MINISTERIO
DE MEDIO AMBIENTE
Y MEDIO RURAL Y MARINO

60th Annual EAAP Meeting Barcelona,
24-28 August 2009

Spanish Ministry of the Enviroment and Rural and Marine Affairs Project for the IPPC Directive implementation in Spain. Results 2003-2008 and future work

Spanish Ministry of the Environment and Rural and Marine Affairs Project for the IPPC Directive implementation in Spain

Results of 2003-2008 and future work

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Introduction

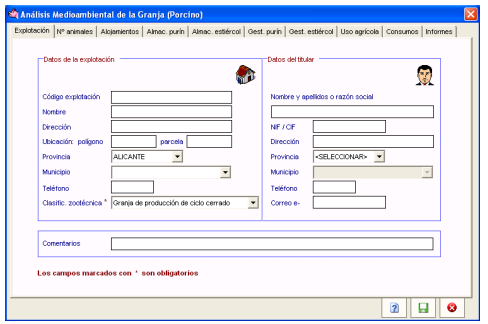
- ✓ During the last decade the approach to environmental issues related to animal production is changing, by means of including concepts such as:
  - Emissions from soil
  - Water
  - Air pollution
  - More efficient use of energy
  - And more efficient use of water resources.
- ✓ Latest regulations have been developed under this concept, such as the Directive 96/61/EC concerning integrated pollution, prevention and control (IPPC).
- ✓ In the EU Reference Document (BREF) on Best Available Techniques (BAT) for Intensive Rearing of Poultry and Pigs, several techniques were proposed for emissions abatement.

Introduction

- ✓ In 2003, a group of expert, under the financing of the Spanish Ministry of the Environment and Rural and Marine Affairs (MARM) and coordinated by Tragsega, implemented a plan to evaluate the BAT proposed by the BREF under Spanish management systems and climatic conditions.
- ✓ The BAT selected were assessed for the pig and poultry sectors in the different production phases:
  - Laying hens
  - Broilers
  - Pigs: Gestating sows, lactating sows, nursery, growers-finishers
  - Manure storage and spreading.
- ✓ Cost calculations were also carried out according to the methodology suggested in the BREF.

Introduction

- ✓ All the results obtained from different experiments performed were:
  - Updated in the Spanish Guide Document, both technical and economical
  - Included in a software, developed for the MARM, to calculate pollutant emissions, resources consumption and BAT effects on emissions and consumptions from Spanish farms
  - Transferred to technicians and farmers



Aim of this presentation

To describe:

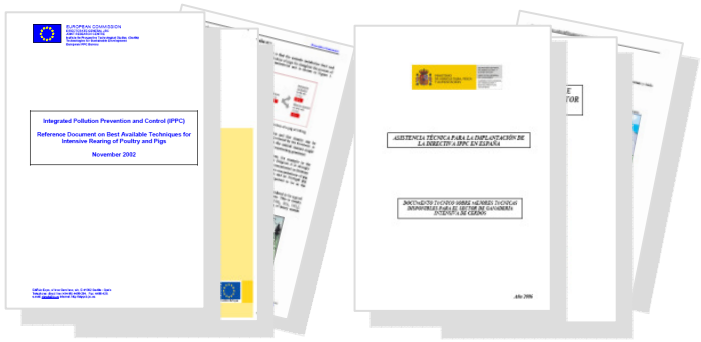
- ✓ The Spanish Guide Document about Best Available Techniques. Information:
  - Technical
  - Economical
- ✓ Participation in the 'BREF, 2003' revision
- ✓ Trials for BAT assessment developed under Spanish conditions: nutritional, building, manure storage and application (will be described in the next presentation).
- ✓ Software to calculate pollutant emissions
- ✓ Work publication
- ✓ Ongoing activities

The Spanish Guide Document

- ✓ During 2004-2008 period, the Ministry of the Environment and Rural and Marine Affairs has developed a Spanish Guide Document on Best Available Techniques (BAT) for intensive rearing of poultry and pigs.

  http://www.mapa.es/es/ganaderia/pags/IPPC/IPPC.htm

- ✓ This document has been updated with the latest information available, both technical and economical. The sources for this update have been:
  - the new literature,
  - the results obtained from different experiments performed for BAT assessment under Spanish conditions.
- ✓ The results have been transferred to technicians and farmers.



The Spanish Guide Document

Information about BAT

TÉCNICAS NUTRICIONALES

Dieta baja en proteína

Descripción de la técnica

- La formulación con dietas bajas en proteína supone ajustar al máximo el contenido proteico del pienso a las necesidades del cada tipo de animal, reduciendo la incorporación en el pienso de materias primas ricas en proteína bruta, como la harina de soja, con el fin de disminuir la proteína bruta total ingerida y la excreción nitrogenada.
- Para que los rendimientos productivos no se vean mermados, muy frecuentemente es necesario suplementar el pienso con aminoácidos sintéticos (lisina, metionina, triptófano y treonina).

Eficacia medioambiental

- Reducción del contenido en nitrógeno en los purines y estiércoles en torno al 25**%
- Reducción de las emisiones de amoniaco entre un 30** y un 40***%

Aplicabilidad

- Aplicable tanto en instalaciones nuevas como en existentes
- Técnica de elección, siempre que sea posible su implantación por disponibilidad de un suministrador.
- No se requieren cambios estructurales en la granja

Limitantes

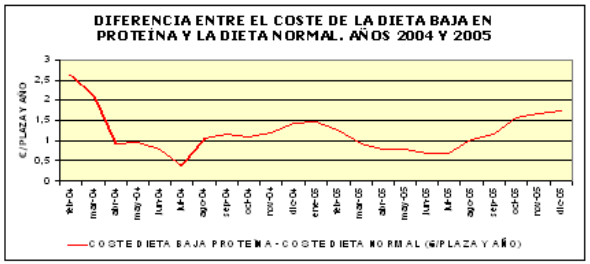
- Disponibilidad de suministro de piensos formulados con estos criterios
- Su aplicación está influenciada en gran medida por la situación de mercado de los precios de la soja, de los cereales y de los aminoácidos sintéticos en cada momento.

Efectos asociados

- Al ajustar el contenido proteico a las necesidades animales:
  - Se reduce el consumo de agua, disminuyéndose el volumen de purín generado
  - Se reduce la excreción de compuestos del catabolismo nitrogenado (sulfhídrico y compuestos orgánicos volátiles) y por tanto las emisiones de olores.
- Es una técnica de fácil seguimiento y monitorización

Sobrecostes

Los sobrecostes fluctúan según la situación de los precios de la soja, los cereales y los aminoácidos sintéticos en el mercado, pudiendo resultar en ciertas épocas inviable su aplicación.



Los sobrecostes estimados para cerdos de cebo varían entre:
0,39 a 2,61 €/plaza y año
0,0013 a 0,0088 €/kg de cerdo producido

* Datos BREF, 2003
**Datos ensayos MAPA

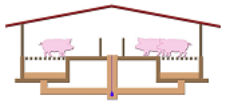
MEJORAS EN LOS ALOJAMIENTOS DE GESTACIÓN

Suelo parcialmente enrejillado y foso reducido

Descripción de la técnica

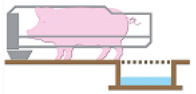
- Alojamientos sobre suelo parcialmente enrejillado, reduciendo de forma paralela el tamaño de foso.

Figura 12. Suelo parcialmente enrejillado para cerdas gestantes en grupo



Fuente: Elaboración propia

Figura 13. Reducción del tamaño de foso en alojamientos individuales de cerdas gestantes.



Fuente: Elaboración propia

Eficacia medioambiental

Reducción, respecto al sistema de referencia, de las emisiones de:

- Amoniaco: 20* – 50**%
- Metano: 28**%

Aplicabilidad

- Aplicable tanto para instalaciones nuevas como para instalaciones existentes que deban reformarse para su adecuación a la normativa de bienestar animal.
- Una vez implantada, su régimen de funcionamiento es similar al del sistema de referencia.

Limitaciones

- La reforma necesaria en instalaciones existentes complica el manejo de los animales durante las obras.
- Los costes de aplicación en instalaciones existentes pueden variar notablemente según las características de los alojamientos pre-existentes.

Efectos asociados

- Puede haber una ligera disminución del consumo de agua de limpieza

Sobrecostes

- En instalaciones nuevas, implantar esta técnica no tiene ningún sobrecoste respecto al sistema de referencia.
- En instalaciones existentes los sobrecostes estimados van de:
  5,69 a 6,83 €/plaza y año
  0,0021 a 0,0030 €/kg de cerdo producido

* Datos BREF, 2003
**Datos ensayos MAPA

The Spanish Guide Document

Information about BAT

MEJORAS DURANTE LA APLICACIÓN DE PURÍN AL CAMPO

Aplicación del purín sobre la superficie del terreno mediante sistema de mangueras

Descripción de la técnica

- El purín se aplica directamente sobre la superficie del terreno mediante la utilización de sistemas de mangueras.

Imagen 10. Sistema de aplicación de purín mediante mangueras

Fuente: Elaboración propia

Eficacia medioambiental

- Reducción, respecto al sistema de referencia, de las emisiones de amoniaco entre un (40-50)**%, variable en función del tipo de terreno y la época de aplicación.

Aplicabilidad

- Esta técnica se puede aplicar en terrenos cultivables, en praderas y sobre cultivo
- Su rendimiento de trabajo es similar al del sistema de plato difusor
- Los equipos requieren un mantenimiento regular (incluido en el cálculo de sobrecostes)

Efectos asociados

No se han descrito

Sobrecostes

- Los sobrecostes estimados son de:
  - 0,79 a 1,21 €/m^3 de purín aplicado y año
  - 0,0099 a 0,0151 €/kg de cerdo y año

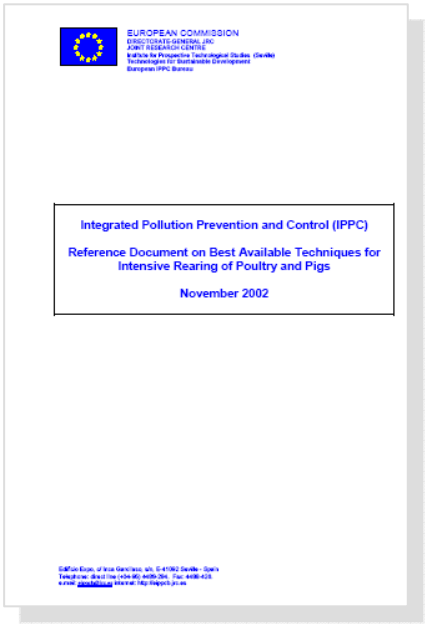
Los costes varían según el plan de gestión asociado a cada explotación

* Datos BREF, 2003

** Datos ensayos MAPA

BREF 2003 revision

- ✓ Publication and compilation of experimental trials developed under IPPC Project.
- ✓ Meetings with other Ministerial Departments, Regional Administrations, and Sectors, to coordinate the Spanish position in discussions.
- ✓ Participation in the TWG (working group) for the review of the reference document on BAT for the intensive rearing of poultry and pigs.



Trials for BAT assessment

- ✓ The candidates BAT were selected from the BREF, 2003 document based on its:
  - Efficiency
  - Applicability
  - Cost-effectiveness
  - Eligibility under Spanish conditions

Technical information

Trials for BAT assessment

- ✓ Were assessed for the pig and poultr… under commercial conditions in the dif… phases.
  - – Poultry
    - • Laying hens
    - • Broile…
  - – Pig…
    - …ws
    - …y
    - …Growers-finishers
  - – Storage
  - – Spreading

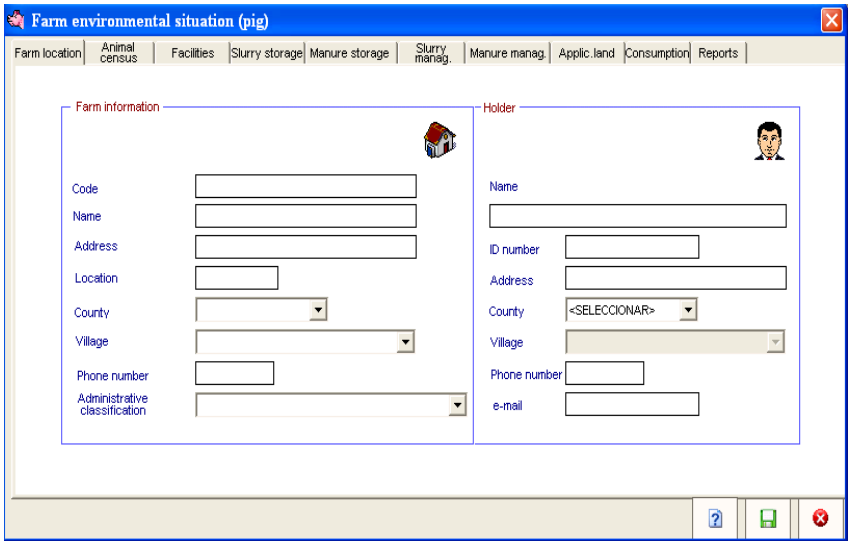
More information in the next presentation

Economical information

- ✓ Investment and operational costs were also calculated for every technique.
- ✓ The calculation have been carried out according to the methodology set out in the BREF, 2003.
- ✓ Current costs should be used for all calculations
- ✓ Capital expenditure should be annualized over the economic life of the investment (deducting any grants).
- ✓ Changes in performance should be taken into account

Software to calculate pollutant emissions

- ✓ The objective of this software is to integrate factors as nutrition, facilities design, slurry storage and spreading, and its influence in emissions level and water and energy consumption at farm.
- ✓ The structure of this application includes all the information related to the farm that may have an effect on pollutant emissions or resources consumption from pig and poultry Spanish farms.



Software to calculate pollutant emissions

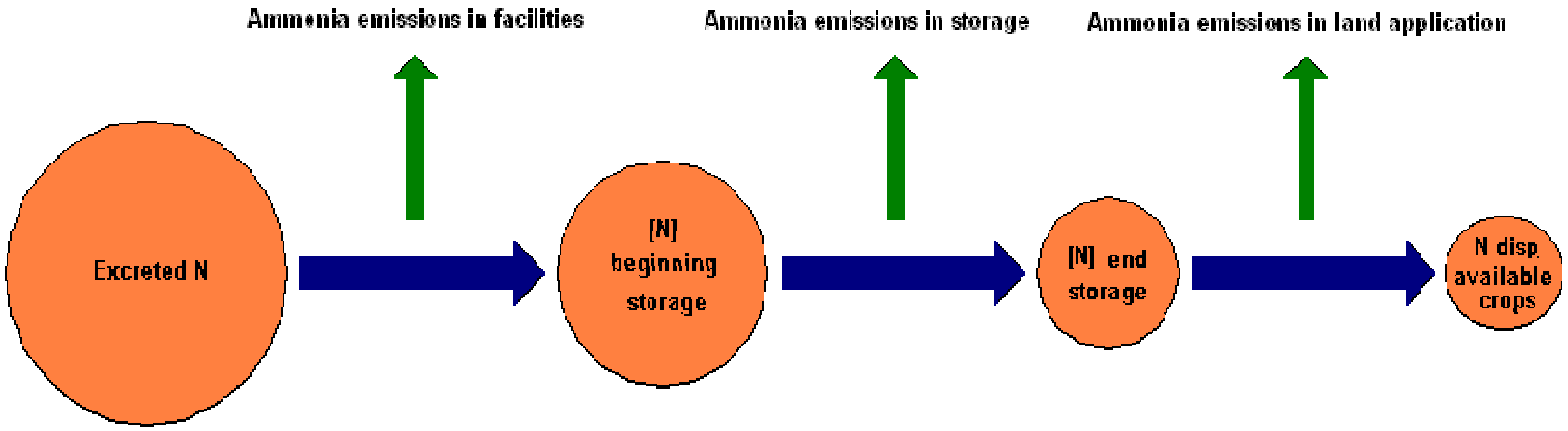
Structure

- ✓ Farm location: name, address, location, administrative classification.
- ✓ Animal census: highest productive capacity, up to date animal number, annual production.
- ✓ Facilities design: floor, pit, slurry or manure remove frequency, material used for bedding.
- ✓ Slurry and manure storage system
- ✓ Slurry and manure management
- ✓ Slurry and manure application to land
- ✓ Consumption of water and energy

Software to calculate pollutant emissions

Structure

- ✓ The data base used to obtain the emission calculations was the same as that used in the National Emission Inventory (2003).
- ✓ For water and energy consumptions, a huge bibliography review was carried out.
- ✓ Information regarding manure production was obtained from the Spanish legislation (RD 324/2000).
- ✓ To calculate pollutant emission in each stage of the productive process, the software uses a mass-balance system, including the reduction ratios obtained from experimental trials carried out by Spanish Ministry in an environmental project conducted through 2003-2007 period.



Software to calculate pollutant emissions

Results

- ✓ Slurry or manure storage capacity in months
- ✓ Slurry or manure composition and production
- ✓ Nitrogen balance:

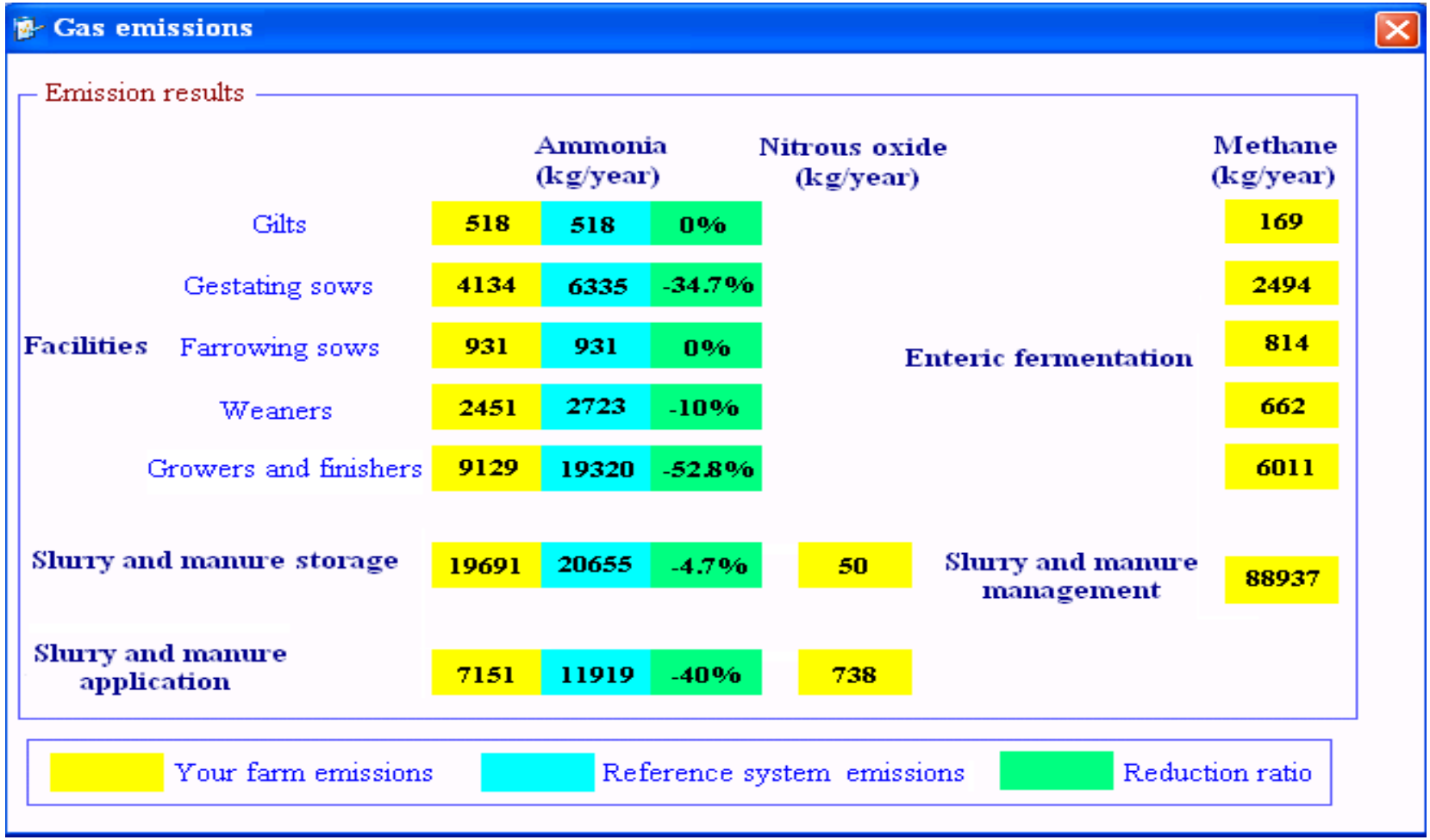
crop nitrogen requirements – nitrogen applied with the fertilization program

- ✓ Ammonia, methane and nitrous oxide emissions
- ✓ Water and energy consumptions
- ✓ European Pollutant Emission Register (EPER-PRTR) information
- ✓ Farm environmental situation report
- ✓ Improvement proposals
- ✓ Cost of pollutant abatement techniques

Software to calculate pollutant emissions

Results

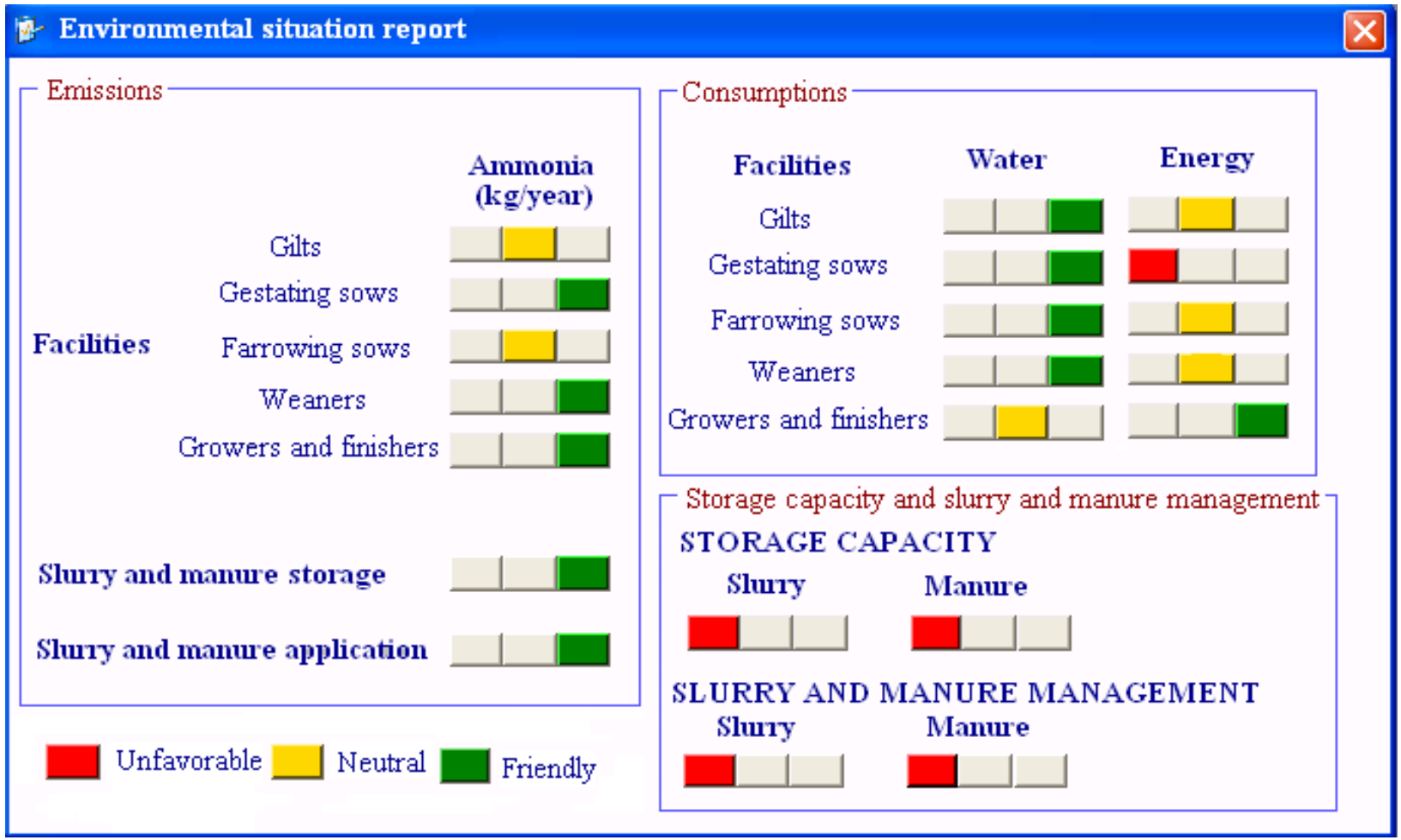
Gas emissions



Software to calculate pollutant emissions

Results

Farm environmental situation report



Results

- ✓ With the use of this tool, farmers and technicians are able to calculate ammonia, methane and nitrous oxide emissions, taking into account the influence of the BAT.
- ✓ It is possible to estimate water and energy savings when best available techniques are implemented.
- ✓ As an *add-on* tool, farmers and technicians can achieve further information about the BAT effect, in order to improve the environmental situation of their farms.
- ✓ **This software is an interesting tool to promote good environmental practices in farms, indispensable with currents international policies.**

Knowledge spreading

✓ Extension journals

Piñeiro, C., Pérez, A.I., Illescas, P., Montalvo, G., Herrero, M., Giráldez, Bigeriego, M. 2007. **Ley 16/2002, de prevención y control integrado de la contaminación. ¿Cómo afecta a las explotaciones de pollos de carne?**. Selecciones Avícolas. Agosto 2007

Piñeiro, C., Pérez, A.I., Illescas, P., Montalvo, G., Herrero, M., Giráldez, Bigeriego, M. 2007. **Ley 16/2002, de prevención y control integrado de la contaminación. ¿Cómo afecta a las explotaciones de gallinas ponedoras?.** Selecciones Avícolas. Agosto 2007

Piñeiro, C., Pérez, A.I., Illescas, P., Montalvo, G., Bigeriego, M. 2006. Efectos medioambientales derivados de la ganadería intensiva. Curso de gestión de residuos. Revista SUIS. Julio-agosto 2006. Nº 29.

Piñeiro, C., Pérez, A.I., Montalvo, G., Sanz, M.J., Illescas, P., Bigeriego, M., Giráldez, R., Herrero, M. **Reducción de emisiones procedentes de las deyecciones. Curso de gestión de residuos**. Revista SUIS. Septiembre 2006. Nº 30.

Piñeiro, C., Pérez, A.I., Illescas, P., Montalvo, Herrero, M., G., Bigeriego, M. **Tratamiento de purines y uso de aditivos. Curso de gestión de residuos**. Revista SUIS. Octubre de 2006. Nº 31.

Bigeriego, M. 2005. **La ganadería y los nuevos compromisos medioambientales. Acciones del Ministerio de Agricultura, Pesca y Alimentación**. Revista Porci. Mayo 2005, nº 87.

Piñeiro, C., Montalvo, G. 2005. La Directiva IPPC para el **control integrado de las emisiones contaminantes en ganadería intensiva de porcino.** XXI Curso de especialización FEDNA. Avances en nutrición y alimentación animal. Fundación española para el desarrollo de la nutrición animal. Madrid, 7 y 8 de Noviembre de 2005.

Piñeiro, C., Montalvo, G., Herrero, M., Giradles, R., Bigeriego, M. 2005. **Propuesta de mejores tecnologías disponibles en producción porcina.** Agrícolas. Revista del Colegio Oficial de Ingenieros Técnicos Agrícolas del Centro. Nº 26. Septiembre-octubre de 2005.

Piñeiro, C., Montalvo, G., Illescas, P., Herrero, M., Giradles, R., Bigeriego, M. 2005. **Propuesta de Mejores Tecnologías Disponibles en producción porcina. Descripción del proceso de evaluación.** Revista Porci. Mayo 2005, nº 87.

Piñeiro, C., Montalvo, G., Illescas, P., Herrero, M., Giráldez, R., Bigeriego, M. 2005. **Implicaciones de la directiva IPPC. Propuesta de mejores tecnologías disponibles en producción porcina**. Tierras de Castilla y León. Ganadería. Nº 119, año 2005.

Sanz, M.J., Monter, C., Antequera, C.R., Montalvo, G., Bigeriego, M. 2005. **Influencia del sistema de aplicación de purines sobre las emisiones de amoniaco a la atmósfera en una explotación agrícola.** Revista Porci. Mayo 2005, nº 87.

Knowledge spreading

✓ Scientific congresses

C. Pineiro, G. Montalvo, M.A. Garcia, M. Herrero, M. Bigeriego. European Association for Animal Production (EAAP) 59th Annual Meeting. Vilnius (Lituania), 24-17 agosto 2008. **Development of a software tool to calculate pollutant emissions, resource consumption and the effects of best available techniques on Spanish farms**.

C. Pineiro, G. Montalvo, M.A. Garcia, M. Herrero, M. Bigeriego. Joint Annual Joint Annual Meeting of American Society of Animal Science (ASAS). Indianápolis, Indiana. 7 - 12 julio 2008. **Development of a software tool to calculate pollutant emissions, resources consumption and best available techniques effects from Spanish farms**.

C. Pineiro, G. Montalvo, M.A. Garcia, M. Herrero, M. Bigeriego. 13th Ramiran Internacional Conference Congreso RAMIRAN (Network on Recycling of Agricultural and Industrial Residues in Agriculture) 11 - 14 junio 2008. Albena (Bulgaria). **Development of a software tool to calculate pollutant emissions, resource consumption and the effects of best available techniques on Spanish farms**.

C. Pineiro, P. Illescas, G. Montalvo, M. Bigeriego. Joint Annual Meeting of American Society of Animal Science (ASAS). San Antonio, TX 8 - 12 julio 2007

- **Cost of ammonia emissions abatement techniques in Spain**
- **Effect of different dietary strategies on productive performance and gas emissions in post-weaned piglets.**
- **Effect of littered systems on pollutant emissions into the air in gestating sows**.

C. Pineiro, P. Illescas, G. Montalvo, M. Bigeriego. International Conference on Ammonia in Agriculture: Policy, Science, Control and Implementation. Wageningen (The Netherlands) 19 - 21 marzo 2007

- **Effect of piglet diet on gas emissions**
- **Comparison of ammonia emissions when using different techniques after application of slurry in Spain: Summary of results 2004 – 2006**
- **Cost of ammonia abatement techniques in Spain**
- **Ammonia concentrations around three pig farms in the central plateau of Spain**
- **Ammonia concentrations around two poultry farms in the central plateau of Spain**

Knowledge spreading

Piñeiro, C., Pérez, A.I., Illescas, P., Montalvo, G., Herrero, M., Giráldez, R., Sanz, M.J., Bigeriego, M. 2006. **Spanish Ministry of Agriculture, Fisheries and Food Project for the IPPC Directive implementation in Spain. Results of 2004-2005 and future work.** 12th Ramiran International Conference. Technology for Recycling of Manure and Organic Residues in a Whole-Farm Perspective. Vol. I. Ministry of Agriculture and Fisheries. DIAS Report.

Sanz, M.J., Monter, C., Vázquez, M., Sanz, F., Montalvo, G., Illescas, P., Pineiro, C., Bigeriego, M. 2006. **Ammonia concentrations around 5 farms in the Central Plateau of Spain.** 12th Ramiran International Conference. Technology for Recycling of Manure and Organic Residues in a Whole-Farm Perspective. Vol. I. Ministry of Agriculture and Fisheries. DIAS Report.

Sanz, M.J., Monter, C., Antequera, R., Sanz, F., Palau, J.L., Montalvo, G., Illescas, P., Pineiro, C., Bigeriego, M. 2006. **Ammonia emission rates alter application of slurry by different techniques in dry grasslands and arable fields in the Central Plateau of Spain.** 12th Ramiran International Conference. Technology for Recycling of Manure and Organic Residues in a Whole-Farm Perspective. Vol. II. Ministry of Agriculture and Fisheries. DIAS Report.

Pineiro, C., Perez, A.I., Illescas, P., Montalvo, G., Sanz, M.J., Bigeriego, M. 2006. **Effect of littered systems on pollutant emissions in gestating sows.** 12th Ramiran International Conference. Technology for Recycling of Manure and Organic Residues in a Whole-Farm Perspective. Vol. II. Ministry of Agriculture and Fisheries. DIAS Report.

Piñeiro, C., Montalvo, G., Bigeriego, M. 2005. **Assessment of strategies to reduce ammonia, methane, and nitrous oxide emissions from gestating and lactating sows.** Book of Abstracts of the ADSA-ASAS-CSAS 2005 Joint Annual Meeting. Cincinnati. Ohio. USA.

Piñeiro, C., Montalvo, G., Bigeriego, M. 2005. **Best available techniques to reduce ammonia, methane and nitrous oxide emissions control from piglets facilities**. Book of Abstracts of the 56th Annual Meeting of the European Association for Animal Production. Uppsala, Sweden. 5-8 June 2005.

Piñeiro, C., Montalvo, G., Bigeriego, M. 2005. **Effect of frequency of manure renoval and drying on ammonia, methane, nitrous oxide and carbon dioxide emissions from laying hen houses**. Book of Abstracts of the 56th Annual Meeting of the European Association for Animal Production. Uppsala, Sweden. 5-8 June 2005.

Piñeiro, C., Montalvo, G., Bigeriego, M., Herrero, M. 2005. **Integrated pollution, prevention and control implementation in Spain: Ongoing and future work**. Emissions from European agriculture. Capítulo 22. Wageningen Academic Publishers, The Netherlands 2005.

Bigeriego, M., Montalvo, G., González, C., Piñeiro, C., Herrero, M., Giráldez, R. 2004. **Implementation of the IPPC directive in the pig and poultry sectors in Spain. The MAPA approach about the current status and future work.** Book of abstract of the 11th International Conference of the FAO ESCORENA Network on Recycling of Agricultural, Municipal and Industrial Residues in Agriculture. Sustainable Organic Waste Management for Environmental Protection and Food Safety.

Montalvo, G., Illescas, P., Ryan, M., Piñeiro, C., Herrero, M., Giráldez, R. Bigeriego, M. 2004. **Calculation of unit cost for techniques for the reduction of ammonia emissions from livestock production**. Sustainable Organic Waste Management for Enviromental Protection and Food Safety. Ramiran 2004. FAO European Cooperative Research.

Ongoing work

- ✓ Enlarge studies including the bovine sector (cows and calves) and to include this species in the software tool.
- ✓ Experimental trials to evaluate alternative systems for laying hens and pig farms.
- ✓ Evaluation of BAT and its relationship with water and energy saving

Thank You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TROUPE OF VERY REMARKABLE TRAINED PIGS.
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