, F. ANDRE, B. LE BIZEC**. Exposure assessment of prepubertal children to steroid endocrine disrupters. Analytical strategy for estrogens measurements in plasma at ultra-trace level. Analytica Chimica Acta. (2007) 586:105-114.

- **B. VEYRAND, A. BROSSEAUD, L. SARCHER, V. VARLET, F. MONTEAU, P. MARCHAND, F. ANDRE, B. LE BIZEC**. Innovative method for determination of 19 polycyclic aromatic hydrocarbons in food and oil samples using gas chromatography coupled to tandem mass spectrometry based on an isotope dilution approach. Journal of Chromatography A, 1149 (2007) 333-344.

- **L. RAMBAUD, F. MONTEAU, Y. DECEUNINCK, E. BICHON, F. ANDRE, B. LE BIZEC**. Development and validation of a multi-residue method for the detection of a wide range of anabolic steroids in hair using gas chromatography-tandem mass spectrometry. Analytica Chimica Acta. (2007)586:93-104.