

R A M I R A N

N E W S L E T T E R

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N°3

Network Coordinator : Dr José Martinez,
Cemagref, 17 avenue de Cucillé, CS 64427, F
35044 Rennes cedex, France.

Email : jose.martinez@cemagref.fr

Network Secretary : Marie-Noëlle Maudet,
Cemagref, Rennes.

Email : marie-noelle.maudet@cemagref.fr

Newsletter Editor : Dr Brian Pain, Lamorna,
Sandford, Crediton, Devon, EX17 4LN, UK.

Email : brian.pain@ukgateway.net

**Welcome to issue 3 of the RAMIRAN
Newsletter**

My apologies for the late distribution of this Newsletter. It was due in July but there were unavoidable delays. Most of you will know that Jose is stepping down after doing a tremendous job as Network Coordinator over the past few years. The delay in publication provides opportunity to record in this issue our thanks to Jose for all the support and effort he has put into RAMIRAN. Thanks are also due to Marie-Noëlle for all the very efficient “behind the scenes” work she has done for the Newsletter and the Network as a whole. There is also the opportunity to welcome Tom Misselbrook from the UK and Harald Menzi from Switzerland as the new joint coordinators.

Whilst on the subject of change, I have decided to “retire” as Newsletter editor. It is nearly 7 years since I was actively engaged in research and believe the Newsletter needs someone more closely involved in the activities of the Network to take it forward. I am sure that Tom and Harald would be pleased to hear from those that would like to take on the role.

Editor

Ramiran 2006, 12th International Conference of the FAO ESCORENA Network on Recycling of Agricultural, Municipal and Industrial Residues in Agriculture, was held in Aarhus (Denmark), from 11th to 13th September, 2006.

General Theme : “Technology for recycling of manure and organic residues in a whole-farm perspective”

Organised by Danish Institute of Agricultural Sciences
<http://www.manure.dk/ramiran/index.htm>

Conference organiser : Sven G. Sommer and
Soren O.Petersen

e-mail : sveng.sommer@agrsci.dk

Soren.O.Petersen@agrsci.dk

Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences



**Next Conference to be held in Bulgaria
in 2008**

Organised by **Vesselin KOUTEV**
Nikola Poushkarov Institute of Soil Science, Sofia

The 2004 RAMIRAN Conference, Murcia, Spain.

Maria-Pilar Bernal. CEBAS-CSIC.

The 11th Ramiran Conference was held in Murcia (Spain) from 6 to 9 October 2004.

The Conference was organised by the Centro de Edafología y Biología Aplicada del Segura (CEBAS) of the Consejo Superior de Investigaciones Científicas (CSIC), Dr. Maria Pilar Bernal and the Department of Agrochemistry and Environment of the Universidad Miguel Hernandez in Orihuela, Dr Raoul MORAL.

The theme of the Congress was “Sustainable Organic Waste Management for Environmental Protection and Food Safety” and was organised in five thematic sessions :

- Nutrients and carbon cycling in sustainable plant-soil systems
- Gaseous emissions and odours
- Waste contaminants : lifecycle and entry into the food chain
- Organic waste treatments : safety implications
- Waste management strategies.

The fact that more than 180 participants, from 24 countries, attended showed the relevance and the international interest of the subject.

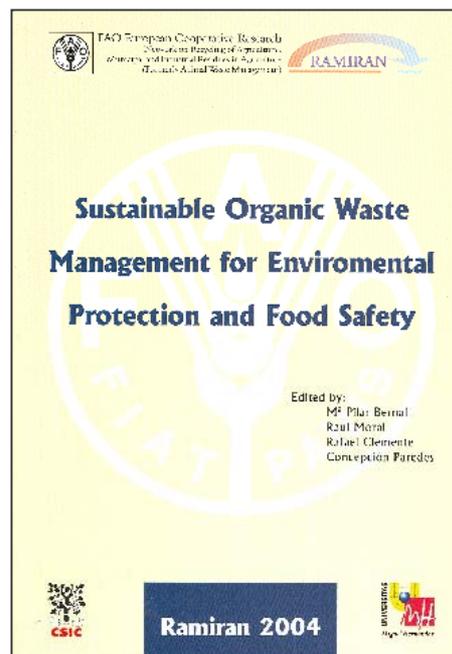


Photo from the Spanish Newspaper “ La Opinion ” . 7.10.2004. Murcia

The conference started with a Plenary Lecture by Dr. Soliva, who gave an overview of the recycling of organic wastes in Spain, highlighting the fact that these wastes can be considered a problem or a resource of nutrients and organic matter. Each scientific session was introduced by a Key Note invited speaker (E. Stentiford, S. Sommer, S. Williams, S. Piccinini and W. Magette), followed by oral presentations. The poster display and

round table discussion, which completed each session, allowed the participation of all contributors in the exchange of ideas.

The dissemination of the main results of the RAMIRAN 2004 was covered not only by the published proceedings but also by the publication of selected papers in special issues of well known scientific journals, such as Bioresource Technology, Biosystems Engineering and Livestock Science.



The municipal solid wastes treatment plant of Murcia : A study tour.

Anne Tremier, Cemagref, Rennes, France

As clearly explained in its name, the RAMIRAN network focuses on the recycling of wastes in agriculture. The scientific exchanges within the network have long dealt mainly with animal manures or plant residues but the 11th conference of the RAMIRAN network, held in Murcia in October 2004, widened the debate by including the municipal solid waste treatment. This topic was further emphasised by the technical visit to the Municipal Solid Wastes treatment plant of Murcia during the study tour at the end of the conference.

The study tour firstly led us to the Veterinary Farm of the University of Murcia, where we visited the animal manure treatment plant. Then, after a little bus trip through the barren land surrounding Murcia, we arrived in front of the visitors` entrance to the Municipal Solid Wastes

treatment plant of Murcia and what was previously an olive oil mill plant .

The MSW treatment plant of Murcia, operated by CESP, incorporated a range of technology from sorting, to biological treatment in order to maximize the recovery of the valuable part of the raw MSW: a sorting plant, a sanitary landfill, a biogas treatment plant and a composting plant

Bags of raw MSW, collected in Murcia and its surrounding area, first enter a sorting plant where all recyclable fractions of the raw MSW are separated. Through a succession of sorting technologies (screening, magnetic separation, aluminium separation, Tetrabrick separation, plastic separation and finally manual sorting), the raw MSW is broken up into its component parts : plastic film, papers, tetrabrick , aluminium, PET, PEAD, iron wastes, organic part and residual part. Except the organic and residual parts, all the other fractions are sent to recycling plants.

The residual part of the raw waste is landfilled. The cells of the landfill are composed of a compacted clay layer, a PEHD film, a geotextile film, a special gravel layer. They are filled with the compacted residual waste and covered with compacted soil. They are equipped to recover leachates in order to treat them. The biogas produced by the anaerobic degradation of the waste in the cell is collected through a pipe and sent to the biogas treatment plant. Thanks to this co-generation plant, electrical energy is produced that is partly used in the composting plant.

The composting plant treats the organic part of the raw MSW mixed with sewage sludge. The composting process is divided in two parts: the active biodegradation that takes place in a closed area, and the curing phase that occurs in opened windrows. The active biodegradation area is a rectangular platform. Organic wastes are continuously disposed on one side of the area by a conveyor belt. After a few days, the organic waste is then moved to the other side of the area by a screw system. The mixing of the waste, induced by the screw system, and water added to maintain an optimal moisture in the substrate enhance the biodegradation, the increase in the temperature and gaseous emissions. These emissions are sucked out and treated in a biofiltration system. After the curing phase, the compost is used in agriculture.



Photos B. Vinneras. 9 October 2004.

European Biogas Initiative to improve the yield of agricultural biogas plants (EU-AGRO-BIOGAS).

Thomas Amon*, Barbara Amon, Andrea Machmüller , Katharina Hopfner-Sixt , Vitaliy Kryvoruchko, Vitomir Bodiroza, University of Natural Resources and Applied Life Sciences, Department of Sustainable Agricultural Systems, Division of Agricultural Engineering, Peter Jordan-Strasse 82, A-1190 Vienna, Austria. *Email: thomas.amon@boku.ac.at.

Introduction

Today, there is a large range of different systems for agricultural biogas production depending on the local, regional or national political and social circumstances as well as on the available substrates. The EU-AGRO-BIOGAS STREP project was developed to provide a better knowledge and understanding and, where appropriate, a Europe wide harmonisation. At the 11th RAMIRAN conference in Murcia/Spain, the core team of the EU-AGRO-BIOGAS project agreed to set up and hand in the proposal. Since then, the project has been positively evaluated,

contract negotiations have been finalised and the project will start in autumn 2006.

The EU-AGRO-BIOGAS STREP aims to (i) develop and demonstrate a standard methodology to assess the methane yield of a range of energy crops and other organic substrates (ii) develop and demonstrate an automatic monitoring, management and early-warning system for agricultural biogas plants and (iii) optimise and demonstrate innovative approaches to improve biogas yield and energy output. The EU-AGRO-BIOGAS project focuses on the improvement of the entire biogas production and conversion process, thus, increasing the degree of efficiency of the digester and conversion technologies, as well as improving the competitiveness of such plants. An efficient technology transfer and demonstration activities on full scale commercial agricultural biogas plants are key elements of the research programme.

The EU-AGRO-BIOGAS project will focus on the agricultural sector and include the following waste / substrate streams: energy crops, animal manures, agricultural cropping residues, residues from plant production, harvesting and silage, agricultural wastes (e.g. decomposed seeds, sugar beet waste, molasses, distillers wash, organic waste).

The aim of the consortium is to analyse and identify the most important factors responsible for the currently sub-optimal performance of agricultural biogas plants. The innovative approaches of this project will be tested and demonstrated at a pilot plant level and scaled up to the commercial plant level. The consortium has already defined 16 medium to large scale agricultural biogas plants in different regions of Europe that will be used as demonstration sites for the activities during the work plan of the project.

Consortium

The consortium for the EU-AGRO-BIOGAS project combines different expertises and competencies in the field of agricultural biogas plants from different European regions that reflect know-how throughout the whole life-cycle or chain of biogas production and utilisation.

The consortium includes two universities, eight applied research institutions with the necessary partnerships with the operators of agricultural biogas plants, two industry and one SME partner (Table 1).

Table 1. Partners in the EU-AGRO-BIOGAS project

Country	Participant name	Short Name
Austria	Universität für Bodenkultur, Department of Sustainable Agricultural Systems	BOKU Coordinator
Austria	RTD Services	RTDS
Austria	GE Jenbacher	GEJ
Austria	Thoeni Industriebetriebe GmbH	Thöni
Czech Republic	Research Institute of Agricultural Engineering	VUZT
Denmark	Danish Institute of Agricultural Sciences	DIAS
Germany	Institute of Agricultural Engineering	ATB
Germany	Federal Agricultural Research Center	FAL
Germany	Kuratorium für Technik und Bauwesen in der Landwirtschaft	KTBL
Germany	Vogelsang GmbH	Vogelsang
Italy	Universita degli Studi di Torino	UNIT
Poland	EC Baltic Renewable Energy Centre	EC Brec
The Netherlands	Agrotechnology & Food Innovations	A & F
UK	Institute of Grassland & Environmental Research	IGER

The applied research institutions are essential for the success of the project because they will be responsible for the optimisation and implementation of new technologies and systems to improve the biogas production yield. Their close links with the operators of the agricultural biogas plants in the region i will ensure that development and demonstration activities can be organised at these plants.

Main objectives and work plan

The main objectives of the EU-AGRO-BIOGAS project are:

- (i) To optimise the planning and operating process of agricultural biogas plants through the development of a European online substrate atlas-database and on a standardised methane energy valuation model with the aim of reducing investment costs.
- (ii) To optimise biogas production through a demonstration of an innovative feeding technology for agricultural biogas plants.
- (iii) To monitor, identify and benchmark the main influencing factors during the technological process in agricultural biogas plants based on already available and newly acquired data.
- (iv) To test, implement and demonstrate a newly developed monitoring, management and early-warning system for agricultural biogas plants and new and innovative technological solutions under full-scale operating conditions in agricultural biogas plants: to improve the degree of efficiency

in the digester, to increase the biogas yield, to optimise and guarantee quality and safety of the digestate.

(v) To improve, optimise and demonstrate several selected conversion technologies that will lead to an improvement of the degree of efficiency.

(vi) To reduce the investment and operational costs of medium and large agricultural biogas plants.

(vii) To disseminate the results and to provide inputs for the future development of energy policy and legislation.

Acknowledgments

The European Biogas Initiative to improve the yield of agricultural biogas plants – EU-AGRO-BIOGAS will be financed by the EU as an FP6 Specific Target Research Project.

GRUB'S UP: Recycling and Upgrading Wastes from Food Production for use within the Food Chain

Dr. M.P. Bernal, CEBAS-CSIC, Apartado 164, 30100 Murcia, Spain.

E-mail: pbernal@cebas.csic.es

GRUB'S UP is an EU Concerted Action financed by the Sixth Framework Programme, included in the Priority 5. Food Quality and Safety. The project brings together 6 Research Institutes, 2 Universities, 9 industries from the food sector and 4 other specialists (consumer associations and consultants) from 10 European Countries: United Kingdom, Germany, Spain, Portugal, Ireland, Greece, Holland, Belgium, Romania and Hungary. The objective of the GRUB'S UP is to encourage the exploitation of food processing by-products whose value is currently lost. The project aims to increase the utilisation and sustainable management of organic matter from food production and processing, by coordinating research into processes and technologies for recycling these wastes and encouraging the development of these processes within the industry. The objectives are:

- To co-ordinate current research into the processing of fruit and vegetable wastes to generate high value-added products, and to identify centres of excellence in this research.
- To document the state of the art of research into these processes.
- To identify the needs of the fruit and vegetable industry that could be addressed by these technologies and processes.

- To assess the environmental and food quality, safety and economic impacts of a group of new processes for upgrading food waste.
- To analyse the market for and consumer/retailer opinion of the novel processes and their products.
- To produce a guide to new processes for upgrading wastes from vegetable and fruit processing.
- To develop the basis for a self-funding network of researchers, end-users and stakeholders with respect to the processes and approaches for recycling and upgrading food waste.

Present commercial practice in most of the fruit and vegetable industry is to landfill wastes or to use them without treatment or segregation as animal feeds and fertilisers. In recent years, legislative pressures and increased concern about environmental issues have led to research into alternative uses for food wastes. The production of food additives and high-value compost are within the food chain and exploit the nutritive properties of the by-products. The project will assess the viability of new processes for recycling and upgrading food wastes in these two areas, in order to encourage take-up of these processes by the industry.

The production of food additives includes dietary fibre, natural flavouring and pectins. Compost falls into three broad categories: soil improvers, surface mulch and growing media. Growing media are the main market for high quality compost, in which the ability of particular types of compost to suppress specific diseases need to be exploited.

The new technologies for food additives and high quality compost have been selected by the participants structured in four expert groups: i) Polyphenols, ii) Organic growth media and fertilisers, iii) Polysaccharides and polysaccharides degradation products, and iv) Colorants, odours and flavours. The 8 technologies selected should meet the following criteria:

- An emerging consumer demand, with favourable trends in legislation.
- Raw materials must be easily-available.
- One process must be from each of the sectors: Fruits and vegetables, olives and wine.
- Health promoting benefits and environmental advantages.
- Information on the technology and the technology itself must be available.
- High quality product.

- Technology suitable for cost benefit analysis.
- Existence of a large number of patents, which indicates a potentially developing technology.

A report of the State of the Art of the research into these processes has been drawn-up including the identification of the gaps in research; this is frequently updated with the new information provided. Based on the state of the art report and the expert group discussion, a list of eight technologies has been decided for detailed study, which will also include a cost/benefit analysis and an environmental risk assessment:

Polyphenols: Supercritical extraction with CO₂ for polar polyphenols from olives; Grape seed enzymatic release having a low content of monomeric polyphenols.

Polysaccharides: Microbial production of xylitol; Recovery of antioxidants fibres from fruits.

Colorants, odours and flavours: Natural anthocyanin-betalain mixtures for food colouring purposes; Carotenolipoproteins – byproducts obtained in the seabuckthorn fruit juice production line.

Organic growth media and fertilisers: Composting of olive waste with another material to produce good quality growing media; Composting of grape pomace, cuttings or stalks to produce a fertilisers for use by wine producers on their own land.

The first Technology Transfer Workshop will take place in September 2006 in Valencia (Spain). Technology specialists and industry participants will take part. The workshop will be designed to provide knowledge from the project to non-experts and end-users. The participation of attendees having an industrial profile and who focus on the vegetable and fruit sector (big producers, distributors, retailers, etc.) is encouraged. The topics to deal with involve: up-grading for human consumption (functional ingredients, natural colorants, cosmetics, pharmaceuticals, etc.), agriculture (new fertilisers, growing media), energy valorisation (biogas, liquid and solid bio fuels, etc.) and other applications (plastics, materials for construction of buildings, pet foods, animal feed).

Updated information of the project and partners can be found at: www.grubs-up.org.

Project Coordinator: Robert Frost, Chalex Research Ltd., Torquay, Devon, UK. E-mail: robert@chalex.com

Use of indicator micro-organisms to examine the hygienic status of piggery manure treatment methods : choice of micro-organism(s) and methods of detection

Anne-Marie Pourcher. Cemagref, Rennes, France. anne-marie.pourcher@cemagref.fr

Every country which produces pigs is confronted with sanitary risk due to the presence of pathogenic micro-organisms in manure. Pigs confined in relatively small areas produce a large amount of manure which must be stored before land application. The volumes of manure that must be disposed of in this way often exceed the assimilative capacity of agricultural soil and as a consequence must be treated or exported. The combination of large numbers of animals and closely confined housing makes it likely that some pigs are asymptomatic carriers of pathogenic micro-organisms. Manures contaminated with these pathogens may pose a public health threat if the pathogenic micro-organisms are disseminated in soil and transported to potable or recreational waters. The microbiological risk becomes more important with intensive production that concentrates micro-organisms during epidemics. Due to sanitary crises undergone by the agricultural and food industry, it has become essential to estimate the microbiological danger and to propose treatments to limit or, if possible, to eliminate the undesirable micro-organisms.

In this context, a working group of 14 specialists of hygienisation of manure, coming from 10 countries, met from the 28 to June 30, 2006 at Cemagref, Rennes.

The objective of the workshop was (i) a more precise knowledge of the regulations and of the aspects of manure treatment in different countries, (ii) a clarification of the methodologies and micro-organisms to be studied. A further main aim was the identification of topics that could be worked in the framework of international collaborations.

Members of the working group
 Fernando Bornay-Llinares. Miguel Hernandez Univ, Spain. Email f.bornay@umh.es
 Luisa Bothelo. Nuclear and Technological Institute, Portugal. Email mlb@itn.pt
 Colin H. Burton. CEMAGREF UR GERE. France. Email colin.burton@cemagref.fr
 Caroline Côté. IRDA Québec. Canada. Email caroline.cote@irda.qc.ca
 Patrick Dabert. CEMAGREF UR GERE. France. Email patrick.dabert@cemagref.fr

Richard Holley. Univ. Manitoba, Canada.
 Email rick_holley@umanitoba.ca

José Martinez. CEMAGREF UR GERE. France.
 Email jose.martinez@cemagref.fr

Fiona Nicholson. ADAS. United Kingdom
 Email fiona.nicholson@adas.co.uk

Anne-Marie Pourcher. CEMAGREF UR GERE.
 France
 Email anne-marie.pourcher@cemagref.fr

Corinne Robinault. AFSSA. France.
 Email : c.robinault@ploufragan.afssa.fr

Kitty Stacey. Cranfield University, United Kingdom. Email kitty.stacey@cranfield.ac.uk

Endre Szucs. Szent István University, Hungary.
 Email Szucs.Endre@mkk.szie.hu

Jan Venglovsky. Research Institute of Veterinary Medicine Hlinkova. SLOVAKIA.
 Email jan@venglovsky.com

Björn Vinnerås. Swedish University of Agricultural Sciences. Sweden.
 Email bjorn.vinneras@bt.slu.se

The following main topics of discussion were:

- **Statement of regulation**

The points of view of different states, in particular in Canada and the EU with respect to sanitary aspects of manure treatment and handling, were compared.

- **Manure treatment technologies and their effect on enteric micro-organisms.**

This section was focused on thermophilic treatments, ionizing radiation, ammonia treatment, centrifugation, biofiltration, low temperature anaerobic and aerobic treatment, liming, and polishing treatment.

- **Choice of indicator micro-organisms**

A discussion was established on the necessity to explore the survival of pathogens organisms other than Salmonella, such as Listeria monocytogenes, Cryptosporidium, Giardia, Microsporidium, during manure treatment.

- **Choice of methods of detection**

A cultural and a molecular method were described:

- A miniaturized method for quantitative assessment of Salmonella enterica
- A comparison of culture and real-time quantitative PCR to enumerate Listeria monocytogenes in sludge

- **Epidemiology and modelling of pathogen and indicator survival**

The behaviour of Salmonella in soil and manure according to different conditions of temperature and type of soil was described

A Risk Assessment Model for Escherichia coli in cattle and sheep in the farm environment was presented.

In conclusion, the workshop highlighted the complementarities of the different institutes. This first meeting will end on a Canadian and European framework which will aim to improve knowledge on the effect of the treatments on pig manure. The reflections and the contributions of each participant will be developed in the form of a report.



Members of the working group.
 Photo M.N. Maudet. 28 Juin 2006

CHIMATRA – Chicken manure treatment and application in Asia and Europe

Henrich Roeper. Hamburg University of Technology. Institute of Waste Resource Management

The common practice of chicken manure usage in Asian countries leads to hygienic and environmental problems as well as to odour annoyance. Due to the steadily increasing demand for chicken products the amount of manure that has to be dealt with is growing. The CHIMATRA project aims to enhance the transfer of experience in environmental-friendly chicken manure treatment and application from Europe to Asia.

A main activity of the project is the technology transfer between higher education institutions in Germany, The Netherlands and Malaysia as well as the co-operation between authorities and organizations, chicken manure producers, fertilizer users and equipment producers. A workshop, a training course for farmers and an international conference have been organized. Furthermore, promotional material such as a detailed brochure and a video have been produced to distribute the knowledge about chicken manure treatment and application technologies and introduce the EU best practice to Asia.

Further low-tech solutions for chicken manure treatment are being evaluated and tested. These include a solar dryer, a composter and a pelletiser. The major goal is to come up with a technology that hygienises the manure to avoid the spread of diseases. Further properties of the treated manure include better storage options, better handling possibilities and better application properties.

Information and media about the CHIMATRA project can be found on the internet at www.chimatra.com. For details contact Dr. Ina Körner (i.koerner@tuhh.de) or Henrich Röper (h.roeper@tuhh.de) at the Institute of Waste Resource Management, Hamburg University of Technology, Germany.



Photo : Development of low-tech manure treatment technologies & plant exper

Advanced course : animal production and environmental management. Fonte Boa (Portugal) 2-7 May 2005
José Martinez, Cemagref, Rennes, France.

Objectives of the course

Animal production is a major component of food supply systems and is a traditional way that man has exploited biological processes to his advantage. Recent livestock production systems have focused principally on increasing productivity to provide affordable and reliable food. Modern livestock enterprises are becoming fewer in number but greater in intensity. At present consumers, public authorities and environmentalists are concerned about the negative impact that animal production could have on the environment. Consequently, it is necessary to maintain a balance between feed resources and the animal feeding requirements to maximize the recycling of nutrients and minimize the release of effluents and gaseous emissions.

Society is demanding multiple goals from agricultural systems. It is not possible to imagine the countryside without animal production, but this must be integrated as a sustainable economic enterprise in balance with the environment and local communities.

The course is orientated towards policy makers, public administrators, technical advisors, livestock producers and researchers. It addresses the challenge of sustaining animal production whilst minimizing impacts on the environment. Technological and management strategies will be presented for both intensive and extensive systems and the potential to develop more sustainable production systems will be illustrated with specific case studies.

Organisation

The course was jointly organized by the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), through the Mediterranean Agronomic Institute of Zaragoza (IAMZ), and the Estação Zootécnica Nacional (EZN) of the Instituto Nacional de Investigação Agrária e das Pescas (INIAP) of Portugal RAMIRAN, through the network co-ordinator (Dr. J. Martinez), participated in the content of this advanced course and several RAMIRAN members were invited as guest lecturers :

- M.P. BERNAL, CSIC-CEBAS, Murcia (Spain)
- J. MARTINEZ, CEMAGREF, Rennes (France)
- T. MISSELBROOK, IGER, Devon (United Kingdom)
- H. MENZI, Swiss College of Agriculture, Zollikofen (Switzerland)
- J. SCHROEDER, Plant Research International, Wageningen (The Netherlands)
- J. CASTRO INSUA, Centro de Investigaciones Agrarias de Mabegondo Pastos y Cultivos, Spain

Programme

1. Introduction (3 hours)
2. Feed resources and feeding strategies to minimize environmental impacts (6 hours)
3. Livestock production and water quality (3 hours)
4. Impact of livestock production on soil quality (3 hours)
5. Effect of livestock production on air quality (3 hours)
6. The role of grazing animals on biodiversity and landscape conservation (3 hours)
7. Environmental management of animal production systems (6 hours)
8. Round table discussion: Sustainable production systems (2 hours)

For further details see the www.iamz.ciheam.org/ingle/pama-05-pub-ing.htm or contact :

Dr. Armando OCCON PLAZAHOLA,
Coordinator Area of Animal Production, IAMZ-CIHEAM, Apartado 202, 50080 Zaragoza, España, Tel: 34 976 716000. Direct Tel: 34 976 716007. Fax: 34 976 716001. E-mail: occon@iamz.ciheam.org. Web: www.iamz.ciheam.org.

Ammonia emissions from dairy farms in Wisconsin, US – Research at the US Dairy Forage Research Center, Madison, WI.

Tom Misselbrook, IGER, North Wyke, Okehampton, Devon, EX20 2SB, UK.

Tom spent Jan-Aug 2004 with Dr Mark Powell at the USDA-Agricultural Research Service's Dairy Forage Research Center (DFRC) in Madison, Wisconsin, assisting with the establishment of an ammonia emissions research programme.

Ammonia emissions to the atmosphere are receiving increasing attention in the US. However, whereas in Europe the key drivers for emission reductions are concerns over eutrophication and soil acidification, the main concern in the US is the formation of fine particulates (PM_{2.5}) with negative implications for human health and regional atmospheric visibility. There are much greater uncertainties in US ammonia emission inventories than those for nitrogen oxides and sulphur oxides, the other precursors of PM_{2.5} in the atmosphere, and better data are needed to improve the models and to assess whether reductions in ammonia emissions would improve air quality in the geographic regions where PM_{2.5} levels exceed national standards. Ammonia emissions from the agricultural upper Midwest region of the US are implicated in the high particulate concentrations of the downwind, urban areas of the Northeast.

Ammonia emission inventories

The US Environmental Protection Agency (EPA) has compiled an inventory of ammonia emissions from animal husbandry (<http://www.epa.gov/ttn/chief/net/2002inventory.html>) for the year 2002. The inventory was compiled using a model developed by Carnegie Mellon University (<http://www.cmu.edu/ammonia/>) which uses a matrix approach, combining emission factors and activity data with a monthly timestep and county

resolution. The major limitations to estimating national emissions with the current tools include limited published US data on ammonia emission factors (many of the current emission factors are derived from European data), limited county level activity data on animal populations and manure management practices, an inability to conduct full process-based modelling and an inability to address seasonal and regional effects on emissions. Recent legislation requires each state to report ammonia emission estimates to the EPA (estimates for 2002 base year to be submitted by June 2004), with the intention that this will lead to improvements to the overall inventory.

Dairy farming in Wisconsin

Wisconsin, known as "America's Dairyland", has the highest number of dairy farms of any state in the US (17,800 in 2002; <http://www.nass.usda.gov>) and was only recently overtaken by California in terms of milk production. Mean herd size is 73 cows although, as in much of Europe, this is increasing as more very large units (> 1000 cows) are established. The traditional dairy system in Wisconsin is based on confinement feeding, either in tied stalls, stanchions or, increasingly, free stalls (cubicle house). An outdoor exercise/feeding area is commonplace but pasture grazing by lactating cows is only practiced by a minority of producers. This system obviously results in the production of large amounts of manure that have to be managed. A range of systems exist from daily haul, on farms with little or no storage, to farms with several months storage able to apply manure to crops at agronomically sensible times and rates. Farms with over 1000 animal units are regulated, and have to submit manure management plans to Wisconsin's Department of Natural Resources, primarily aimed at protecting surface and ground waters. The majority of crop land is used to grow feed for the dairy herd with most farms raise their own replacement heifers. The main crops are maize grain and silage, legume and grass hay and whole crop silage. Most farms are self-sufficient in forage and grain production and import protein and mineral supplements.

Research on reducing ammonia emissions

The USDA-Agricultural Research Service's Dairy Forage Research Center, based at the University of Wisconsin, Madison, has initiated a research programme focussing on management strategies to reduce ammonia emissions from dairy production. Initially, the research is addressing

emissions from cattle housing and from slurry applications to land. Studies involving dietary manipulation to improve protein use efficiency in lactating dairy cows have been ongoing at DFRC for a number of years. These trials will now be expanded to include an assessment of ammonia emissions from within the house and from land application of slurries derived from cows on different diets. Of particular interest are changes in the crude protein and energy content of the diet. Also work on the inclusion of forage legumes with elevated tannin content, thereby protecting some of the protein from rumen degradation leading to a lower proportion of N excretion in the urine. Another study will assess the use of different bedding materials in the house and their influence on ammonia emission. Initial studies of ammonia emissions after slurry applications to tilled land are assessing the reduction efficiencies of injection and 'airway' application compared with conventional surface broadcast. For "airway" application, a slurry applicator is followed by tined rollers that punch holes in the ground to improve the infiltration of the slurry. Research is also aimed at assessing trade-offs between ammonia emission and nitrate leaching and monitoring crop uptake.

The research is being conducted at several scales. At the smallest scale, a system of laboratory chambers has been developed that allow for fairly rapid assessment of the potential of various strategies to be explored. These chambers have been used to measure emissions after application of manures from the dietary trials to concrete surfaces and to soils, to assess the influence of different bedding types on emissions and to assess the influence of temperature on emissions. These studies are to be scaled up to groups of cattle housed in specially constructed chambers, from which ammonia emissions will be monitored and feed input and manure output analysed to conduct nutrient balances. It is planned that some of the treatments will be scaled up again to herd-size studies on the research farm and that measurements will also be conducted on a number of commercial farms involved in a research-industry partnership. These studies will provide information on potential ammonia abatement strategies for dairy farmers in Wisconsin, together with possible trade-offs including costs. In addition, the results will add to the database of US measurements for use in state/national inventories and for potential use in the development of process-based models for ammonia emissions from dairy production.

Knowledge transfer and policy making

In addition to the research being conducted, the DFRC has played a central role in knowledge transfer. Two workshops have been held, organised jointly by DFRC, Wisconsin Agricultural Stewardship Initiative, University of Wisconsin and the Wisconsin Department of Natural Resources, to address the issue of ammonia emissions from dairy production, with participation by the dairy industry, the research community and policy makers. The aim of the workshops was to inform the industry of the issues, present some of the European experiences, demonstrate the DFRC research programme and enable dialogue between the various parties to ensure that all are involved in the discussions and decisions from which policy, and potentially legislative, frameworks will be derived. Informal discussions with some of the larger Wisconsin farmers revealed that they see their biggest challenge over the next 5 years to be addressing the environmental issues associated with manure management and that they welcome research aimed at providing cost-effective solutions.



Traditional Wisconsin dairy farm



Modern Wisconsin dairy farm



Slurry application with the "Airway"



DFRC, Madison, Wisconsin



DFRC farm, Prairie du Sac, Wisconsin

A two months secondment at McGill University, Montréal, Canada (July-August 2004)

José Martinez, Cemagref, Rennes, France.

It is rather a natural trend when you feel too much harassed by work, deadlines, delays etc to dream to escape to an other life, other rhythms, other ambiance; sometimes even it is very tempting to quit. In France we call this "la tentation de Venise". The good thing about working in scientific research, is that you can easily achieve such a dream!!! My chance came when I met Professor Suzelle Barrington and she offered me the possibility of collaborating with her research projects and preparing a twenty hours course on the topic "Livestock farming and climate change".

Research activities

My involvement in research was mainly through the co-supervision of the work of students studying for master's degrees. One of the research themes concerned the development of innovative surface irrigation techniques for the efficient disposal of farm wastewaters. Dairy farms generate large volumes of effluent from milking parlours and manure storages. The average Québec farm with 50 milking cows and an equal number of dairy followers generates between 500 and 900 m³ of effluent each year. In 2001, the Québec Ministry of Environment amended livestock waste management regulation and obliged dairy farms to treat or land spread their milking parlour wastewaters because of the risk of pollution from discharging such effluents directly into watercourses. Compared to application to land with a conventional tanker, surface irrigation can apply enough of this low strength effluent to provide nutrients for crops together with water during the hot summer period. The objective of the study was to determine, through a series of field experiments on various typical dairy farms, the feasibility of such a technique and to evaluate the limits of the method in terms of rate of application, frequency, impact on soil fertility etc.

The work was conducted by Sophie Morin and Ali Inamullah who successfully obtained their master's degrees and published their work in Conference Proceedings as well as in scientific journals.

The second research topic of research in which I collaborated was related to the composting of biowastes (urban food waste or UFW). This was conducted by Bijaya Adhikari (master student) in

close relation with Montreal city and the Eco-Quartier Jeanne-Mance et Mile –End (St Urbain). It consisted of demonstrating the feasibility of reactor composting and optimizing the factors controlling the process, including moisture content, oxygen level and C/N ratio. Further to the characterization of biowastes and locally available bulking agents, the project helped develop procedures for the composting of UFW in Montreal.

Teaching activities

My involvement in lecturing was first through the preparation of a course on greenhouse gases from livestock activity. It was the first time that I faced such a difficult task, and I really learnt my lessons! I take here the opportunity to acknowledge all colleagues that kindly provided various documents, papers and even sometimes power-point presentations! including : Harald Menzi, Pierre Gerber, Dave Chadwick, Paul Robin, Sophie Générmont, Pascal Peu, Pete Smith, Ken Giller etc (I apologise for any name forgotten).

Further to the hard preparation time, presenting the lectures was really a great pleasure and I had the chance of being listened to by a wide range of very lively and interesting students (from undergraduate, masters, Ph D's), and including also a unique cocktail of originating countries (Ghana, Pakistan, China, Bangladesh, Nepal, Mexico, Denmark, and Canada!).

I would like to acknowledge all these students also for their valuable Final Reports on topics like :

- The effect of wastewater on the greenhouse gas emission, by Xuenjun Chen,
- Impacts of livestock keeping in urban and peri-urban Sub-Saharan Africa on GHG emissions, by Nana Osei K. Mainoo,
- Anaerobic digestion of livestock manure as a tool for reducing GHG: the Canadian context, by Luis Ortega Charleston,
- Techniques to reduce greenhouse gases emissions from farm systems, by Julie Thibault,
- An analysis of the sink potential of Canadian agricultural soils, by Liette Connolly-Boutin,
- Foodwaste production in relation with urban population growth and greenhouse gas (CH₄) generation- a review, by Bijaya K. Adhikari.*

* Adhikari B.K., Barrington S., Martinez J. 2006. Predicted growth of world urban food waste and

In conclusion, my summer visit at Mc Gill University was a unique experience, rather relaxed in nature (I was there to participate, help) and finally studios, and scientifically fruitful.

Apart from renting regularly typically big American cars like Pontiac, Chevrolet (see photo) I also very much enjoyed the lively Montreal music festivals (Jazz Festival, Franco-follies, Blues festival...) and the cosmopolitan atmosphere of the city.



Photo Li Wang. (Suzelle Barrington in the middle, Ali and José on either side)



Photo Li Wang (From left, Bijaya, myself, Alvin and Suzelle)



methane production. Waste Management and Research, 24, 1-13.

Announcements

First International Ammonia Conference in Agriculture

On 19, 20 and 21 March 2007, Wageningen UR (The Netherlands) and the University of Kiel (Germany) will organize the First International Conference on Ammonia in Agriculture: Policy, Science, Control and Implementation. It will address the role of ammonia in agriculture in a broad sense; from the policy on ammonia inventory and abatement in different EU-states to measuring methods and mitigation strategies. Non-CO₂ greenhouse gases, odour and Particulate matter (PM) can also be addressed.

The Conference is held in Conference Centre "De Reehorst", Ede, The Netherlands. Hotel accommodation will be available at the Conference Centre (approx. 80 rooms) and at the Wageningen International Conference Centre (WICC) in Wageningen (approx. 200 beds). RThe Conference fee will be published soon. This fee will not include hotel accomodation and travel to and from the Conference.

You are warmly invited to join, by attending and presentation of a paper or poster that focuses on the Conference objectives and themes. Find your abstract submission form here.

Due to recently changed insights, the organization has decided to widen the possibilities for abstract submission.

The data are now:

- deadline for submission of abstracts: Mid October 2006
- notification of acceptance on paper or poster: within 4 weeks after submission

Those who have ahead submitted an abstract have been notified about this change Congress web site : www.firstammoniaconference.wur.nl
Gert-Jan Monteny, Wageningen UR, The Netherlands, co-ordinator



The XIII International Congress in Animal Hygiene will be organised in Tartu, Estonia, on June 17-21 2007.

The Congress will focus on fresh and topical issues in animal hygiene. In order to cover the majority of different fields of animal hygiene and related areas the meeting will be divided into six sessions.

The Congress venue is a newly renovated, well-equipped and internationally-oriented concert and conference centre : Vanemuise Concert Hall.

The organizing committee and the Estonian University of Life Sciences (www.emu.ee) welcome you in TARTY-CITY OF GOOD THOUGHTS (www.tartu.ee).

Congress web site : <http://www.emu.ee/isah2007>

Scientific Office : Associate Professor Andres Aland, 2nd Vice-Président of ISAH.

Department of animal healts and environment, Institute of Veterinary Medicine and Animal Sciences. Estonian University of Life Sciences. Kreutzwaldi 62. 51014 Tartu, Estonia.

E-mail : Andres.Aland@emu.eeFirst

Journals' Special Issues from RAMIRAN Conferences

1. Following the 2002 Conference, a general Issue was published in Bioresource Technology (Volume 96, Issue 2, January 2005).

This Special Issue of **Bioresource technology** results from RAMIRAN'02 (the 10th International Conference on Recycling of Agricultural, Municipal and Industrial Residues in Agriculture) that was held in Strbské Pleso, High Tatras (Slovak Republic) on May 14-18, 2002.

This issue captures the flavour of the event and the wide range of topics covered throughout the conference.

Guest Edited by Dr. José Martinez, and Dr. Maria Pilar Bernal.

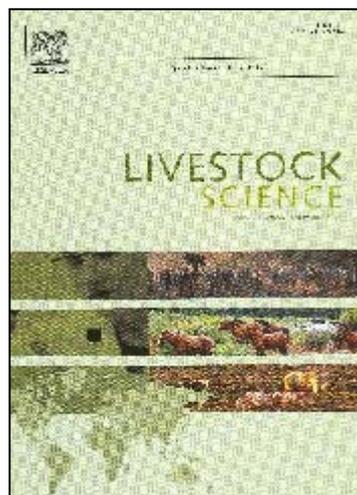


2. Following the 2004 Conference, 3 Thematic Special Issues are published or in progress

Livestock Science : Biosecurity of Livestock Effluents (Volume 102, Issue 3, July 2006)

This Special Issue of **Livestock Science** results from a joint collaboration between Ramiran'04 (the 11th International Conference of the FAO Escorena Network on Recycling of Agricultural, Municipal and Industrial Residues in Agriculture) that was held in Murcia, Spain in October 6-9, 2004 and the ISAH (in-between congress of the International Society for Animal Hygiene) organized in Saint-Malo, France in October 11-13, 2004.

Guest Edited by Dr. José Martinez and Dr. François Madec.

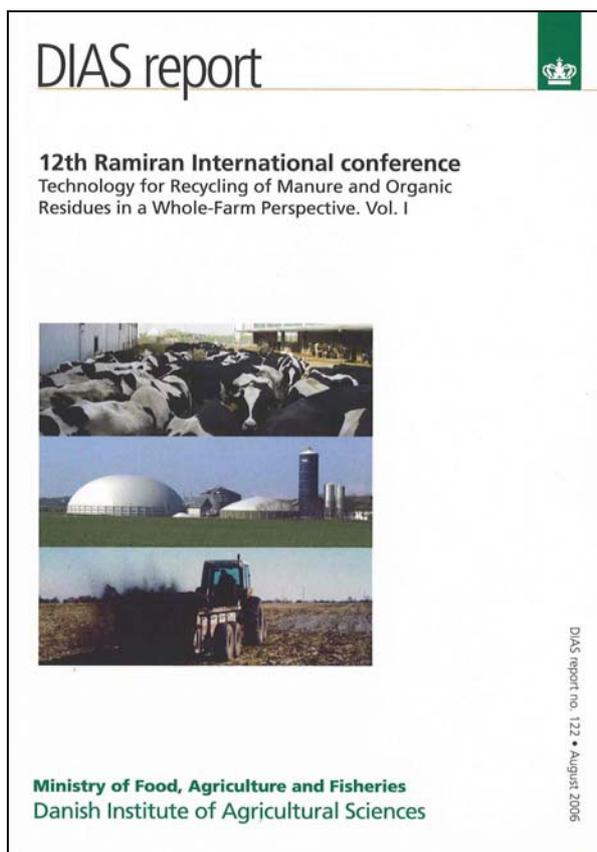


Bioresource Technology : Recycling of nutrients from organic wastes and treatment options. Ramiran' 04.

New Special Issue from Ramiran'04 is in press. Guest Edited by Dr. Maria Pilar Bernal, Dr. Raul Moral and Dr. Sabine Houot

Biosystems Engineering : Gaseous Emissions from Organic Wastes

New Special Issue from Ramiran'04 is in preparation. Guest Edited by Dr. Tom Misselbrook, Dr. Jan Huijsmans and Dr. José Martinez



The future of RAMIRAN



The “happy” New Ramiran Management : Harald Menzi (left) and Tom Misselbrook (right) the joint coordinators, on either side of the former network coordinator, José Martinez (in the middle).

