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RAMIRAN
Research Network on Recycling of Agricultural, Municipal and Industrial Residues in Agriculture.

R A M I R A N

N E W S L E T T E R

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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 2 OF THE RAMIRAN NEWSLETTER

The RAMIRAN network continues to provide an invaluable means of exchanging ideas, information and experiences on topics that are becoming increasingly important on a national and international basis. These exchanges are achieved mainly through the conferences, that take place every two years, and through the activities of the Working Groups. The Newsletter provides a means of keeping in touch with the extended RAMIRAN family between conferences. It is distributed to all those who have at sometime registered with the network. So, even if you are unable to attend the latest conference, you can keep abreast of what's going on. I would be pleased to receive articles, announcements and suggestions for future issues.

Editor

6-9 October, 2004. MURCIA (Spain)

Ramiran 2004, 11th International Conference of the FAO ESCORENA Network on Recycling of Agricultural, Municipal and Industrial Residues in Agriculture

General Theme : Sustainable Organic Waste Management for Environmental Protection and Food Safety

Organised by CEBAS-CSIS in collaboration with UMH.
http://www.ramiran.net
Conference organiser : Maria-Pilar BERNAL, CEBAS-CSIC. e-mail : ramiran04@cebas.csic.es

10th RAMIRAN CONFERENCE : HYGIENIC SAFETY IN ORGANIC WASTE PROCESSING

Jan Venglovsky, DVM, PhD
Research Institute of Veterinary Medicine in Kosice
e-mail : venglov@vuvm.sk

Hygienic safety in the processing of organic waste belongs to the problems receiving worldwide attention and it was the topic of the 10th international FAO RAMIRAN (FAO European Cooperative Research Network on Recycling of Agricultural, Municipal and Industrial Residues in Agriculture) conference. The conference took place May 14 – 18, 2002 at Strbské Pleso, High Tatras, Slovak Republic and was organized by the team of Jan Venglovsky, DVM, PhD, of the Research Institute of Veterinary Medicine (RIVM) of the University of Veterinary Medicine in Kosice.


Strbské Pleso, High Tatras (Slovak Republic)

Since 1992 the RIVM has been member of the FAO RAMIRAN cooperative network which deals with research into environmental problems connected with the processing of agricultural, municipal and industrial wastes and their use in agriculture.

It was the aim of the conference to present a survey of the most important questions connected with the processing of different organic wastes and the impacts of the latter on agriculture, environment and the health of animals and humans.

The official opening of the conference was preceded by a working meeting of invited specialists with Ms Maria Kadlecikova, Deputy Prime Minister of the Slovak Republic in charge of European Integration. Mr Michal Demes, representative of the FAO REUR prepared a presentation of activities in the field of information technologies.
It was proposed that RAMIRAN, FAO REUR and FAO be linked via the internet at www.ramiran.net


Strbské Pleso, High Tatras (Slovak Republic)

The conference was attended by ninety three scientists from 22 countries of Europe as well as the USA, Japan, Chile and Mexico. In six sessions 44 scientific contributions and 45 posters were presented which dealt with the following topics :

- Hygiene safety in organic waste management
- Strategies for organic waste management in agriculture
- Agronomic value of organic wastes
- Measurement, modelling and control of gaseous emissions
- Processing and handling of wastes
- Environmental impacts


Strbské Pleso, High Tatras (Slovak Republic)

The contributions have been summarized in the form of conclusions which will be included in the current revision of EU regulations concerning composting and the use of sludges in agriculture.

A great number of contributions dealt with the survival of important pathogens and indicator microorganisms in manure and in the environment. Minimization of nitrogen losses during organic waste processing and minimization of greenhouse gas emissions were also largely discussed.

Several recommendations concerned changes in the regulations concerning risk material with view to TSE. Revisions shall also include regulations concerning composting and aerobic and anaerobic treatment of wastes. Revision will be suggested for the hygienic regulations concerning untreated poultry manure as well as the parameters of manure treatment.

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HOW DO WE ESCAPE FROM DISINTEGRATION ?

a personal annotation to our meeting in Strebske Pleso.

Jaap Schröder,
Agrosystems Research
Plant Research International
Wageningen
Email: jaap.schroder@wur.nl

What an extravagant corner to convene! This primary reaction was soon followed by a submissive awareness of atlantic centralism on my behalf. Yet, I think that I have not been the only one who curiously consulted his atlas several times. Travel arrangements were made and, eventually, the excitement emptied itself in a breathtaking journey for bird watchers. From behind the windows of the bus taking me from Kosice to Strebske, a marvellous landscape unrolled itself. This experience painfully reminded me of the destruction of landscapes at home, thanks to questionable decisions which were facilitated by the EU's CAP. Apparently, loss of environmental quality takes place at such a deceptively slow pace, that one needs calibration abroad to become aware of it. O yes, remission of sins exists, but recuperation can not be forced. I'm afraid this also applies to the loss of landscapes. Sure, everyone is entitled to his own mistakes but I find it difficult to suppress an outcry that paradise can be lost only once. Then I disembarked from the bus, talked to my hosts who helped me out of my dream saying that what looked like paradise from a bus seat isn't always that breathtaking. Subsequently, the apparent inevitability of 'modernisation' assailed me. That is, modernisation at the expense of wholeness.

At work then : the meeting in the High Tatras commenced. A personal reunion with members of the RAMIRAN family that I last met round about ten years ago in Bad Zwischenahn. In the following hours and days I enjoyed a well-organised parade of posters and oral presentations. All participants reminded me once more of the incredible number of aspects related to the subject of residue recycling. In the course of the meeting, however, the awareness grew that research, too, has fallen apart along disciplinary borders. Within one and the same meeting I have heard pathologists advocating actions that agronomists on the spot abominated: let temperatures rise in your manure heaps, turn these heaps regularly while adding lime, apply the manure well ahead of the growing season and do not incorporate the manure. In short, everyone was talking sense from his perspective but, unfortunately, attempts to synthesise the matter were hardly made. Apparently, it requires superhuman abilities to quantify the various trade-offs between societal demands and make the risks of problem swapping explicit. Some other participants pictured the blessing prospects of novel technologies. I truly welcome technology but expect prophets to include at least tentative drafts indicating which price technology carries in terms of finance, energy consumption, education and control. Attempts in that direction could be

counted on the fingers of one hand, I'm afraid, just as ten years ago. Everyone of us, trapped in our disciplines, finds it extremely difficult to provide the integral picture.

Researchers and policy makers seem to have developed a peculiar relationship: awaiting new technologies, they unanimously proclaim that it is still far too early for draconian measures. Simultaneously, gut feeling tells us that our intensive designs at the slippery edge of societal requirements, is asking for trouble or, at least, for immediate gigantic efforts.

These feelings at the end of the meeting reminded me of the out-journey. The wonderful 'drafting tour' (a combination of drinking and rafting as we found out) along the Slovak-Polish border which was offered to us by our hosts, was probably to be blamed for this musing too. But seriously, many countries now find themselves standing before a crucial decision: either intensify their production on a limited area with extended technological inputs that could bring about an increased resource use efficiency, or maintain their extensive production whilst combining rural functions and cherishing self-sufficiency. Whatever the choice, it will have irreversible implications for the quality of life in general and that of our European landscape in particular. Therefore, let us no longer delay and try to find ways to objectively weigh how societal requirements of present and future generations can be complied with as good as possible. With a timely start of such an ambitious work, history does not necessarily have to repeat itself.

My compliments to all the people who made it such a rewarding meeting!

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WORKING GROUPS

Full reports of the activities of the Working Groups are contained in "Report of the Tenth International Conference of RAMIRAN May 2002", copies of which are available from the Network Secretary.

The current Working Groups and chairman are listed below together with a brief update on the Groups` activities where appropriate. Please contact the Chairman if you are interested in the activities of the Group.

Heavy Metals
Fiona Nicholson, UK
fiona.nicholson@adas.co.uk

Gaseous emissions
Tom Misselbrook, UK
tom.misselbrook@bbsrc.ac.uk

Hygienic aspects
Reinhard Böhm, Germany
boehm@uni-hohenheim.de

Composting and transformation of organic wastes
Maria Pilar Bernal, Spain
pbernal@natura.cebas.csic.es

Management of organic wastes
Giorgio Provolo, Italy
giorgio.provolo@unimi.it

Other wastes generated on the farm
Paolo Balsari
balsari@agraria.unito.it

Information Technology
Jan Venglovsky
jan@venglovsky.sk

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FOCUS ON THE WORKING GROUP ON HEAVY METALS – MAY 2003

Fiona Nicholson, ADAS Gleadthorpe Research Centre, Meden Vale, Mansfield, Notts NG20 9PF, UK

This report provides an update on three issues which could have implications for manure and waste management :

- Cadmium (Cd) and lead (Pb) in cereals
- SCAN reports on copper (Cu) and zinc (Zn) in livestock diets
- AROMIS Concerted Action

1. Cadmium and lead in cereals

The EU has recently introduced legislation* setting maximum permissible concentrations (MPC) of Cd and Pb in foodstuffs. For cereals excluding wheat grain, bran, germ and rice, the MPC for Cd is 0.1 mg kg^{-1} fresh weight (FW), while the MPC for the aforementioned exceptions is 0.2 mg kg^{-1} FW. The MPC for Pb in cereals is 0.2 mg kg^{-1} FW. An important point from the regulation is that "Food ingredients used for the production of compound foodstuffs should comply with the maximum levels set in this Regulation prior to addition to the said compound foodstuff in order to avoid dilution". This precludes the possibility of dilution of non-conforming grain batches with grain batches having lower metal concentrations, and has important implications for the recycling of sewage sludge and other metal-containing wastes to cereal-growing land.

2. SCAN reports on Cu and Zn in livestock feeds

The Scientific Committee on Animal Nutrition (SCAN) has recently published opinions on zinc (Zn) and copper (Cu) in livestock diets, which may influence the concentrations of these metals in manures subsequently applied to land. (http://europa.eu.int/comm/food/fs/sc/scan/out120_en.pdf) . The reports had the following conclusions and recommendations :

Zinc

Conclusions

Zn is an essential trace element necessary to all animals. It has to be provided to animals to cover their requirements. Currently, Zn is authorised for all species including fish at the level of 250 mg/ kg feed (see Council Directive 70/524/EEC). This concentration exceeds the requirement for farmed livestock, fish, dogs and cats. In terms of growth promotion and improvement of animal performances, SCAN considers that the effect of Zn remains questionable. No particular risk for the environment has been identified consecutive to the use of Zn in animals' diets at the current allowed levels.

Recommendations

(1) Current Zn levels allowed in diets should be reviewed to better reflect animal requirements.
(2) If reviewed, the current levels of Zn in animal feed should consider the natural level of Zn present in feedingstuffs and all factors impacting on Zn availability. An appropriate safety margin should therefore be included in the levels fixed for this trace element. A total Zn of 150 mg/kg complete feedingstuff would appear appropriate for all animals considered.
(3) As long as 175 mg Cu/kg feed remains authorised, comparably high levels of Zn and iron should be kept to prevent adverse effects of Cu.
(4) The impact on aquatic environment of the use of Zn in fish feed should be considered and assessed using adequate models for different fish production systems in Europe.
(5) Levels of Zn presently allowed in feed of farm animals should be kept under scrutiny in the light of the possible evolution of the authorised load of Zn on soil. For some animal categories, Zn may indeed replace nitrogen as limiting factor for spreading of manure onto lands, if the allowed load of Zn on soil was to be reduced.
(6) Zn is known to be used in some animals, for prophylactic or therapeutic purposes, at far higher levels than those authorised as additive in feed, in particular in piglets. Levels can reach 10 to 20 times those allowed in the feed additive legislation. This other use may invalidate the assessment of the impact on environment done for the animal categories considered. If an authorisation of high Zn levels for piglets and for a short time should be considered - *e.g.* under the control of the medicated feed legislation as a prophylactic or

* European Commission. 2001. Commission Regulation (EC) N°466/2001 of 8 March 2001 seeting maximum levels for certain contaminants in foodstuffs. Official Journal of the European Communities L77:1-13.

therapeutic agent or as a characteristic for a feedingstuff for particular purposes - the environmental impact should be re-evaluated.

Copper

Conclusion

Cu is an essential trace element necessary to all animals. It has to be provided to animals to cover their requirements. Currently, Cu is authorised for all species including fish. Levels allowed in the diet of animals vary (see Council Directive 70/524/EEC). The current levels cover largely the above mentioned animal requirements. In the case of calves the levels authorised are even close to toxicity levels. In terms of growth promotion and improvement of animal performances, Cu is not known to have any practical effect in fish or farm animals, with the exception of pigs up to 8 to 10 weeks of age. High levels of Cu (175 mg/kg) as authorised for piglets are efficient in promoting growth, but efficacy for growing finishing pigs could not be demonstrated. Some studies have also shown some effects in poultry. Cu is preferably stored in the liver. The other storage organ is kidney but to a lesser extent. Lower levels are observed in muscle and fat whatever the level used inthe feed. Use of Cu at the current levels authorised in feed does not increase significantly the exposure of human consumers to Cu. In the case of piglet (highly supplemented) and calf (having a high liver affinity for Cu), the exposure of human consumers is increased, although remaining within the PMTDI. No particular risk for the environment has been identified consecutive to the use of Cu in pig and ruminant diets at the current allowed levels.

Recommendations

(1) Current Cu levels allowed in diets should be reviewed to better reflect animal requirements.

(2) If reviewed, the current levels of Cu in animal feed should consider the natural level of Cu present in feedingstuffs and all factors impacting on Cu availability. An appropriate safety margin should herefore be included in the levels fixed for this Cu of 25 mg/ trace element. A total kg complete feedingstuff would appear appropriate for all animals considered except calf fed milk replacer and sheep.

(3) The present level allowed for sheep (15 mg/kg) should be retained.

(4) The present level allowed for pre-ruminant calves could jeopardise their health due to the high accumulation of Cu in their liver. Consequently, Cu level authorised in feed should ideally be reduced to 5 mg/kg in milk replacer to protect calves health. This would in addition allow reduction of the human consumer exposure.

(5) Because the growth promoting effect of 175 mg Cu /kg diet could only be demonstrated for piglets, SCAN would recommend to reduce the period of authorisation of a level of 175 mg/kg to the first 10 weeks of life instead of till 4 months of age.

(6) As long as 175 mg/kg feed remains authorised, comparably high levels of Zn and iron should be kept to prevent adverse effects of Cu.

(7) The impact on aquatic environment of the use of Cu in fish feed should be considered and assessed using adequate
models for different fish production systems in Europe.

(8) Levels of Cu presently allowed in feed of farm animals should be kept under scrutiny in the light of the possible evolution of the authorised load of Cu on soil. For some animal categories, Cu indeed replace nitrogen as limiting factor for spreading of manure onto lands, if the allowed load of Cu on soil was to be reduced.

(9) Attention should be paid to avoid spreading of pig slurry on pastures accessed by sheep as this species is extremely sensitive and as exposure to Cu can be fatal.

(10) A gene encoding resistance to Cu has been located on a plasmid derived from a gut bacterium which also carries a number of antibiotic resistance genes. Further work is needed to establish whether the use of Cu, particularly at the highest permitted level in feed, can inadvertently co-select for antibiotic resistance.

3. AROMIS Concerted Action

The EU: AROMIS Concerted Action (Assessment and reduction of heavy metal inputs into agro-ecosystems) led by Henning Eckel of KTBL in Germany is reaching its conclusion. A final workshop will be held in Germany in November 2003.

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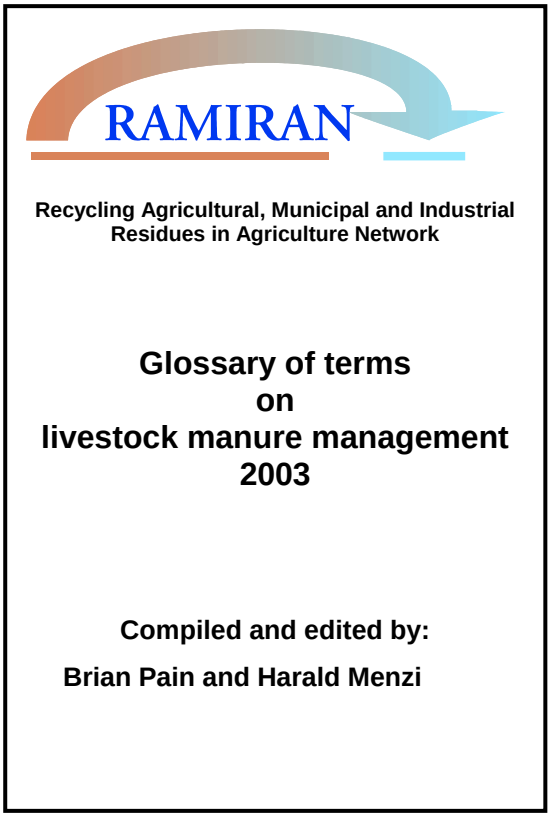
NEW GLOSSARY OF TERMS

The glossary contains definitions/descriptions of about 500 terms concerning livestock manures, organic wastes and related topics. It was compiled by Brian Pain and Harald Menzi with considerable assistance from an *ad hoc* working group that met in Bern and other members of the RAMIRAN network.

A printed copy of the glossary will be sent to all members of the RAMIRAN network and it is also hoped to put it on www.ramiran.net.



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FORTHCOMING MEETINGS AND EVENTS

Three international symposia will be held jointly at Research Triangle Park, Durham, North Carolina on October 12-15, 2003 sponsored by ASAE
http://www.asae.org/meetings

1. International Symposium on Animal, Agricultural and Food Processing Wastes (ISAAFPW 2003)
2. International Swine Housing Conference
3. International Conference on Air Pollution from Agricultural Operations

There will also be a North Carolina conference right after the ASAE symposia at the same location on October 16-17, 2003 to discuss projects on alternative manure management systems for swine (http://www.cals.ncsu.edu/waste_mgt/

12th N Workshop : Controlling N Flows and Losses.
21 –24 September 2003
Organised by IGER at Exeter University, Devon, UK
www.iger.bbsrc.ac.uk/igerweb/confs/N_Workshop/index.htm
email : 12th N workshop@bbsrc.ac.uk

3rd Int. Conf. on Sustainable Viticulture and Winery Waste Management.
Barcelona, 24 – 26 May 2004
www.winery.ub.es

ISAH 2004. International Congress "Animal production in Europe : finding the ways in a changing world"
Saint-Malo, France. 11-13 October, 2004 ;
http://www.zoopole.com/ispaia/isah2004.htm

EURO Summer School "Biotechnology in organic waste management"
Wageningen, The Netherlands. June 29 – July 4, 2003.
www.ftns.wau.nl/mt/solidwaste.html

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PATHOGENS IN LIVESTOCK MANURES: A UK PERSPECTIVE

Fiona Nicholson and Brian Chambers
ADAS Gleadthorpe Research Centre, Meden Vale, Mansfield, Notts NG20 9PF

Background

The number of reported cases of food-borne illness has risen significantly in the UK over recent years. The main causative agents are bacteria, particularly *Salmonella*, *Campylobacter* and verocytotoxic *Escherichia coli* (VTECs), viruses and the parasitic protozoa *Cryptosporidium* and *Giardia*. One route by which pathogens may enter the human food chain is from the application of organic manures to agricultural land. In the UK, the use of raw/untreated sewage sludge on agricultural land growing food crops ceased at the end of 1999 as part of the 'Safe Sludge Matrix' agreement between the UK Water Industry and the British Retail Consortium. All sewage sludges (biosolids) recycled to agricultural land are now treated to conventional or enhanced standards. However, around 30 times more livestock manure is recycled to agricultural land than biosolids in the UK each year, so it is important that appropriate management practices are implemented to minimise the risks of pathogen transfer to the food chain.

Pathogens in Livestock Manures

Pathogen prevalence and levels in livestock manures are affected by a number of factors. Shedding of some pathogens appears to be triggered by birth and levels are often higher in the faeces of young animals. Dietary changes are also linked to apparent increases in faecal pathogen levels during spring and autumn when cattle are commonly moved between housing and grazing. Increased shedding of pathogens has also been linked with raising the fibre content of ruminant diets, and with fasting or other forms of stress.

Temperature is probably the single most important factor determining pathogen survival times in manures and the wider environment. Pathogens are generally considered to be destroyed after a short time at high temperatures (>55°C) and by freezing. However, even at low to moderate temperatures pathogen numbers will decline over time, especially under very dry conditions or on exposure to UV radiation.

Livestock Manure Management

Manure storage and treatment

Many farmers spread manures straight to land after they are removed from housing, either because they do not have adequate storage capacity or for the greater convenience. Spreading fresh manure straight to land presents a higher risk of pathogen transfer to the food chain, because there is no interim storage or treatment period during which pathogen levels can decline.

A single slurry store or solid manure heap may consist of excreta from different animal houses and will often contain material of different ages. The rate of pathogen decline in stored manures depends on the management and ambient weather conditions. Temperature, aeration, pH and slurry dry matter content have all been shown to influence pathogen decline rates during storage.

Pathogen levels decline with increased storage duration, with survival times reported in untreated slurry of up to 3 months. Survival times are likely to be longer during winter than in summer, because of lower ambient temperatures. Solid manure storage for at least 1 month has been reported to be sufficient to ensure elimination of most pathogens, provided that elevated temperatures (at least 55°C) are reached within the main body of the heap. However, there is a small risk that some pathogens may still survive in the cooler exterior or drier parts of manure heaps. Turning and composting of solid manures to thoroughly mix and promote higher temperatures should ensure effective pathogen kill. However, where solid manures are not actively managed, elevated heap temperatures may not

be achieved and a longer storage period of 3 months is likely to be required.

Anaerobic digestion and aerobic slurry treatment systems can reduce pathogen numbers. However, the capital costs involved are very high and they are generally only be partially effective in reducing pathogen loads unless elevated temperatures are achieved. A more appropriate investment for the UK industry would be to increase slurry storage capacity, which has the dual benefit of reducing pathogen levels and improving nutrient utilisation.

Land spreading and grazing

All solid manures are surface applied in the UK, whereas slurries may be surface applied (by broadcasting or band spreading) or injected into the soil. Band spreaders and injectors have lower risks of aerosol generation, but the slurry is likely to dry more slowly and be exposed to less UV radiation, increasing the potential for pathogen survival. At present, >90% of slurry in the UK is broadcast spread, although pressures to reduce ammonia and odour emissions are moving the industry towards band spreading and injection. In addition, excreta containing pathogens may be deposited directly onto the land from grazing cattle and sheep, as well as from outdoor pig farming and cattle/sheep over wintering on arable stubble crops.

Pathogens are likely to survive longer in soils than on the surface of crops, with some still being viable in the soil several months (or even years) after manure spreading or excretion by grazing livestock. As both animals and humans may ingest soil adhering to crops, it is important to ensure that there is a sufficient interval between manure application/excretion and the harvest or drilling of crops (particularly those likely to be consumed raw) or resumption of grazing, to allow pathogen levels to decline.

Recommendations for Farmers and growers

The key recommendations for UK farmers and growers to reduce the risks of pathogen transfer into the food chain are summarised below.

- Slurries should be stored prior to land application for at least 1 month and preferably for 3 months. Where more than one slurry store is available on farm, these should be filled and emptied in batches, to avoid recontamination with fresh material.
- Solid manures should be stored for at least 3 months prior to land spreading. Active manure management should be encouraged to promote elevated temperatures during composting (>55°C for 3 days), when an overall storage period of 1 month is likely to be sufficient.
- The band spreading and injection of slurry will substantially reduce the risk of direct pathogen inhalation via aerosols and potential contamination of adjacent crops, grazing land, livestock and waterways from aerosol drift.
- Manures should never be applied directly to ready to eat crops and an interval of at least 6 months should be observed between spreading of ‘untreated’ manure and crop harvest.
- Where ready to eat crops are grown on land previously used for livestock grazing or foraging, at least 4 months should elapse before crop harvest.
- Where manure application to grassland during the grazing season is unavoidable, farmers should to store manures for at least 1 month before land spreading and leave pastures ungrazed for at least 1 month or until all visual signs of manure solids have disappeared.

The microbiological contamination of crops that are unlikely to be cooked before they are eaten (salads, fruit and some vegetables) provides the highest potential risk to human health. It has been estimated that up to 10% of the area growing ready to eat crops in the UK may receive livestock manures prior to

planting. Whilst washing crops thoroughly after harvest will reduce the risks of food borne illness, it does not guarantee the removal of all pathogenic micro-organisms, and since not all crops are routinely washed, other precautions must be taken. The UK Food Standards Agency has recently published a draft guidance note for consultation on "Managing Farm Manures for Food Safety : Guidelines for Growers to Minimise the Risk of Microbial Contamination of Ready to Eat Crops" that builds upon the information summarised in this article.

Implication of measures to control pathogens associated with livestock manure management.

The costs and environmental impacts of the potential measures to control pathogens associated with livestock manure management were also assessed. Extended batch storage periods, or the treatment of solid manures and slurries, generally gave the best reduction in pathogen loads ranging from 2 to 6 $\log_{10}$ reductions in *E. coli* numbers.

The estimated capital costs of providing additional slurry storage were extremely high (*c.* £600 million), particularly if all farms were equipped with two 90-day stores to avoid recontamination of stored slurry with fresh material. The capital costs of providing additional storage for solid manures on a concrete-base were also very high (*c.* £800 million), but were much lower (*c.* £10 million) if field-heaps direct on soil were used, although precautions would then have to be taken to minimise water pollution risks from heap runoff.

Longer manure storage periods would increase emissions of ammonia, nitrous oxide and methane, although the estimated ammonia increases during storage (*c.* 4 kt NH_3-N/annum) would be more than offset by decreases in the subsequent land spreading phase (*c.* 20 kt NH_3-N/annum) largely due to N immobilisation during storage. Increased storage periods were predicted to increase nitrate leaching from slurries (*c.* 3 kt N/annum), largely as a result of likely increase in slurry applications in the autumn , but decrease that from solid manures (*c.* 5 kt N/annum) again due to N immobilisation in storage.

Other conflicts also exist. For example, broadcast slurry spreading techniques can disseminate pathogens via aerosols over distances greater than 500m, whereas band spreading and injection techniques give little risk of aerosol generation. But the bandspread/injected slurry will dry less quickly and be exposed to less UV radiation, thus increasing the potential for pathogen survival. Similarly, the rapid incorporation of manure into the soil following spreading on cultivated land will reduce ammonia and odour emissions, but is likely to increase pathogen survival in the soil. The challenge for scientists and policy makers is to develop sustainable manure management practices that will protect both food safety and minimise environmental pollution.

Acknowledgements

The worked described in this article was funded by the UK FSA (Food Standards Agency) and Defra (Department for the Environment, Food and Rural Affairs).

Key references

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MANURE ISSUES IN THE USA

Philip W. Westerman
Professor, North Carolina State University, Raleigh, NC USA

Manure Issues in the USA – The USA has many similarities with Europe regarding issues with management of livestock manure and other organics. As livestock farms have grown in size and concentrated in some regions of the USA, environmental issues such as ammonia emissions and social issues such as odor nuisance have received more attention. Because of emphasis nationwide on environmental issues with confined animal production, there has been a trend of increasing regulation of confined animal production. The US Environmental Protection Agency (EPA) published new Confined Animal Feeding Operations (CAFO) regulations February 12, 2003, the first major EPA change in CAFO regulations since the 1972 Clean Water Act. Background information on the strategy for these regulations is included in the published regulations (http://www.epa.gov/npdes/caforule/) and in an article by the US Dept. of Agriculture Economic Research Service (see Feb. 2003 issue of Amber Waves, http://www.ers.usda.gov/AmberWaves/)). With implementation of these regulations, EPA estimated that the number of large CAFOs (> 1000 cattle, > 700 dairy cows, >2500 swine, etc.) requiring a permit would increase from 4,500 operations to 15,500 operations by the year 2006. Individual states retain authority to determine the type of permit – general or individual – to be issued to a given operation, and states can have more stringent regulations. To help with transition of the regulations, more financial assistance for management practices was included in the 2002 Farm Bill and in the Environmental Quality Incentives Program (EQIP) which is supposed to target 60 % of funding to livestock operations. Education about the new rules and recommended management practices will be provided by various sources such as state environmental agencies, Cooperative Extension Service, the US EPA National Agriculture Compliance Assistance Center (http://www.epa.gov/agriculture/index.html), and the Livestock and Poultry Environmental Stewardship (LPES) organization (http://www.LPES.org). In recent years, there have been more multi-state cooperative projects on manure management and environmental issues. A National Center for Manure and Waste Management was funded by the USDA Fund for Rural America that included participants from 16 universities, and has published a series of "white papers" on the state of the science on newly developing priority areas of animal production and waste management. Summaries of 20 white papers are at http://www.cals.ncsu.edu/waste_mgt/natlcenter/papers.htm. The USDA Initiative for Future Agriculture and Food Systems (IFAFS) funded several multi-state projects in 2001 on animal manure management issues such as emissions of air pollutants from livestock barns, management of phosphorus, animal diet modifications to reduce nutrient excretion and enhance air quality in swine operations, and pathogens in animal excreta (http://www.reeusda.gov/ifafs/). With increased emphasis on reducing emissions to the atmosphere, there has been more interest in "alternative" waste management systems. Smithfield Foods, Inc. and Premium Standard Farms, Inc. have contributed $15 million and $2.3 million, respectively to help develop and evaluate treatment technologies that would reduce odor, ammonia emissions, pathogens, and better manage nutrients for swine farms. This program is being administered through the North Carolina State University Animal and Poultry Waste Management Center (http://www.cals.ncsu.edu/waste_mgt/apwmc.htm). Some animal manure issue priorities selected by a joint agency program "Animal Waste Initiative: Promoting Environmental

Stewardship" can be found at http://www.cals.ncsu.edu/waste_mgt/initiative/eissues.htm. These are similar to priorities in Europe. The USDA Agricultural Research Service (ARS) has identified three critical issues with livestock manure and by product utilization for their research priorities : atmospheric emissions, nutrient management, and pathogens (http://www.nps.ars.usda.gov/programs.htm?npnumber=206). Overall, the national interest and support for research, education and implementation of management practices for animal manure has never been greater. At the same time, there is a national economic downturn, so the near-future funding level from individual states and from federal agencies for these activities is in question.

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ORGANIC WASTE MANAGEMENT AND EUROPEAN LEGISLATION

Pascal Mallard
Cemagref, Rennes, France

European environmental legislation is not new: the Nitrate Directive of 1991 has noticeably influenced the national policies of European member states regarding fertiliser and manure use in agriculture, particularly for livestock production. But there is now a number of other European environmental measures that could also have an appreciable effect on, more generally, the use of organic residues in agriculture in the longer term.

Currently, European environmental measures are tending to become less specific and more and more integrated: in other words, multi-source, multi-pollutant, multi-effect. In the field of water for example, the Nitrate Directive remains in force (indeed, unfortunately, its objectives are still far from being achieved); but it now forms part of the general water policy, the principles of which are set out in the Water Framework Directive of 2000. This requires that surface and underground waters are managed by 'River basin district' with the aid of 'management plans' drawn up every six years on the basis of a technical and economic analysis. In particular, each business sector - industry, households and agriculture - is supposed to pay according to the amount it pollutes (polluter pays principle). Phosphorus and nitrogen are both mentioned as eutrophication factors. The first river basin management plans should be finalised by 2009.

The scheme is similar for the soil protection field, although it is less advanced than that for water. In this area, there are two draft directives, that should come out in 2004: one is on sewage sludge, to replace that of 1986, and one is on the biological treatment of biodegradable waste (biowaste), excluding agricultural waste. But these two directives should be included in a general 'thematic strategy' for soil protection, which should also be finalised in 2004. In the present draft of this strategy, the soil is described as a non-renewable resource and a living medium that is extremely variable. Taking into account the huge variety of situations in Europe, biodiversity and organic matter content should become the central common priorities for soil protection.

Another draft thematic strategy, called 'Clean Air for Europe' (CAFE), should focus on air pollution. It should also be released in 2004. The CAFE strategy will notably take into account the NEC Directive of 2001, which has fixed 'national emission ceilings' to be achieved by 2010 for four gases, including ammonia. Member states had to draw up national programmes by last October, to comply with the objectives of this directive. Regarding ammonia, these objectives are the same as those fixed by the 1999 'Gothenburg Protocol', signed within the 'Convention on Long-range Transboundary Air Pollution'. But this protocol, which involves 31 countries, is not yet in force. For its elaboration, a guidance document was realized and adopted during the seventeenth session of the Executive Body, on 'control techniques for preventing and abating emissions of ammonia' (among others), which is being currently reviewed.

The two thematic strategies on air pollution and soil protection are the most advanced among the seven defined by the 6th European Environmental Action Programme. This programme, adopted in 2002, also identifies four priority areas, the first of which is climate change. Climate change is dealt with separately from air pollution, in the framework of the Kyoto protocol of 1992, which was ratified by the European Union in May 2002 (but is not yet in force). Organic waste management and agriculture are second priority areas in the 'European Climate Change Programme', but they are of concern because of methane and nitrous oxide emissions, and also for the ability of agricultural soil to constitute 'carbon sinks'.
Finally, we should not forget two sectoral measures that may be important for animal waste management.

- Firstly, the Directive on Integrated Pollution Prevention and Control (IPPC) of 1996 applies to – among other activities – 'intensive rearing of poultry or pigs', namely with more than 40,000 places for poultry, 2,000 places for production pigs, or 750 places for sows. The operation of such an installation requires the issue of a permit, accompanied by technical requirements based on the 'best available techniques' (BAT). The IPPC Directive had to be transposed into national law by October 1999; for 'intensive livestock farming', the BAT reference document (BREF) was finalized last November.
- Secondly, manure is involved in the regulation of 3 October 2002 'laying down health rules concerning animal by-products not intended for human consumption', as a 'category 2 material'. Practically, this regulation is not very restricting regarding fresh manure management but, where manure is treated, it must comply with different conditions and particularly with microbiological standards.

With the exception of the Nitrate directive, all these regulations or programmes are new or in progress. Thus it is difficult to predict how they will evolve, how they will be implemented in member states and, finally, to what extent they will influence, in a practical way, organic waste management. But this influence of the European level will certainly become increasingly important, even if specifically national measures remain predominant in this field for the moment and, already, the main directions are fixed.

Some useful Internet resources

European Commission, Environment Directorate-General
http://www.europa.eu.int/comm/dgs/environment/index_en.htm

Access to European legislation and official documents (EurLex)
http://europa.eu.int/eur-lex/en/index.html

Searchable database on the decision-making process between European institutions (PreLex)
http://europa.eu.int/prelex/rech_simple.cfm?CL=en

United Nations Economic Commission for Europe / Convention on Long-range Transboundary Air Pollution (and the Gothenburg Protocol)
http://www.unece.org/env/lrtap/welcome.html

United Nations Framework Convention on Climate Change (and Kyoto Protocol)
http://unfccc.int/

Intergovernmental Panel on Climate Change
http://www.ipcc.ch/

European IPPC Bureau / BREF page
http://eippcb.jrc.es/pages/FActivities.htm

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UPDATE ON PROPOSALS TO EU FP6

Following the conference in Strbsk Pleso, two expressions of interest (INOWAST and MORES) were submitted to the EU. Since then, the Commission has finalised the

priority themes and it appears that there are a few possibilities for RAMIRAN but not yet as a Network of Excellence. We will continue to promote RAMIRAN as a group and keep everyone informed of progress and possibilities.

It would be important for our Network to succeed in having some support from the EU for the enhancement of the scientific and technical coordination among countries and fostering the communication and involvement of key stakeholders.

However, this is difficult as strong European competition exists.

In the next months, we will pay a special attention to the call for proposals on global change and ecosystems.

Web site Ramiran.net

Last conferences proceedings