



Danish Pig Producers and **Food Safety**



Food safety – how we perceive it

Food safety is about giving both customers and consumers confidence in Danish meat – confidence that every possible effort has been made to deliver safe and nutritious food.

Ensuring food safety is a complex issue as it involves all stages of a fully comprehensive production chain.

As no chain is stronger than its weakest link, all stages of the production process must be managed with regard to all types of risks – biological, chemical or physical. The safe production of food, therefore, demands attention to detail combined with a holistic approach to risk.

The cooperative structure of the Danish pig meat industry is an ideal model for addressing food safety issues. The close links between producers and abattoirs allow them to solve any problem in partnership.

Danish food safety legislation often exceeds that of other EU Member States – with full support of the industry. However, fulfilling legal requirements is only part of a wider remit to deliver the safest pig meat to demanding customers worldwide. Even the most rigorous legislation cannot embrace all the complexities of food safety. The delivery of high standards of food safety requires the industry itself to take the initiative in embracing a wholly responsible approach.

Finally, we believe that a transparent approach to food safety is paramount in maintaining the confidence of our customers, the authorities and, of course, the end consumer.

A comprehensive food safety approach

Careful management and control of all risks

Biological risks

- Zoonoses controlled at farm level
- Strict biosecurity limits animal diseases
- The highest hygienic standards in the abattoirs assured by careful design of processes and comprehensive hygiene training for employees
- First major pig producing country to implement a Salmonella Action Plan (1995)
- Success in limiting incidence of antibiotic resistant bacteria.

Chemical risks

- Use of medicines in Denmark is among the lowest in the world
- Residues in Danish pig meat virtually non-existent
- Use of pesticides significantly reduced.

Physical risks

- Inspection, enforcement of product specifications and comprehensive training ensure that products are free from bones, cartilage or other foreign bodies.



Co-operating for success

The co-operative model, which has shaped farming in Denmark for over a century, remains the cornerstone of the Danish pig meat industry. Its unique structure enables Danish producers to work together, pooling resources and expertise, for the mutual benefit of the industry and its customers.

The co-operative companies, including almost all Danish abattoirs, are owned and managed by the pig producers themselves, and in recent years have developed a network of meat processing facilities in several key export markets.

This structure has long since proved its worth in maintaining the highest standards of food safety and in generating significant resources for research and development.

Food safety – how we achieve it

– action, innovation, regulation and responsibility

The Danish commitment to producing safe food is widely recognised and has been achieved through co-operation between farmers, the meat industry and authorities, backed by an extensive programme of research and development. Although strict controls have been a hallmark of the Danish approach, the industry has often been in advance of new food safety legislation. A good example is the Danish Salmonella Action Plan, which operates at each stage of the production chain and has been in operation since 1995.

At farm level, many strategies have been implemented to maintain healthy herds. Such programmes reduce the presence of zoonoses as well as imposing strict bio security measures to prevent any spread of animal disease. Most Danish producers have a formal Health Advisory Agreement with their local veterinarian. A strategy is also in place to eliminate any unnecessary use of veterinary medicines. A high level of animal health therefore coexists with one of the lowest usages of medication

among major livestock producing countries. The use of pesticides on all crops, including those grown for feed, is also strictly controlled by legislation. Extensive surveillance programmes confirm that residues in Danish pig meat are virtually non-existent.

All abattoirs have implemented self-audit programmes, supervised by the authorities and based on detailed risk assessment procedures linked to Hazard Analysis and Critical Control Points (HACCP). Through industry-led initiatives, such as the Global Red Meat Standard (GRMS), Danish abattoirs have set even higher standards than those required by legislation. Extensive training programmes for managers and employees as well as independent control measures ensure that these higher standards are properly implemented.

The Danish meat industry benefits from a dynamic research environment, with much of the work funded by the producers themselves. This is based on a unique

partnership between farmers, the industry and its suppliers, research institutions and the authorities.

For some years there has been growing public concern about the development of antibiotic resistant bacteria. Although a separate issue is the use of antibiotics in the human population, the Danish agricultural industry acknowledges its responsibility to minimise the use of antibiotics in the rearing of its livestock. In addition to the initiatives taken to reduce use of veterinary medicines, the industry also stopped the use of all antibiotic growth promoters in 2000, six years ahead of the ban implemented across all EU Member States.

The latest precautionary initiative undertaken by the industry is a two year ban on the use of cephalosporins in treating pigs. Cephalosporins are important antibiotics in the treatment of both humans and animals and the voluntary ban will contribute understanding their role in the development of resistant bacteria.

Food safety

Action

- Farmers use veterinary medicines responsibly
- Growth promoters have been banned since 2000
- All abattoirs have implemented a self-audit programme based on HACCP principles
- Industry-led initiatives include e.g. DANISH Product Standard and the Global Red Meat Standard.

Innovation

- Danish pig producers benefit from a dynamic research environment delivering innovation in the field of food safety technology. It is based on a unique partnership between farmers, the industry, research institutions and the authorities.

Responsibility

- Public concern about the development of antibiotic resistance in the human population has resulted in strategies to minimise the use of antibiotics in animal production.

Regulation

- Cooperation between the authorities and the industry ensures a highly effective surveillance system
- In addition to legal requirements, Danish companies take additional measures to ensure food safety
- A detailed traceability system ensures that all retail products can be traced back through the production chain.

Farmers' initiatives

Ensuring the production of safe food begins on the farm and is based on responsible farming practices.

In Denmark, a high level of animal health coexists with one of the lowest levels of medicine use among major livestock producing countries. This remarkable result has been achieved through a number of initiatives, including a fully comprehensive health system where farmers have easy access to high quality advice and support.

More than 90% of pig farmers have a Health Advisory Agreement with their local veterinarian. This formal visit helps ensure that the correct medication is used and that withdrawal periods are respected. The visit will involve both the farmers' and the vets' observations and registrations on key aspects of animal health and welfare, as well as the use of medicines and compliance with national zoonoses action plans. Pig producers who demonstrate good farming practice are given the option of reducing the number of visits, which varies between nine and twelve per year for sow

herds and four and six per year for finisher herds. Every farmer is required to carry out a self-audit of his herd's animal welfare standards. This record is then audited by a veterinarian who is also subject to audit by the Danish authorities.

Danish legislation does not allow veterinarians to sell medicines – they may only prescribe them, with all usage registered on a database called VetStat. This discourages any unnecessary use of medication. Prescribing veterinary medicine must be based on a formal diagnosis and prophylactic treatment – administering medicines to animals not displaying symptoms as a disease prevention method – is not allowed. The use of growth hormones is banned and Denmark was one of the first countries to end the use of all antibiotic growth promoters in pig production in the year 2000.

The Danish Salmonella Action Plan also includes pig producers. All herds – breeding and multiplier herds, sow herds and finisher herds – are monitored and assigned a Salmonella status. As the strategy is aimed at

reducing Salmonella in fresh pork, there is particular focus on finisher herds. Hygiene standards and feeding methods are important in ensuring that Salmonella levels remain low. The slaughterhouses impose financial penalties on herds with high Salmonella levels.

The Danish Plant Directorate, a government agency, is responsible for the control of the feed industry. The results of its surveillance of individual companies are available at www.pdir.dk (in Danish). In addition, all producers mixing their own feed on the farm have to be formally licensed with the Plant Directorate and are also subject to regular control visits.

In addition, legislation controlling the use of pesticides is among the strictest in Europe and the results of the extensive surveillance programme have shown that the presence of any unwanted residues in Danish pig meat are virtually non-existent.

Achieving best practice

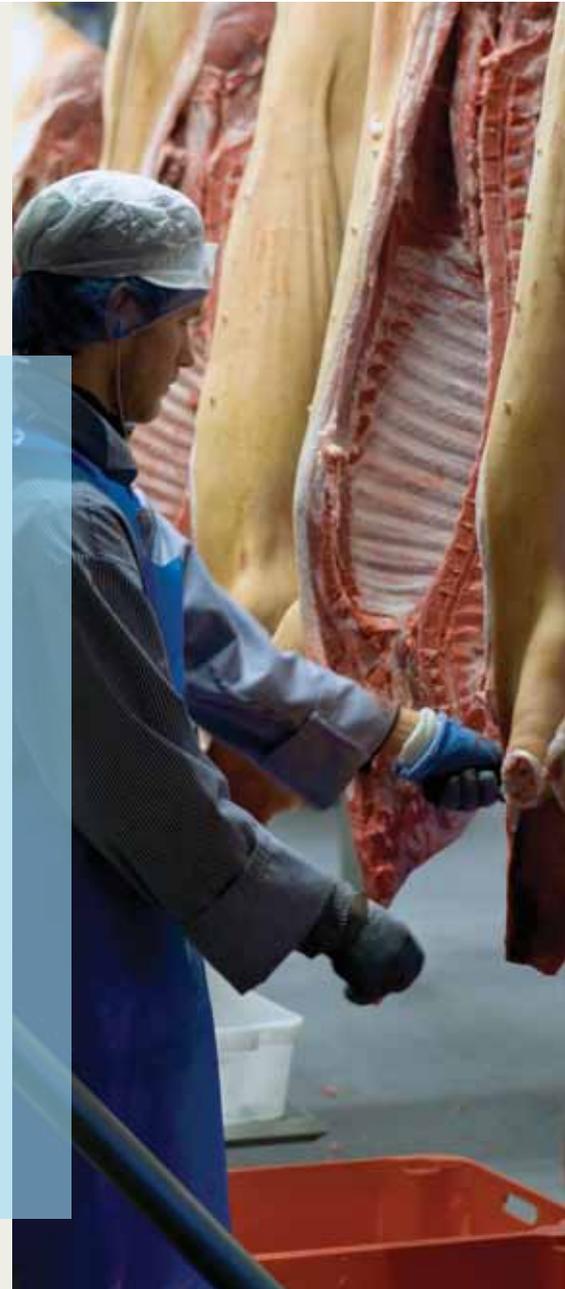
There is a trend towards more 'risk-based' control of Danish farms, which provides a basis for improved targeting of farms with special risk areas as well as offering a powerful incentive for all producers to aim for best practice.

The Danish authorities now group all Danish pig producers into three new categories. These will be linked to factors such as the use of antibiotics and mortality levels at the farm. The three categories are:

- 1. Good farming practice*
- 2. Satisfactory farming practice*
- 3. Unsatisfactory farming practice*

All use of antibiotics on Danish farms is recorded in a centralised national database (VetStat) and the authorities also have access to independent data on mortality levels at Danish pig farms through the national carcass collection service organised by DAKA a.m.b.a.

Pig producers demonstrating 'good' or 'satisfactory' farming practice will be given the option of reducing the frequency of visits by local veterinarians under the requirements of animal health programmes (Health Advisory Agreements). However, those demonstrating 'unsatisfactory farming practice' will be more closely monitored within the programme of unannounced visits carried out by the Danish Veterinary and Food Administration. More than 50% of these 'targeted' farms will receive an unannounced inspection by the authorities every year.





"Producing safe food is not really anything new. It has been a continuing priority for me since I started as a pig farmer."

Food safety – a continuing priority

Michael Nielsen's pig farm is located south of the historic town of Hillerød in Northern Zealand. Michael and his six employees tend 650 sows, and he sells around 18,000 piglets every year.

“Producing safe food is not really anything new. It has been a continuing priority for me since I started as a pig farmer.”

Controlling Salmonella is crucial for Michael. He only buys animals from Salmonella-free herds and his meticulous pest control is vital in eliminating a potential source of Salmonella contamination.

Michael follows the “all in - all out” principle strictly, with disinfection between each batch of pigs to minimise the risk of Salmonella transmission between groups of animals.

Quality feed is another priority. On his 300 hectares of land Michael cultivates 80% of the cereals he needs to feed his pigs. Producing his own feed guarantees that the pigs are only fed the best quality feed.

Michael Nielsen is also proud to be a certified SPF farmer. SPF means Specific Pathogen Free, so Michael's herd has been declared completely free from a number of diseases, thereby reducing the need for medication.

“I established my SPF farm in 1998, when I converted from arable production to pig farming. I've maintained my SPF status since then and I go to great pains to keep it,” Michael explains.

In fact, more than 70% of all sows in Denmark live in SPF-certified herds and the number is increasing. SPF animals can only be replaced by other SPF animals and SPF farmers have strict rules for quarantine and regular testing to demonstrate freedom from the listed SPF-diseases.

“Any visitor to my production must respect a quarantine period of 12 hours since the last visit to a non-SPF herd. This is important to avoid contamination, although it sometimes makes logistics for my advisors and my veterinarian a bit complicated,” says Michael Nielsen.

In addition, Michael never allows transport trucks with other pigs near his production unit. Instead, he uses his own special trailer to deliver the pigs to the transporter trucks some distance away. The trailer is disinfected afterwards.

Controlling disease is particularly important for Michael in ensuring that his pigs are healthy and thriving. Moreover, he is able to minimise the use of medication and reduce food safety risks.

Meat industry initiatives

The industry's long-term commitment to common quality objectives means that the procedures for slaughtering pigs are almost uniform throughout Denmark.

All abattoirs have implemented self-audit and control procedures covering each step in the production chain: transport, lairage, stunning, sticking, bleeding, cutting and boning and further processing. All pigs undergo a formal veterinary inspection on arrival at the abattoir and a further detailed examination takes place on the slaughterline before the carcass is approved for

human consumption. These procedures are supplemented by additional control measures including Salmonella testing and an extensive residue surveillance programme.

The system is doubly secure since all self-audit procedures are supervised by the Danish Veterinary and Food Administration. The concept of self-auditing also makes certain that the internationally recognised procedures for controlling food safety, HACCP, are followed at all critical control points during the process. All abattoir

personnel, supervisors and managers complete hygiene training programmes.

In order to meet the diverse requirements of customers across the world, the Danish pig meat industry has developed and launched a single standard, focusing on the slaughter and cutting process. The Global Red Meat Standard (GRMS) has been implemented by all Danish co-operative abattoirs. It is independently audited and covers all the key process areas. Details of the GRMS can be viewed at www.grms.org.

Veterinary inspectors on the slaughterlines register any signs of injury or disease they find in individual pigs and this information is passed back to the farmer. In addition, the farmer is advised of the pigs' Salmonella status and the results of all residue tests conducted on the pigs supplied. This information may then be utilised in the development of the herd health plan, overseen by his veterinary advisor.

Hardly a trace...

Every year, more than 20,000 samples are taken for analysis for the presence of any unwanted residues of antibiotics, hormones, pesticides and heavy metals in Danish pig meat. This level of sampling is significantly higher than that required by EU legislation.

Since 1991, residues of antibiotics have been detected in less than 0.05% of samples analysed. Residues of hormones have not been detected at all over the last 15 years. Likewise, no residues of pesticides or PCBs above the permitted level (MRL) have been found and only a single sample (in 1990) revealed an excess concentration of heavy metals.

Hygiene equals knowledge and responsibility

"We try to develop the attitude of abattoir workers rather than just teach them new techniques. When it comes to hygiene, knowledge is important but not enough. Employees themselves need to feel responsible for hygiene," says Ole Vestergaard, Inspector at the Danish Meat Trade College in Roskilde, which trains more than 9,000 students annually.

Ole, who has an MBA and worked for six years as an economist in the meat business, has contributed to the content of the hygiene courses. He also has practical butchery experience.

"In our hygiene courses each student is given a camera. They visit other students' abattoirs and photograph any critical control points. In fact, the employees themselves know best where these are. Afterwards, we look at the photos taken and discuss them as a group," says Ole.

"We aim to use leading edge technology in our training programmes. For example, we run one of our courses in different coloured tents to symbolise different values. This enables the students to see things in new ways and encourages participation. Hygiene techniques are key. However, it is far more important that workers feel responsible for their daily work. They should also feel part of the business and, not least, part of a team. Each student should understand the role he plays in ensuring that his company maintains its competitive edge."





Open doors inspire confidence

Margrethe Jensen is a Quality Manager in Danish Crown's Food Safety Department, and is also responsible for customer relations. Many of the queries received require a written response but Margrethe also arranges frequent visits for customers to inspect the production lines for themselves.

Low level of Salmonella in fresh meat

For many years, the Danish Salmonella Action Plan has focused on reducing the incidence of Salmonella in finished pigs and at slaughterhouses to ensure the safety of Danish pork. Measured by the number of positive carcasses and the number of human cases, the programme has been successful. For years, the incidence of Salmonella in fresh pork has been around 1% and the number of cases of human salmonellosis, which can be traced to Danish pork, has been steadily declining since the mid-1990s, from 1,100 cases in 1993 to around 150 cases today. In addition to monitoring the entire supply chain from farm to table, the Danish Salmonella Action Plan comprises a declaration system for Salmonella in all breeding and multiplier herds.

“Most of our customers have complete confidence in us. This has been built up over many years. However, both new and established customers are always welcome to see our production systems first hand.”

Margrethe takes pride in showing her customers how, for example, the Danish Salmonella Action Plan is implemented in practice. In place nationally since 1995, the plan operates at all stages of the pig production chain. Its cornerstone is the monthly surveillance for Salmonella antibodies in pig herds.

“What really impresses our visitors is our automated Salmonella control procedures. We can trace all pigs back to their farm of origin. The results of Salmonella tests are automatically returned to the farmer in order for him to take action if required. In addition, if Salmonella antibodies over a certain level are repeatedly found in the analyses, the price paid to the farmer is reduced until the problem has been rectified.”

Margrethe also draws much from a two-way dialogue with her customers.

“Sometimes a customer points out something in our procedures that he thinks could be improved. I always listen to observations like this to ensure that anything relevant is implemented. Such dialogue is characteristic of the relationship with our customers.”



Partnership for research

Good hygiene practice and the production of safe meat has been a major focus of meat industry research in Denmark and will remain a high priority in the years ahead.

Although much of the meat industry research is funded by the pig producers themselves, there are many collaborative projects with other research establishments and commercial suppliers to the industry. This has created a dynamic research environment in Denmark which has enabled the meat industry to introduce many new technologies to ensure the production of safe food products.

Areas of particular priority in the current Danish food safety research programme are:

- Decontamination techniques to reduce occurrence of Salmonella
- Hygienic design of equipment and machinery
- Improved usage of cleaning and disinfection agents
- Innovative packaging solutions to improve shelf-life and meat quality
- New equipment for automatic detection of foreign bodies in meat products
- Improved methods for detection of chemical residues.

Investing in research

The Danish Meat Research Institute (DMRI) based in Roskilde, plays a major role within the Danish meat industry. Employing around 120 specialist technicians and highly qualified personnel, the institute has an international reputation as a leading knowledge centre in meat and slaughter technology. The DMRI is a division of the Danish Technological Institute (DTI), Denmark's leading consultancy in the area of food innovation and technology.

The DMRI carries out research in controlled laboratory conditions and also has the opportunity to conduct research projects in a real-life working environment at the abattoirs owned by its industry partners.

Mathematical modelling is of particular importance at the DMRI. Computer programmes simulate, for example, the behaviour of bacteria in meat under different conditions. Models can test how the growth of certain bacteria is influenced by different methods of preservation. Modelling is usually cheaper and faster than laboratory testing – and is proving itself as an accurate and cost-effective research tool.



Legislation, control and self-audit procedures

Denmark is highly regarded for its strict food safety legislation which, in many areas, exceeds the level required by the EU authorities.

Danish producers have often implemented standards on their own initiative, and often these exceed the requirements of national legislation. They have also taken a proactive approach to food safety, often in advance of new legislation.

The meat industry is often consulted by the government when new legislation is to be developed. An important example of this is the Salmonella Action Plan, which was developed through co-operation between the industry and the Danish Veterinary and Food Administration.

Today, meat production is, to a large extent, controlled by self-audit procedures in accordance with HACCP principles – an internationally recognised system for controlling food safety. The industry itself is responsible for the production of safe food, while the authorities perform a supervisory role,

ensuring that the agreed procedures are followed.

Similar controls extend right the way down to farm level, with the comprehensive Salmonella control programme and the VetStat register to monitor the use of antibiotics and other veterinary medicines.

All pig herds in Denmark are registered in the Central Husbandry Register, which is available to the public at www.glr-chr.dk (in Danish). All animal movements are also

recorded on this database and the origin of every pig is known on arrival at the abattoir. This comprehensive approach enables rapid tracing and intervention in the event of an outbreak of disease or other problems.

Beyond the EU baseline

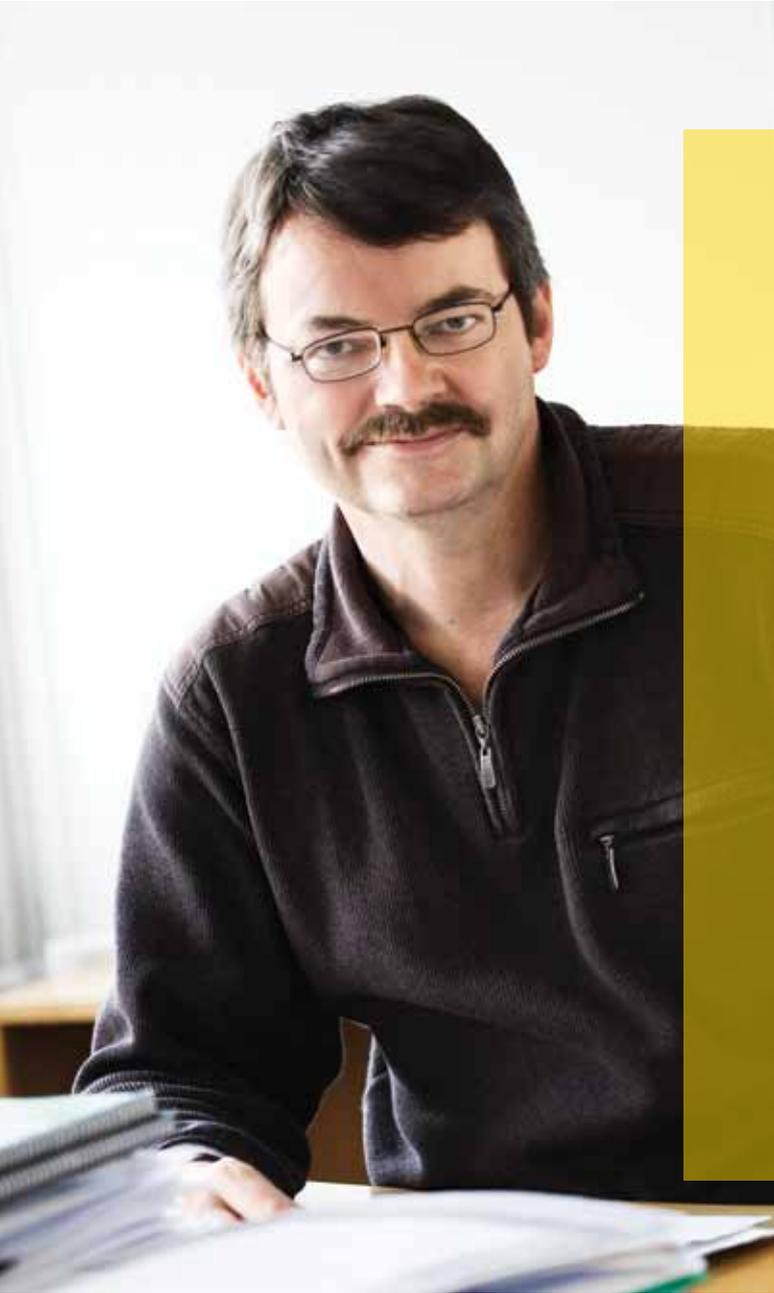
- *Denmark is the only major pig producing country in the EU with a comprehensive whole chain Salmonella Action Plan laid down in legislation.*
- *The Veterinarian Act outlines the responsibilities of local vets. It imposes strict restrictions on the use of medicines, including a provision banning vets from selling medicine.*
- *Every year more than 20,000 samples are taken to check for residues of antibiotics, hormones, pesticides and heavy metals. This is significantly higher than the level required by EU legislation.*

VetStat

VetStat is a central register established by the Danish authorities in 2001 as part of the strategy to minimise the use of veterinary antibiotics and drugs. Any use of livestock medicine is recorded in VetStat. The programme registers all therapeutic medicine, sera and vaccines administered for each herd.

As a result, VetStat provides Denmark with a unique farm-level view of trends and use of veterinary medicines. The detail of the information available is unrivalled in any other major pig producing country.





A matter of trust

The Danish pig meat industry has a close and constructive dialogue with the authorities on all food safety matters. The Danish Agriculture & Food Council (DAFC) is formally consulted when any new legislation relevant to pig production is being planned. The Government's Fourth Salmonella Action Plan, which was passed by the Danish Parliament in January 2010, was developed with significant input from the pig industry.

"We don't write the legislation – politicians do. However we are always consulted prior to the development of new legislation and we often help in establishing its parameters. We prepared most of the groundwork behind the most recent Salmonella programme," says Jan Dahl, chief consultant at DAFC. He continues:

"Our relationship is based on trust and has been developed over many years. Our colleagues in government have had confidence in our ability to deliver accurate and detailed information when requested."

Another example of the close and constructive dialogue with the authorities on food safety matters is the introduction of a 'yellow card' system. This enables the authorities to issue 'yellow cards' to veterinarians and herds where antibiotic consumption is too high. The scheme is the outcome of a partnership between the authorities and the pig industry whereby the authorities monitor and implement controls while the industry advises on 'best practice' for herds where consumption is too high.

Dealing with antibiotic resistance

The increasing number of bacteria resistant to antibiotics is of growing public concern. Although part of the present problem has been attributed to the prescription of antibiotics in the human population, there has been an emerging view that all livestock industries must also adopt a far more prudent approach to their use of antibiotics.

Denmark implemented a strategy to eliminate the unnecessary use of antibiotics in livestock with the introduction of a surveillance programme to monitor antibiotic resistance in bacteria in 1995. The DANMAP study measures the presence of antibiotic resistant bacteria in livestock, food and the human population. It then

correlates this information with the use of antibiotics in different livestock species and those used in treating human illnesses.

The study has enabled government and the meat industry to pursue a coherent strategy in seeking to reduce levels of antibiotic resistance. The objectives are not only to minimise the use of certain products which are also used to treat severe human diseases but also to minimise the overall use of antibiotics for veterinary purposes, without compromising animal health. An example of this approach was the Danish ban on antibiotic growth promoters in 2000, six years ahead of the EU as a whole. The latest in the series of many precautionary initiatives undertaken within the Danish

Information in the public domain

The Danish Zoonosis Centre carefully monitors the occurrence of zoonoses or infectious diseases capable of transmission from animals to humans. The results of their surveillance programmes and their Annual Report on Zoonoses in Denmark have been produced and placed in the public domain since 1997.

The Danish Zoonosis Centre, now part of the National Food Institute in Denmark (DTU Food), has a pivotal role in the development of public health policy in relation to food safety. The availability of comprehensive data collected from the livestock industry has proved a valuable resource in achieving a reduction in the levels of food borne diseases in the human population.

For more information, visit www.food.dtu.dk.

pig industry to curb the development of resistant bacteria within livestock is a two year ban on the use of cephalosporins in treating pigs, pending a fuller investigation into their potential in the development of antibiotic resistant extended beta-lactamase (ESBL) in livestock, with implications for their transfer into the food chain and human population.

The Danish agricultural industry continues its participation in scientific work related to development of guidelines for more effective use of antibiotics for livestock, which also minimises the risk of the spread of antibiotic resistance.

Denmark's use of therapeutic antibiotics for livestock, measured per kg pig meat produced, is between one third and one fifth of the level in other major pig-producing countries.

Mapping it out...

In 1995, the Danish authorities established a surveillance programme to monitor antibiotic resistance in bacteria in livestock, food products and the human population. The programme is called The Danish Integrated Antimicrobial Resistance Monitoring and Research Programme (DANMAP). Denmark is now widely recognised for its strategies aimed at preventing the spread of resistant bacteria.

DANMAP has proved an invaluable tool in developing coherent strategies for addressing antibiotic resistance and similar programmes have been introduced in other countries, such as Canada, Holland and Norway. One feature of DANMAP is the possibility to track prescription and use of medicine by vets right down to farm level. This is possible because the national system for monitoring veterinary drugs, VetStat, demands that individual prescription of veterinary medicine must be recorded for a specific farmer.

The comprehensive approach of DANMAP is ensured by the participation of five different government organisations: the National Food Institute, the National Veterinary Institute, the Ministry of Food, Agriculture and Fisheries, the Danish Medicine Agency and the National Serum Institute.

For more details, visit www.danmap.org.

Facts about the Danish pig industry

Pig Farming

- There are around 5,000 pig farms in Denmark with an overall population of 12.7 million pigs
- Today, pig production is concentrated on fewer but larger and more specialised farms
- Three quarters of Danish pig production takes place in Jutland.

Pig Meat Industry

- Around 19 million pigs are slaughtered annually in Denmark
- Over 8 million live pigs are sent for export, including piglets
- Production of pig meat in Denmark totals around 1.9 million tonnes, of which 1.8 million tonnes is exported
- Pig meat exports have a value of around € 3.6 billion
- Pig meat exports accounts for 50% of all agricultural exports and 4,9% of all goods and services exported from Denmark
- Denmark exports to some 140 countries
- The largest markets for Danish pig meat in terms of volume are Germany, UK, Poland, China, Japan, Russia and Sweden
- Around 48,000 people are employed in the Danish pig industry overall, including primary production, processing and associated industries.

FØDEVARER



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