

DANISH PIG PRODUCERS AND THE ENVIRONMENT





ENVIRONMENT – HOW WE PERCEIVE IT

Food production interacts with the environment but much can be done to ensure that this is as positive an interaction as possible, thus minimising its impact.

Danish pig producers seek to combine care for the environment and consideration for their neighbours with the management of efficient, modern pig production systems.

The environmental strategy of the Danish pig industry is more about action and less about words, whether locally, nationally or globally. The industry acknowledges the impact of modern pig farms on the environment and then acts to minimise this impact at all levels, be it local, national or global.

In their immediate surroundings, pig farmers strive to reduce emissions of ammonia and odour by using the most advanced technology available and by following strict Danish regulations governing this area. Permits are required from the authorities before new pig production units can be built or existing units expanded. In future, these will be situated away from environmentally vulnerable areas and operated with due consideration to possible odour impacts on neighbours.



Crop producers in Denmark have progressively substituted significant amounts of artificial fertilizer by increasing their utilisation of slurry from pig farms on arable land. Through this more natural recycling of nutrients, the loss of nitrogen from Danish crop farming to the aquatic environment has fallen by almost 50 percent in recent years. Likewise, phosphorous losses have been reduced by 42 percent since 1985.



In Denmark, 17 percent of energy consumption is derived from renewable sources. Biomass from agriculture, forestry, the food industry and households accounts for 70 percent of this significant renewable energy production.

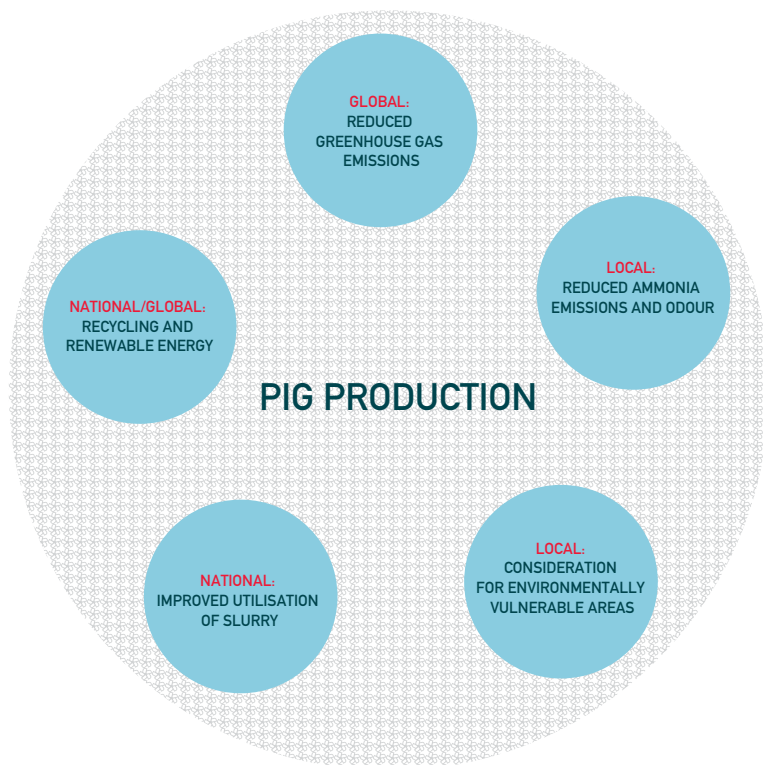
Danish pig farmers are also taking action to combat global warming, and, since 1992, have reduced emissions of greenhouse gases by 17 percent for each kg of pig meat produced.

The bulk transport of meat to customers, even to more distant export markets, contributes only minor emission of greenhouse gases per kg of pig meat delivered. The major part of emissions from pig production and distribution arises from feed production and usage, and Danish pig producers are among the most efficient in the world at utilising feed, thus minimising their impact on global warming.

The Danish pig producers have also set ambitious environmental goals for the years ahead: still lower greenhouse gas emissions, further improvements in the utilisation of slurry, and yet more advanced systems to reduce ammonia emissions and odour.

A COMPREHENSIVE ENVIRONMENTAL APPROACH

FROM THE LOCAL TO THE GLOBAL LEVEL



Protecting the environment at local, national and global levels

- Local: Ammonia emissions reduced by 50 % per kg meat, thus reducing greenhouse gas emissions
- Local: New pig production units or expansion of existing ones are only approved when situated away from environmentally vulnerable areas and with due consideration of odour nuisance
- National: More pig slurry in crop production has led to a 50 % reduction in the use of artificial fertilizers
- National/global: By-products from agriculture, forestry, households and the meat industry are increasingly being recycled for energy production and account for 70 % of Denmark's renewable energy
- Global: Greenhouse gas emissions from Danish pig production have fallen by 17 % per kg pig meat since 1992

A BETTER ENVIRONMENT – HOW WE ACHIEVE IT

– ACTION, INNOVATION, REGULATION AND GLOBAL CONCERNS



The following pages describe how environmental progress by the Danish pig industry has been achieved through a unique synergy between action taken by pig farmers and the meat industry, supported by innovation from leading Danish researchers, strict Danish legislation and control, and an increasing level of global concerns throughout the production chain.

The pig industry has taken action to reduce odour nuisance in the local environment and to increase the utilisation of slurry. Producers have also sought to optimise their use of inputs such as feed, energy and water, and to transform waste in the production of energy.

A unique Danish partnership, with open interaction between farmers, research institutions, private enterprises and the government, is producing a dynamic environment for innovation and use of environmentally friendly technology in pig production.

Denmark is already highly regarded for its strict environmental regulation, which often exceeds the legislation of the EU, and for its all-inclusive control systems.

Long before the Kyoto Protocol began to influence international action to reduce emissions of greenhouse gases, Danish pig producers had already been working to create a better

Denmark and the environment

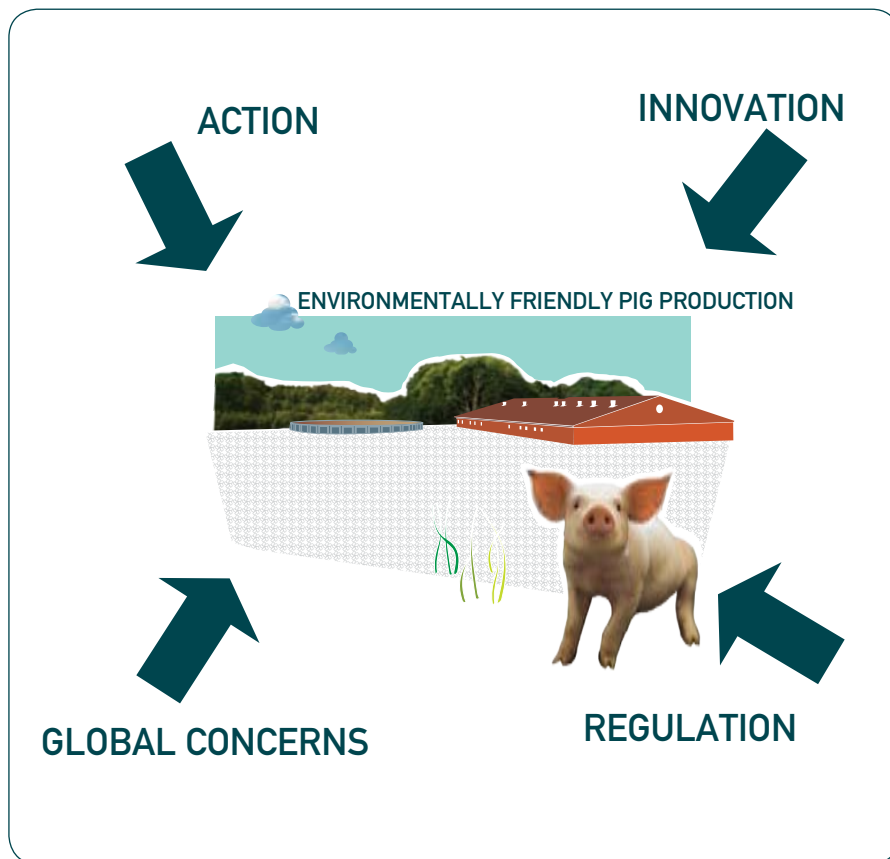


40 percent of the world's wind-energy is produced from wind turbines from the Danish company Vestas.



balance between their production and the local and national environment. Today, the industry's focus on climate concerns is all but second nature.

Action, innovation, regulation and global concerns are among the important driving forces that have taken Danish pig production to the forefront of the environmental arena, and will continue to secure this pre-eminent position in the decades to come.



FARMERS' INITIATIVES



Danish pig farmers have succeeded in increasing productivity, while at the same time creating more environmentally balanced production systems. For example, the utilisation of nitrogen in slurry has been significantly improved and ammonia emissions and odour from pig farms have been reduced.

The relative stability and security afforded by the co-operative system has meant that Danish farmers have one of the highest investment rates in the world. More recently, they have begun to invest heavily in new environmentally friendly technology.

Although most farming enterprises are still in traditional Danish family ownership, the huge environmental investments required today tend to favour the larger, more specialised pig production units. Farmers with a high level of training and professional skill in the most modern environmental solutions are also better equipped to take on the challenges ahead.

Farmers' interaction with the environment is also guided by the need to adhere to rigorous national legislation, such as the Environmental Approval of Animal Production Act and the Agreement on the Action Plan for the Aquatic Environment III 2005-2015.

In order to demonstrate the balance in his production, every Danish pig farmer prepares annual accounts, documenting the number of animal units, farm area and amount of slurry produced. These accounts must be formally approved by the authorities. Following the Danish tradition for openness, this information is publicly available on the Internet at www.pdir.dk, where data on any individual Danish pig farmer may be downloaded (in Danish).

Farmers join forces with a Plan for Nature

Ten farmers from a fertile area in the parish of Vantinge in central Funen have joined forces and prepared a Plan for Nature as an integral part of their farming activities.

They aim to preserve the biodiversity of the area by protecting heathland and marshes as well as the areas bordering rivers and streams, home to many species of wild plants and animals.

They hope to create an environment where modern farming practices live alongside a commitment to protect the natural environment and improve the recreational value of the area.

The plan will be realised by the farmers without any formal subsidy or other economic support.



Photo: Peder Uhd, DTM consult, Ringe



» Of course I'm happy that I'm contributing to a better environment. But it is also sound economic sense, because the improved quality of the slurry helps raise crop yields. I see only advantages from this investment. «

MEET THE FARMER

Mogens Jensen works hard on his farm finishing over 14,000 pigs each year. In addition, he keeps 500 sows with piglets on a separate farm and he grows winter wheat, winter barley, winter rape and perennial rye grass for seed on his farm, totalling 700 hectares (1,730 acres).

Neighbouring Mogens' farm in fertile eastern Jutland is a vulnerable but protected area of forest with orchids and a famous 300-year-old oak tree attracting many visitors.

Recently, Mogens made a considerable investment in a slurry-acidification system, patented by a Danish company; Infarm. The system reduces levels of ammonia evaporation and odour and it increases the fertilising properties of the slurry to the benefit of the environment.

“Of course I'm happy that I'm contributing to a better environment. But it is also sound economic sense, because the improved quality of the slurry helps raise crop yields. I see only advantages from this investment,” explains Mogens Jensen.

Every year, Mogens also supplies 1,500 tonnes of straw to be converted to energy at the district heating facility, and his own pig housing is heated using bio-products from his fields.

Denmark and the environment



Ten years ago, the Danish island of Samsø, home to 4,300 inhabitants and famous for its tasty potatoes, set the ambitious goal of relying 100 percent on renewable energy. Today this has been achieved.

ACTION

MEAT INDUSTRY INITIATIVES

The Danish meat industry was a pioneer in improving energy efficiency during the 1990s', introducing new technology and making concerted efforts to save energy. These endeavours continue today.

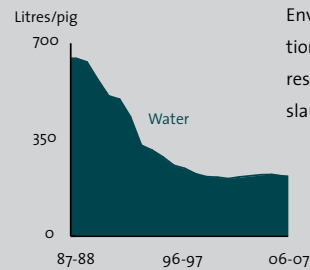
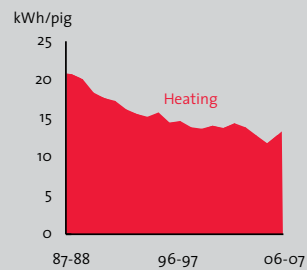
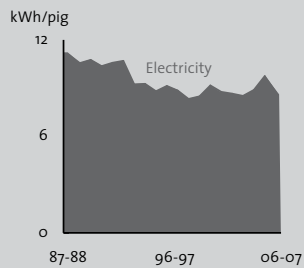
Energy consumption by the Danish pig meat industry has been reduced by more than one-

third in recent decades; significantly lowering emission of greenhouse gases. In the same period, the industry has also managed to reduce its water consumption by almost two-thirds.

Every year, the Danish cooperative companies prepare 'Green Accounts' where the

consumption of energy and water is documented.

A recent development has been the construction of a factory to produce environmentally friendly biodiesel from slaughterhouse waste.



Environmental achievements: The consumption of water and energy by Danish Crown, responsible for 90 percent of all pigs slaughtered in Denmark.



Recycling by-products from the food industries is increasing. Slurry and other waste products are collected and converted into energy at biogas plants.

In 2008, the cooperative company, Daka Biodiesel, started producing environmentally friendly biodiesel based on waste fat. Biodiesel can be satisfactorily incorporated into transport fuels and oil for heating.

Daka has capacity to produce 55 million litres of biodiesel annually.



PARTNERSHIP FOR RESEARCH



Danish research has helped develop the technology for efficient pig production and many of the environmentally friendly solutions that have already been implemented on the farms.

In fact, the Danish pig industry benefits from a quite unique form of partnership between

pig producers, research institutions, private enterprises and the authorities. Much of this research is funded by a levy on pig production.

The result is a dynamic and well funded research climate where any technical innovation is tested by real farmers before being marketed, and all information on research results and tests is publicly available on www.infosvin.dk (in Danish).


Each year, an average of one-third of the value of production of Danish farmers is re-invested on the farm – a level which is unmatched by any other major food producing country in the world.

This major research programme and the high investment rate at farm level are important reasons why Danish pig producers are at the forefront in new environmental technology,

improved animal feeding processes and innovative pig housing units and equipment.

New technology and the improved management and storage have helped increase the utilisation of pig slurry and consequently reduce the nitrogen loss by almost 50 percent since 1990. Research into improving feed utilisation has resulted in a 42 percent reduction in the amount of phosphorus discharged per slaughter pig since 1985 and a 30 percent reduction in ammonia evaporation over the same period.

Other initiatives include the production of renewable energy, reduced energy consumption, and major programmes to improve feed utilisation through breeding strategies. There are also many initiatives in hand to reduce odour through the use of environmental technology, such as air-filtration and slurry treatment systems.



Denmark is breaking new ground with the world's largest biogas pilot plant in Foulum, Jutland.

Biogas equipment converts slurry and other industrial and household by-products into renewable forms of energy and environmentally friendly fertilizer products.



STRICT ENVIRONMENTAL LEGISLATION

Denmark has been a frontrunner in the implementation of environmental legislation for many years. The authorities have strived to implement all EU Directives in Danish legislation and in many areas Denmark's national legislation exceeds the requirements of EU Directives. For example, Danish crop producers may only spread a maximum of 140 kg of nitrogen in the form of pig slurry per hectare of land, compared to 170 kg in other European countries. In contrast to EU standards, Danish pig farmers are also controlled by fixed limits for odour nuisance affecting neighbours and nearby residential areas.

Discharges of nitrogen and phosphorus, ammonia evaporation into the atmosphere and odour pollution from pig farms are controlled by the Environmental Approval of Animal Production Act and the Action Plan for the Aquatic Environment III 2005-2015. Through a holistic approach, these regulate odour

nuisance, nutrient discharge and protection of environmentally vulnerable areas.

The Environmental Approval of Animal Production Act also controls the establishment of new units or expansion of existing pig production. These require approval from the Danish authorities. Permission is only granted for developments located away from environmentally vulnerable areas and taking account of possible odour nuisance for neighbours.

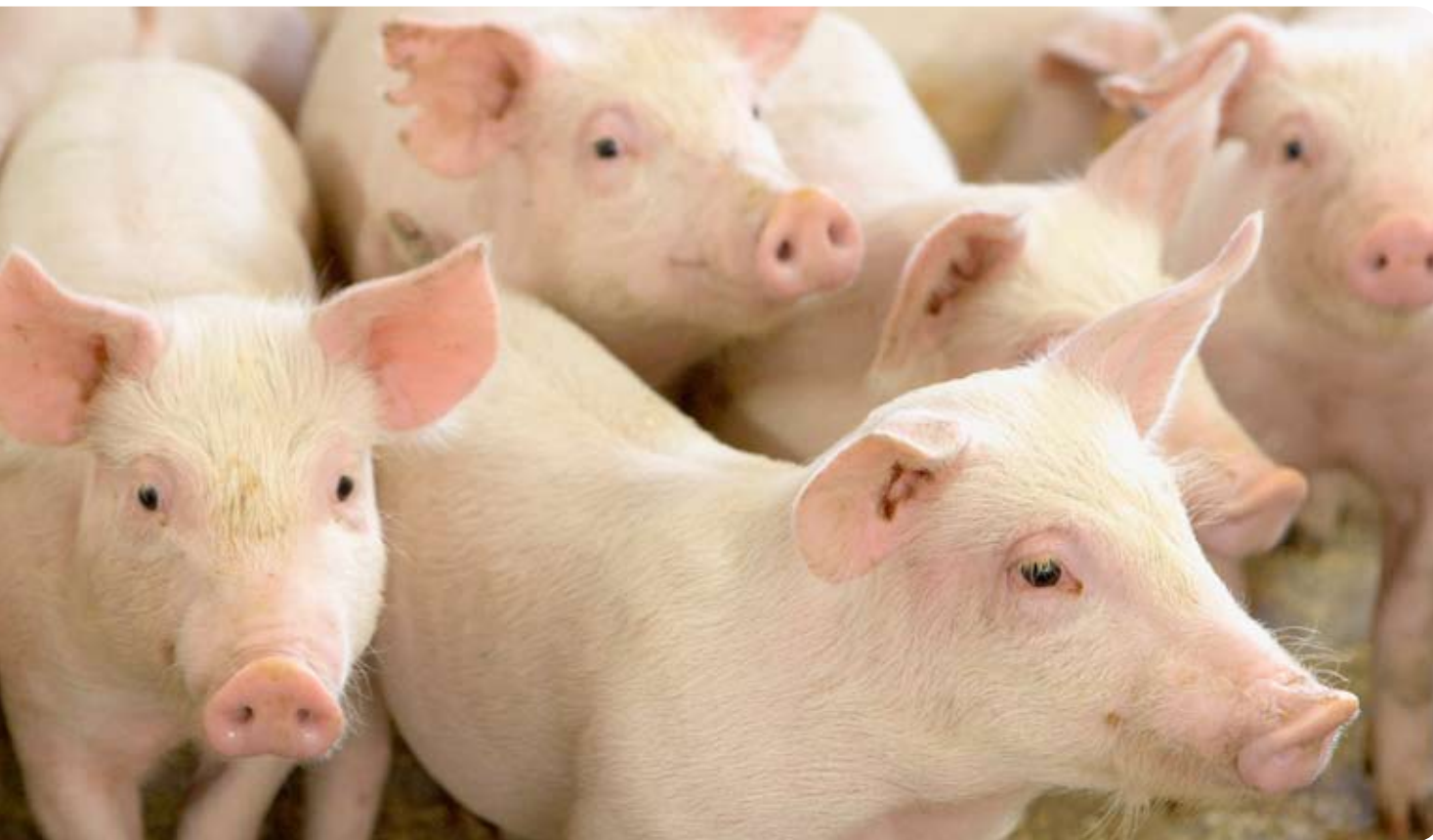
The Danish authorities employ one of the world's strictest agricultural control systems. In the environmental area, unannounced inspections are carried out to check land use, feed mixtures, fertilizer accounts, distance to watercourses, management of slurry and chemicals, as well as health and safety conditions.

Denmark and the environment



In 2005, energy from renewable sources accounted for 17 percent of Denmark's overall energy consumption. The target to be reached by 2025 is 30 percent.

PIG PRODUCTION AND CLIMATE CHANGE



Overall, the Danish pig industry's 'green' balance sheet shows a net reduction in emissions of 17 percent per kg pig meat produced since 1992.

Producing pig meat, like any industrial or agricultural production, has an environmental impact including the emission of greenhouse gases. The production of feed crops in particular, when nitrogen is transformed by microorganisms in the soil, is a significant source of emissions. In addition, the handling, storage and utilisation of slurry and energy consumption during processing at the slaughterhouse are also contributors to greenhouse gas emission.

On the other hand, replacing artificial fertilizer in crop production with slurry from pigs helps balance the account, i.e. it actually reduces the net level of emissions. This is because artificial fertilizer is produced using

significant amounts of fossil fuels. Thus, through improvements in the utilisation of pig slurry at the expense of artificial fertilizer in Danish crop production, the pig industry is helping in counterbalancing emissions from the other stages of the production chain.

There has been recent public debate about the level of greenhouse gas emissions caused by the transport of food products across borders. The term 'food miles' is sometimes used as a shorthand to describe the climate impact of different foods. It has been shown that the distance travelled by particular foods is usually a very unreliable indicator of their overall environmental impact. With regard to pig meat exported from Denmark to England, it can be demonstrated that less than one percent of greenhouse gas emissions are attributable to the transport of the meat between the two countries.

Denmark and the environment



Denmark has long since established its leading position in environmental technology and renewable energy. Therefore, the country was a natural choice to host the UN Climate Summit in 2009, where countries from all over the world will meet to agree on climate initiatives to replace the Kyoto Protocol.

GLOBAL CONCERNS

Since the production and use of feed crops is a significant source of greenhouse gas emissions of producing pigs, research undertaken by the industry over many years has helped producers adjust their feeding regimes to reduce their environmental impact, by reducing protein content and improving efficient feed conversion.

Other climate-friendly initiatives include conversion of waste from agriculture to biogas, which is now gaining momentum and becoming an even more important source of renewable energy in Denmark. Significant improvements have also been made in minimising energy consumption in the meat industry, and recent developments involve the transformation of slaughterhouse waste into environmentally friendly biodiesel.

Denmark and the environment

Half a million Danes (of a population of 5,5 million) use their bicycle to travel to and from work. Denmark has 8,000 km of bicycle lanes.



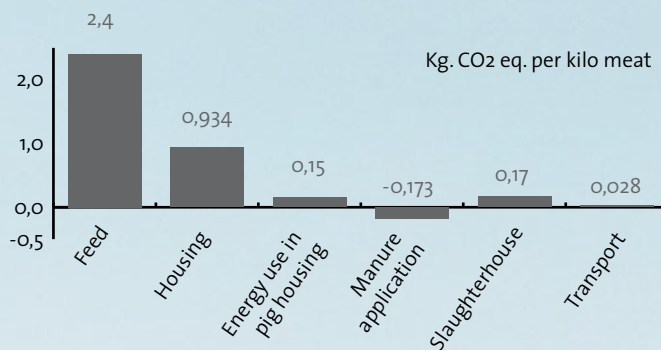
ASSESSING GREENHOUSE GAS EMISSIONS

Though it often receives more than its fair share of attention, transport only contributes a minor part of the total amount of the greenhouse gas emissions caused by the production and distribution of meat, even when exported to more distant markets. The largest proportion of emissions arises from the cultivation and usage of feed crops and the storage and handling of slurry.

The calculation of greenhouse gas emissions from pig production can be estimated through a life cycle Assessment (LCA). The term life cycle refers to the long journey of the meat on its way from farm to the point of sale or dinner table. The emission of greenhouse gases from each stage of production and distribution must be assessed.

The cycle includes growing crops for animal feed, feeding the pigs, transport to the slaughterhouse and subsequent processing. The meat is then transported to customers, sometimes abroad, and finally to the consumer in the supermarket. Each stage of the life cycle causes a certain emission of greenhouse gases.

A life cycle Assessment undertaken by the Danish Institute for Agricultural Sciences shows that the production of one kg of Danish pig meat and the subsequent transport to the port of Harwich in England produces the equivalent of 3.6 kg of CO₂. By comparison, changing a standard 60 watt light bulb used 4 hours per day to an energy-saving bulb saves the equivalent of 33 kg CO₂ per year.



THE FUTURE



Consideration for the environment will become ever more important for producers and consumers in the years to come, and the Danish pig industry has already set a number of clearly defined environmental goals.

Ammonia evaporation from pig production, already reduced significantly over the past decades, will be reduced by a further 40 percent by 2015.

Danish pig industry researchers are currently working on a project to develop technical solutions that reduce odour nuisance and ammonia emissions from pig farms. The project is being co-funded with the Danish Government, and already the project has resulted in development of advanced air-filtration and slurry acidification systems. These systems are now in commercial production and are already in operation on several farms. Other promising environmental technologies from the project are still being tested and developed.

The pig industry shares a number of 'millennium goals' with the Danish agricultural sector, to be reached by 2015 and set out in the Action Plan for the Aquatic Environment III. Among the most important are the following goals, to be achieved by improving slurry management and thus reducing possible harmful losses of nutrients:

- The surplus of phosphorus will be further reduced by 50%
- Nitrogen in slurry to be reduced by 18%
- Nitrogen discharges from fields further reduced by 13%

The effort to reduce emissions of greenhouse gases will continue as new environmental technology and know-how, including biogas production, is developed and put into commercial production.

Close cooperation between farmers, research organisations and the meat industry is behind biogas production in Denmark, which has already reached a significant level. However, the aim is to triple production by 2025.

FACTS

Population of Denmark:

5.5 million

Number of pigs in Denmark:

13.5 million

Danish pig meat production per year:

1.9 million tonnes

Feed ratio in pig production:

Denmark: 2.69; United Kingdom: 2.79;
Brazil: 2.88; USA: 2.93 (kg of feed used per
kg of pig meat produced). Lower feed ratio
means lower greenhouse gas emission

CO₂ emission ...

... from production of 1 kg of Danish pig
meat delivered at the port of Harwich,
England: 3.6 kg

Environmental progress in Danish pig production:

Since 1985:

- ⌘ 39% less nitrogen discharged (per kg of pig meat)
- ⌘ Improved feed utilisation and feeding techniques has resulted in 42% less phosphorous discharged (per pig produced)
- ⌘ The level of excess phosphorus in Danish fields has been reduced by 59%
- ⌘ 50% reduction in ammonia evaporation (per kg of pig meat)
- ⌘ Five-fold improvement in utilisation of pig slurry as fertilizer, leading to a 50% decrease in the use of artificial fertilizers in crop production

- ⌘ Nitrogen leaching and run-off reduced by almost 50% since 1990
- ⌘ Greenhouse gas emissions reduced by 17% per kg of pig meat since 1992

Renewable energy production in Denmark:

2005: 17%
2025: 30% (projected)

Biomass ...

... from agriculture, forestry, food industry and households constitutes 70% of Denmark's renewable energy.

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