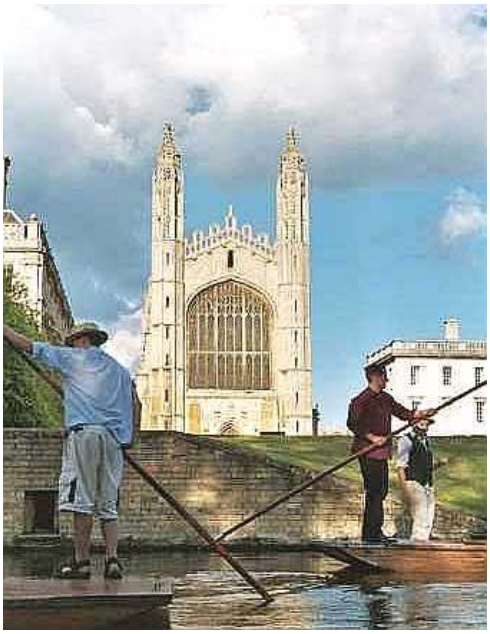


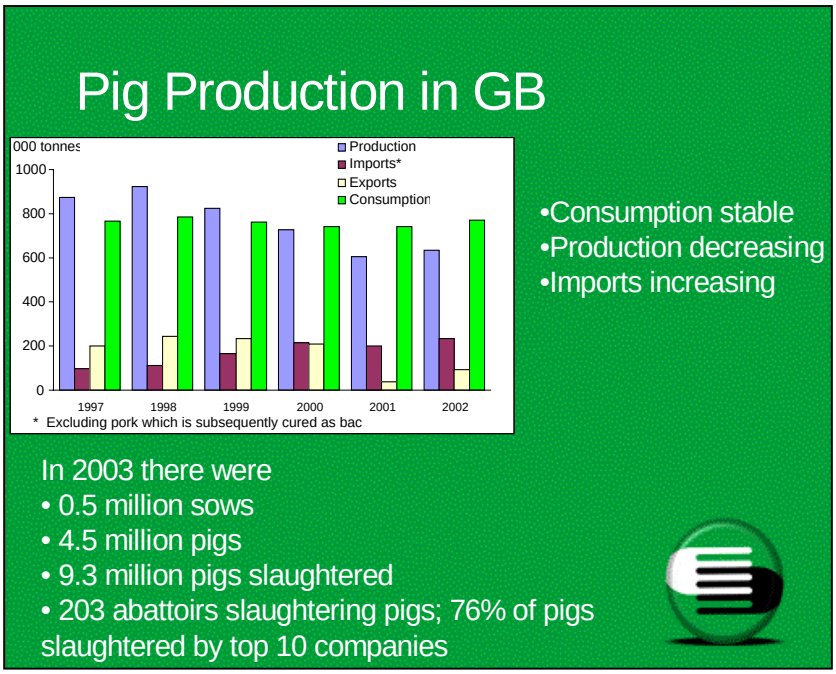
CURRENT MEAT-BORNE HAZARDS WORLD-WIDE

SPEAKER: **DR ALEX COOK**
VETERINARY LABORATORY AGENCY, UNITED KINGDOM

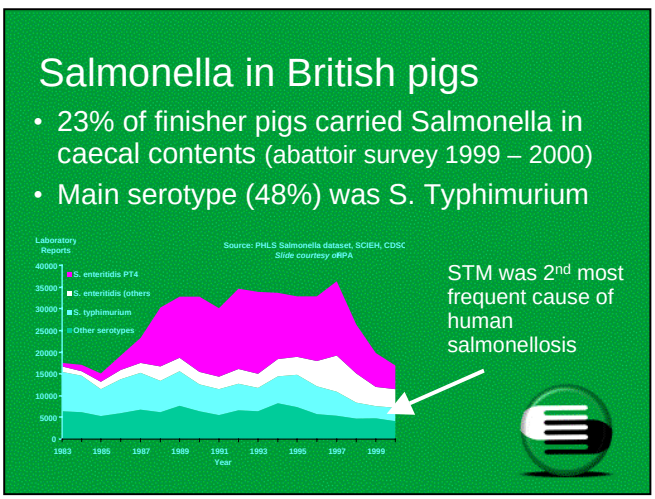
TOPIC: **ZAPPING SALMONELLA IN BRITISH PIGS**

VLA is an Executive Agency of Defra and we are charged by them with the safeguarding of public and animal health through our research and surveillance activities. I am a veterinary epidemiologist within the Centre for Epidemiology and Risk Analysis at Weybridge. I am going to talk about one hazard, Salmonella, in one product, pork, and I hope that this example will illustrate some of the issues in terms of identifying risks and how to control them.

Consumption of pork in this country is pretty much stable while our industry overall is declining, which means for consumption to be maintained, the level of imports is increasing. Pertinent to that is the fact that although there are over 200 plants that are slaughtering pigs, the majority of pigs go through a very limited number of plants.

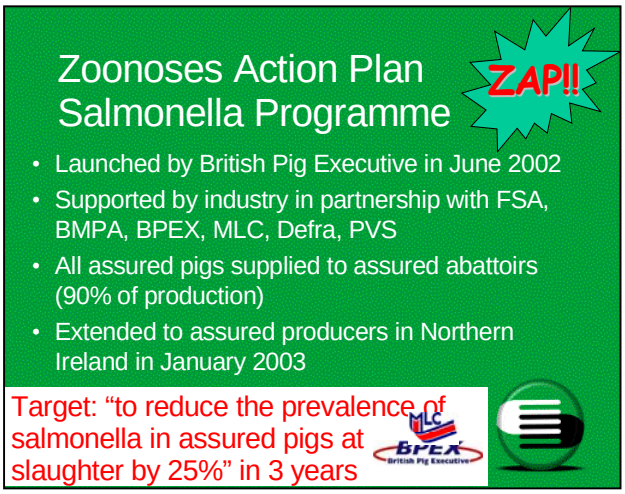


VLA conducted a survey in UK abattoirs between 1999 and 2000, in which we were looking for foodborne zoonoses in a range of domesticated animals and among the findings from that study came the discovery that approximately a quarter of our pigs were carrying salmonella in their caecal contents at the time of slaughter. The main serotype carried by these pigs was Salmonella Typhimurium and this serotype was also isolated from a wide range of other livestock.



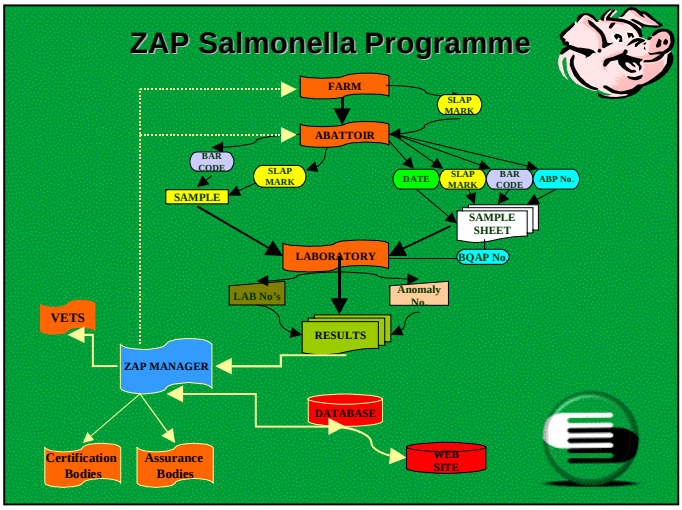
Data from the Health Protection Agency shows that Salmonella Typhimurium is the second most frequent cause of human salmonellosis in the UK while Salmonella Enteritidis is still by far the largest component of human salmonellosis. Nevertheless, the pig industry recognised that this rate of carriage was not a good thing and the industry led an initiative supported by the Food Standards Agency and Defra to develop a control plan. There is recognition from the industry that

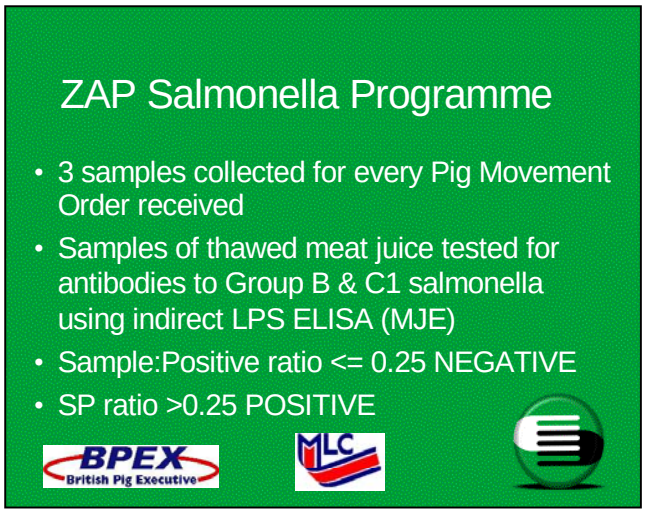
maintenance and development of the pig sector in the country as a whole required addressing issues such as food safety and indeed overall animal health.

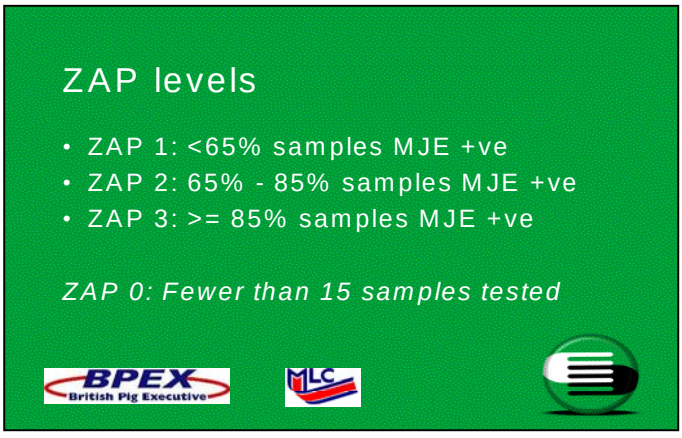


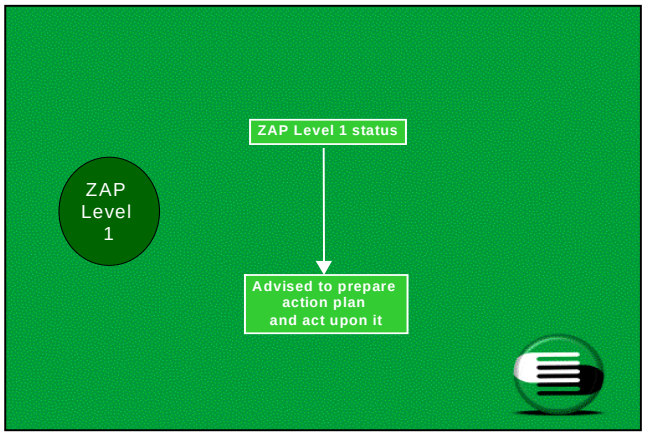
The Zoonoses Action Plan (ZAP) for salmonella control was launched in June 2002 and effectively covers all pigs supplied to a quality assured abattoir in Great Britain. In January 2003 the scheme was extended to abattoirs in Northern Ireland.

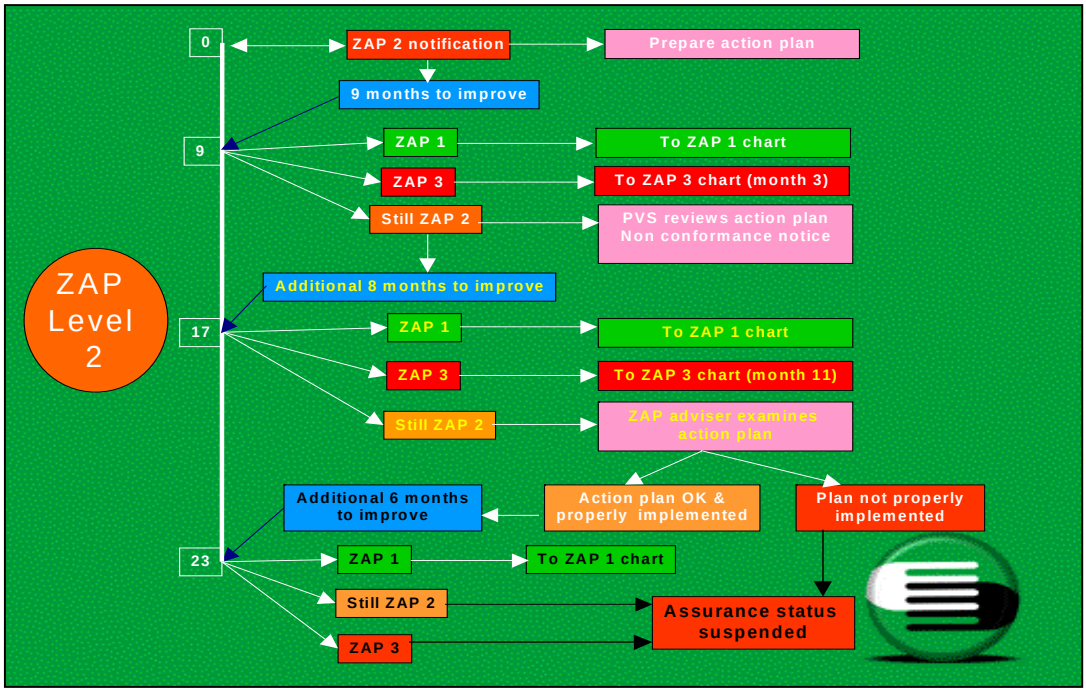
The target is to reduce the presence of salmonella in assured pigs, which are the vast majority of slaughtered pigs in this country, by 25% in 3 years. The way they aim to achieve that is through collection of meat juice samples from the abattoir that are identified back to farm by slap marks. The results of the laboratory ELISA tests are fed back to farmers and they are used to assign the ZAP score to each farm. Currently, three samples are collected from every batch of pigs delivered to a quality assured abattoir.



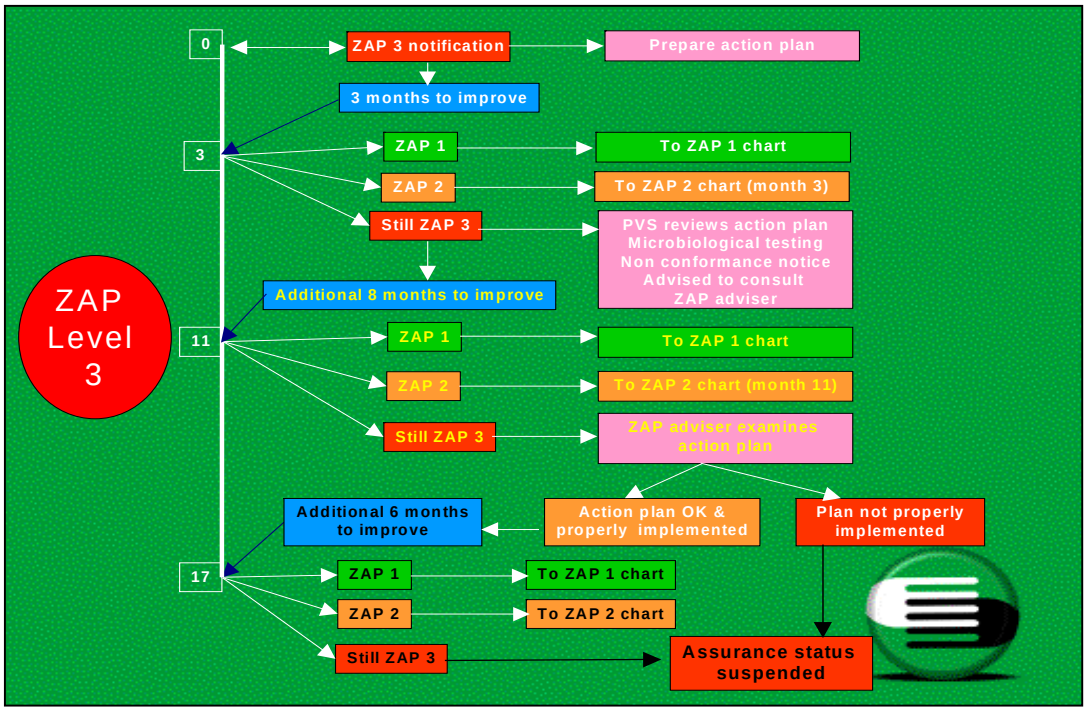








If fewer than 65% samples are positive then the farm is given a ZAP 1 score; between 65% - 85% is ZAP 2, and 85% plus is a ZAP 3 farm. The proviso is that at least 15 samples must be tested within a quarter. The challenge for a ZAP 1 farm is to maintain its status whilst a ZAP 2 or 3 farm must develop and follow an action plan to reduce the prevalence of salmonella to below 65% or eventually face loss of their quality assured status and thus, loss of access to quality assured abattoirs.



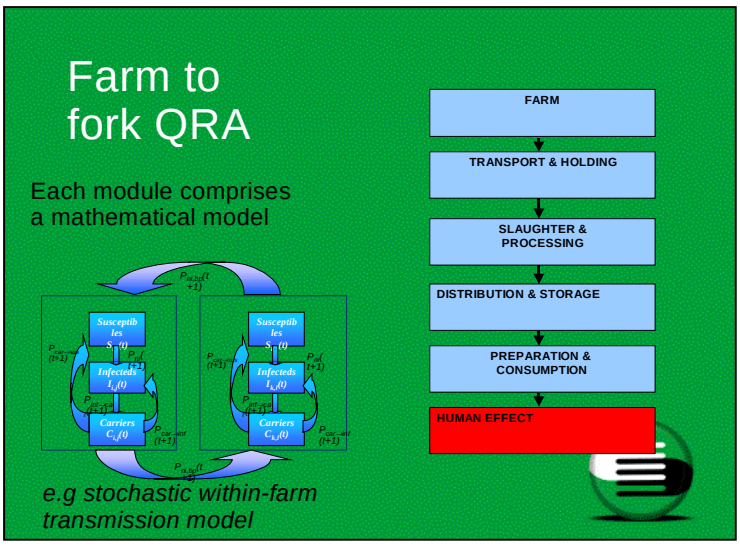
The aim of this programme overall is to improve public health by reducing their exposure to salmonella from pigs and at VLA we have been engaged in a range of activities to produce scientific evidence that we hope will inform ZAP and the industry and policymakers in general in terms of control. Our work has essentially been

involved in four things; measuring the prevalence of salmonella infection at the farm; looking for risk factors for high prevalence of salmonella; seeing how it is distributed within the industry, and then using all this information to integrate into a modelling approach that aims to predict the outcome in terms of human health.

The abattoir survey looked at a random sample of pigs at the point of slaughter but it did not give any indication of what this meant in terms of the number of infected farms or the variation in prevalence between these farms. We looked at a random sample of farms and we examined these farms both by taking 40 meat juice samples from each farm and by taking a collection of pooled faecal samples. The graphs in the presentation show that the majority of our farms actually have a moderately good level of salmonella, with fewer than 10% of pens positive in microbiological terms and less than 10% of samples positive in the meat juice ELISA. However, there is a long tail, and there are a number of problems farms. This picture should encourage the industry, since firstly there are many farm without a serious problem and secondly, it is therefore reasonable to suppose that those farms that do have a problem can aspire to improve and become more like the majority.

Data from that study and two others that we have conducted, helped us to identify risk factors for high prevalence of salmonellosis. These included a specialist finisher/versus breeder/finisher farms, farmers where any of the pigs were kept outdoors, farms where the grower or finisher population were fed on pelleted feed and farms where they were housed exclusively on solid rather than slatted or semi-slatted floors. Farms with a high level of post-weaning multi-systemic wasting syndrome (PMWS), those with poor bio-security and those with high level of salmonella within weaners were also at increased risk. We will test intervention measures that are designed not to attack the 6% of farms in ZAP 2 or 3 scores but to protect the 94% of farms that enjoy relatively good salmonella levels at present. We are also able to use routine data to examine where salmonella lies within the country. The graph in the presentation shows every farm that is contributing samples to the ZAP scheme. The red crosses are the problem farms (ZAP 2 or ZAP 3) and the map shows these to be more strongly clustered in parts of the North East and East Anglia. This is perhaps not unexpected since that is where the majority of our industry lies. In collaboration with colleagues in the University of Liverpool, we have been able to demonstrate that there is indeed over clustering of these ZAP 2 or 3 farms.

Data from our own studies, from expert opinion and from the scientific literature has been used to create our quantitative risk assessment that moves us from farm through to fork.



Each component in the chain, for example the within-farm transition model, is used to estimate the probability of infection being transferred to the subsequent link. Thus, we can mathematically estimate the theoretical benefit that might accrue at the end of the human end from the efforts being put into place by the industry, particularly at farm level. The advantage of this approach is that we can also use the on-farm models, for example, to indicate how changing different components within that farm environment may impact the prevalence of infection as it enters the base of the food chain.

So the model that we have at the moment, and which is still undergoing enhancement within VLA, offers a number of theoretical conclusions. Firstly, it suggests that within a typical British finisher farm at any point in time perhaps 7% of our pigs are actively shedding salmonellosis and a further 8% are carriers of that infection. Perhaps 24% of those pigs will be actually be meat juice positive at the point of slaughter. I would emphasis that these results are theoretical outputs from a mathematical model. But what gives us encouragement is that our model may be reflecting the reality, is that the results from the ZAP scheme and from our own surveys suggests that about a quarter of UK pigs are meat juice positive. So it suggests that if we make conclusions as to how changes in the farming environment may affect prevalence they may indeed be ones that can used as a basis for making interventions later.

In terms of human illness, which is at the far end of our risk model, our model suggests that up to 30% of the British cases of salmonella typhimurium may be attributable to a source in our pig sector, which clearly implies that 70% are not. Interestingly, the model suggests that half of these may be due to cross contamination rather than simply due to consumption of pork product, and again this could be important in terms of promulgating messages for controls since the cross contamination part, for example on such things as salad, clearly would not be controlled simply by good cooking of meat.

What the model suggests is if ZAP succeeds in its aim in reducing the prevalence of infection in farms by 25% then we might hope to achieve a reduction in the human salmonella typhimurium burden of approximately 25% as well. However this is all theoretical and all outputs from mathematical models must be taken with at least a pinch of salt because they depend on whether or not various assumptions and components reflect reality.

I hope that this rapid review has been of interest. I think the key things that I have illustrated are: firstly, that we have been able to identify a true farm to fork approach looking at one specific hazard within the UK, and secondly we have been able to demonstrate how scientific activities and risk modelling can help to inform decision makers within the industry.

SPEAKER: MR JENS KIRK ANDERSEN
DANISH INSTITUTE FOR FOOD AND VETERINARY RESEARCH, DENMARK

TOPIC: MEAT BORNE HAZARDS IN DENMARK

I will present my view on the meat borne hazards that are of concern in Denmark. I will show that classical meat inspection is not an option for the control of these. And I will show which control options that have been chosen in Denmark, in the realisation of the shortcomings of meat inspection in this regard.

The 1st table shows, "Meat related hazards in DK and the importance of meat inspection for their control" as three levels. On the first level, we have the clear and very much present dangers in Denmark in slaughter animals. They have a great impact on human health, however they cannot be detected at meat inspection. Therefore meat inspection is useless in the control of these hazards. On the second level, we have the 'has-beens'. Tuberculosis, brucellosis and trichinosis are eradicated in Denmark. They have a great importance in human health. They can be detected at meat inspection. However, in Denmark, as in other parts of the world, we don't need meat inspection for the control of these diseases anymore. On the third level we have "possibles". Some of them we may know little about, some of them even less. However, it is clear that meat inspection is not the tool for controlling these hazards.

Meat related hazards in DK and the importance of meat inspection for their control

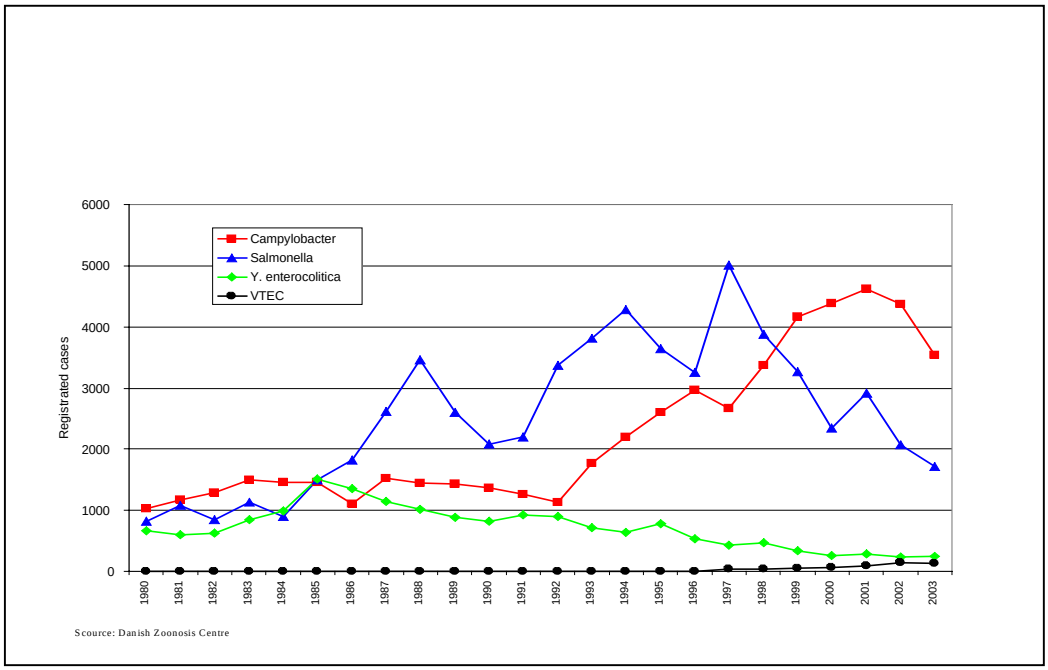
	Presence in DK	Importance in human health	Detection at meat inspection	Importance of meat inspection
Salmonellosis **Yersiniosis** **Campylobacteriosis** **Listeriosis** **VTEC**	+++	+++	-	-
Tuberculosis **Brucellosis** **Trichinosis**	-	+++	+++	-
Cysticercosis	++	+++	+	+
Sarcocystosis	+++?	(+)	+	(+)?
Cryptosporidiosis	+++	+++	+++	(+)
Leptosporidiosis	++	+	+	-
Erysipeloid	+	+	+	-
M. avium-intercellulare	+	+?	+?	+?

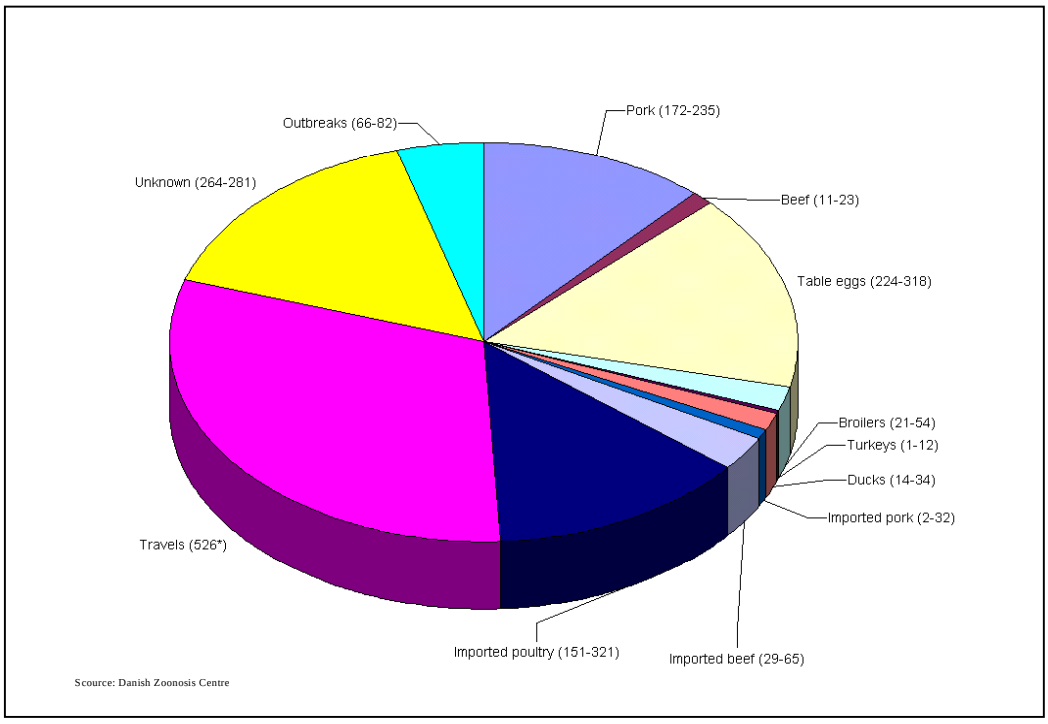
- pleuropneumoniae
Mycoplasma
Pasteurella multocida and others
Haemophilus pleuropneumoniae
Actinobacillus pyogenes
Staph. aureus
Streptococcus spp.
Haemophilus parasuis
Erysipelotrix rhusiopathiae
Pseudomonas aeroginosa
Pasteurella multocida
Proteus spp.
E. coli

The most common micro-organisms isolated from pathological conditions detected at meat inspection are listed in the 2nd table. These are of minor importance in human health and in many cases they are not food-borne. To conclude, the current meat inspection has little effect as a control measure for hazards with regard to human health.

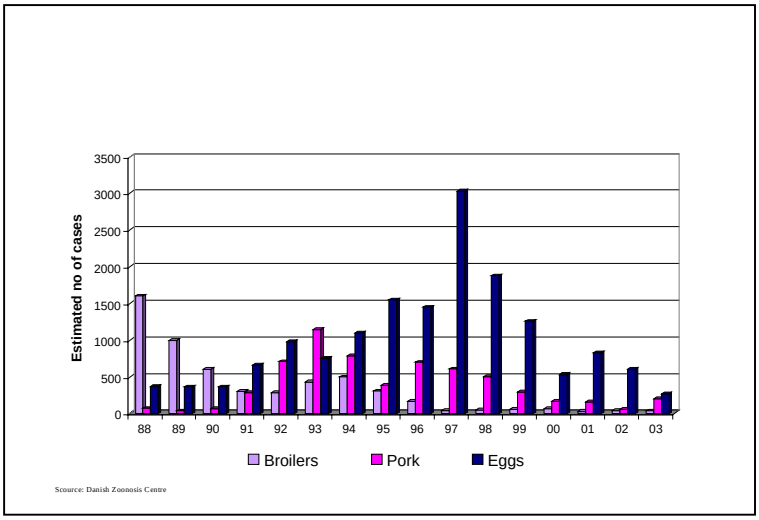
The 3rd table illustrates the development of human gastroenteritis in Denmark. So far Salmonella has created the biggest problems, and demanded most attention. Three peaks are clearly seen. Their inclines represent an increase of cases, due to increased exposure from Salmonella in various animal food sources.

The decline of the curve illustrates the efficiency of specific action plans instigated to control this risk. Although salmonellosis may be caused by a multitude of sources, we have been fortunate that the types and sub-types of salmonella have been divided between the different sources, so that we have been able to make an estimation of the relative importance of human salmonellosis. This is illustrated in pie chart showing the number of cases attributed to various sources in 2003.





The next illustrates the development of the primary sources from 1988 to 2003. It is evident that with regard to domestic problems, we have had problems with broilers, followed by pork, and latest we have had a problem with table eggs.



In order to control salmonellosis caused by pork the Danish Veterinary and Food Administration established a control programme, based on acquiring data on the Salmonella status of the larger herds (herds that are producing more than 200 pigs for slaughter each year). Salmonella anti-bodies are detected from meat juice when they are delivered at the slaughterhouse. According to the prevalence in the delivered pigs, action is taken. Action may be taken at herd level and action is also taken at the abattoir level. The slaughterhouse will be selected on basis of the herd status. The carcasses will be swabbed if a high prevalence has been found in the herd. According to the results of the status of the carcasses the product will be determined.

A 25-fold reduction in the prevalence of human campylobacteriosis associated with *Campylobacter jejuni* in broilers could be obtained by:

- A 100-fold (2 log units) reduction in the concentration of *Campylobacter jejuni* on the broiler chickens
- A 25-fold reduction in the flock prevalence (e.g. from 60% to 2.4%)
- A 25-fold increase in ”safe” behaviour during preparation of a chicken meal

With regard to Campylobacters in broilers a quantitative risk assessment has been performed. This indicated that a 25-fold reduction in human cases of campylobacterisosis could be achieved in several ways. By a reduction of the qualitative number of salmonellas on the carcasses by 2 log units or, by a 25-fold reduction in flock prevalence. Also it was indicated that a 25-fold increase in consumer’s kitchen hygiene would provide a similar result. It was decided that reduction of the quantitative occurrence of Campylobacters on poultry carcasses probably was most feasible. As a result an action plan by the Danish Veterinary and Food Administration was established, based on the same principles as the one described for pigs: to acquire prior knowledge on the herds when they deliver birds for slaughter, and treat them according to this knowledge. An ante-mortem inspection in the herds has been established. This includes microbiological testing of the herds before they are delivered to slaughtering. Based on this knowledge slaughtering is modified according to status, and freezing or other non-chemical decontamination treatment may be performed. As a result a decrease in the human prevalence has been observed. The action plan seems to have worked.

My conclusion is that traditional meat inspection has negligible impact on public health, at least for Denmark. If we want to do something about the clear and present dangers we need to follow a scientific risk-based approach in a farm to table perspective.

SPEAKER: **DR TRULS NESBAKKEN**
NORWEGIAN SCHOOL OF VETERINARY SCIENCE, NORWAY

1st TOPIC: **OCCURRENCE OF "THE NORDIC SALMONELLA", *YERSINIA ENTEROCOLITICA* IN SLAUGHTER PIGS - Consequences for meat inspection, slaughtering and dressing procedures**

In the Nordic countries we have a high level of *Yersinia enterocolitica* and a low level of salmonella in pigs, that is why I have chosen this title.

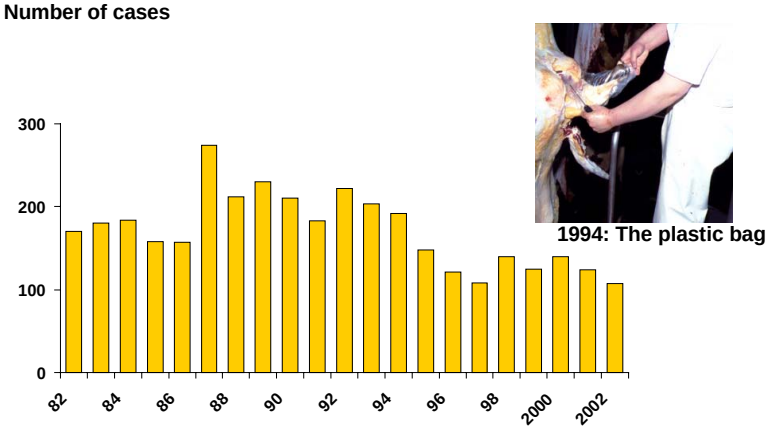
Some facts: Pigs are healthy carriers of serovar 0:3 of *Y. enterocolitica*. There is a lower level in conventional farrow--to-finish herds (53.1% seropositive herds) than in conventional slaughter pig production (86% seropositive herds), and according to case control studies conducted in the late 80s, pork and drinking water are the sources for humans. The reactive arthritis following an infection of *Y. enterocolitica* could be severe and last from a few days to several weeks or even months or years. Comparing salmonella, 90% of salmonella cases are imported from abroad. The level in domestic animals in Norway is quite low, lower than 0.2% even in poultry.

ZOONOTIC AGENTS IN HUMANS AND AMONG DOMESTIC ANIMALS IN NORWAY(1995 –2002)

Agent	Humans (National Inst. of Public Health)		Animals (Different sources)	
	Cases per year	infected abroad	Species	infected
Salmonella	1000-1500	90%	Pigs, cattle, poultry	< 1%
Campylobacter	1000 - 2800	50 %	Broilers	< 10%
Yersinia enterocolitica	100 - 170	25 %	Pigs	> 50%
VTEC	0 - 15	0 – 90%	Cattle	0.3%
Toxoplasma gondii	100?	?	Lamb	20%

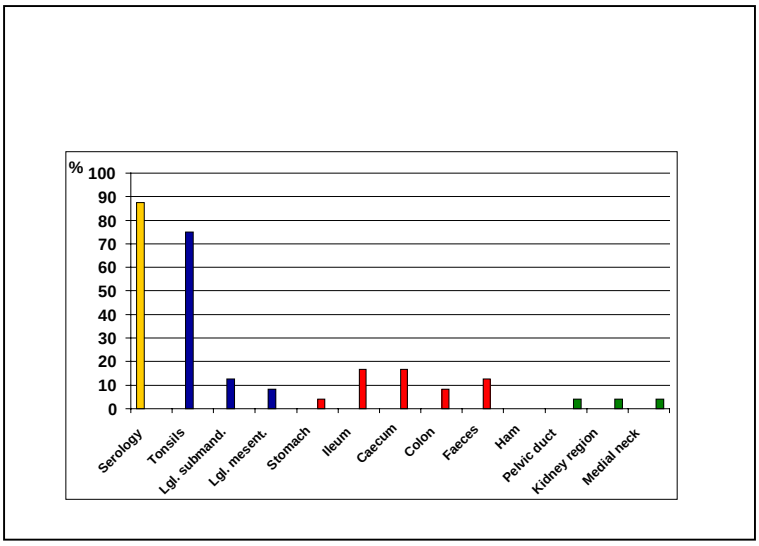
Talking about *Y. enterocolitica*, it is quite opposite. 75% of the people are infected domestically and there is a high level in pigs. That is why we implemented the use of the plastic bag to enclose the rectum during evisceration in all main slaughterhouses during 1994. Since then we have had a lower level among people reporting *Y. enterocolitica*.

Human cases - *Yersinia enterocolitica*
1982 - 2002



1994: The plastic bag

The level of *Y. enterocolitica* in pigs, not only tonsils and faecal material that have been investigated several times, but also among other sources in the pig, might have consequences for meat inspection and meat hygiene. If we have pigs infected with *Y. enterocolitica* they will have antibodies against it. In this case, 90% of the 24 animals had antibodies against Yersinia, and talking about tonsils we had a level of about 75% and going further we see that in the maxilliary lymph nodes it was even more than 10% of the animals being infected. Going further through the system, we see that even in ileum and caecum it was more than 10% positive samples and also on the carcase we could find it, and that has some implications, in particular the level in tonsils and also in lymph nodes. The removal of the plucks is a risky transaction. It is important that the tonsils are following the plucks, not the carcase, so we should not have the rest of the tonsils on the carcase in this way, it should all be on the plucks. So to the compulsory procedures of incisions of lymph nodes - according to the old EU Regulations, all maxilliary lymph nodes should be cut into. However, in the Nordic countries tuberculosis spread by pigs has no relevance, but meat inspectors are probably spreading *Y. enterocolitica* very efficiently this way.



Conclusions - the new EU Regulation with its possibilities to avoid incision of lymph nodes in specific herds is probably a victory for slaughter hygiene and human health. Also the procedures of the slaughterman when he removes the plucks are important. The best way of solving this problem is removal of the head early in the slaughter line. This should be possible with the new EU Regulation. Then the tonsils, the tongue, the gullet are taken care of before the removal of the plucks.

- **If the operator has divided the tonsils, highly contaminated parts of the tonsils are still on the carcass**

- **It is important that the operator, who is responsible for the red offal evisceration, removes the tonsils together with the tongue and the gullet (HACCP: CCP !)**

Y. enterocolitica free herds might also be possible. If a successful reduction of *Y. enterocolitica* could be accomplished on the top levels of the breeding pyramid,

lowering of prevalence of *Y. enterocolitica* might be obtained in the general pig population.

2nd TOPIC: MODERN MEAT INSPECTION IN A NORDIC CONTEXT (2002 - 2006)

A Nordic project on meat inspection started in 2002 and terminates October 2006. The project is funded by the Council of Nordic Ministers. The Nordic countries are Denmark, Iceland, Finland, Sweden and Norway representing more than 20 million people. The project steering group has two members from each of the Nordic countries, one from the authorities and one from the industry. The steering group has appointed 2 abattoirs in each of the Nordic countries to carry out projects by the local meat inspection units in co-operation with the slaughterhouses.

Among the specific objectives are to find practical and relevant ways of risk assessment and food chain information at the Nordic level. To allocate a relevant number of persons in the meat inspection teams in abattoirs is an important issue. Another is to propose new and relevant training programs for both veterinarians and technicians working in meat inspection to achieve relevant qualifications according to the new regulations.

- **Argue for a change in the legislation towards a more integrated meat inspection system, more based on employees from the industry and revisions from the authorities**
- **Argue for a change of the legislation towards a real risk based meat inspection also comprising cattle, sheep and lambs (and not only pigs)**
- **Communicate results from the project to the authorities in the Nordic countries, the Nordic meat industry and the EU Commission during the whole project period**

Talking about the overall objective, it is important to say that we will try to test solutions based on the new legislation that passed through the EU parliament in the spring of 2004, but also pointing out what is missing in the new legislation and what will be the future needs in a Nordic prospective. The general statement of John Wooden ”Do not let what you cannot do interfere with what you can do!” might be connected to the outcome from the EU Parliament. It is important to be optimistic and not let the conservative veterinarians from central Europe destroy our vision of a future, dynamic risk based meat inspection also in Europe, as in Australia for instance.

If you have questions about the project, please send an email to the project manager: truls.nesbakken@veths.no

SPEAKER: **DR WING-KA AU**
FOOD & ENVIRONMENT HYGIENE DEPARTMENT, HONG KONG

TOPIC: **TRICHINELLOSIS SURVEILLANCE IN SLAUGHTERED PIGS IN HONG KONG**

To start with some background on Trichinellosis and the parasites -Trichinellois in animals and in humans is mainly caused by consumption of meat infested with viable larvae of the nematode called Trichinella.

Life Cycle

The encysted larvae in meat being ingested are released by the gastric juice in the infected host. The liberated larvae invade the small intestine mucosa where they develop into adult worms. The female worms release the larvae and they migrate to the striated muscle where they encyst. However, two species: T. pesudospiralis and T. papuae do not encyst. Encysting takes 4 to 5 weeks to complete and the larvae may survive for years inside the muscle waiting for the other animals to pick them up. The parasite circulates around the animals such as pigs and rats in most domestic cycles, but may occasionally be passed to animals such as foxes, wolves, polar bears and walrus in the wildlife cycle and vice versa. Humans and pigs are infected when eating improperly processed infested meat - mostly the raw or uncooked meat.

Ante-mortem inspection in the slaughterhouse

Trichinellosis is rarely detected clinically in naturally infected pigs, except very young pigs with severe infection. You may see in a massive experimental infection in pigs - they show signs of fever, anorexia, emaciation and muscle pain. The detection of Trichinella in slaughtered pigs in slaughterhouses is mainly divided into two methods.

The first is the direct method – Trichinoscopy -this cannot reveal mild infection with larvae <3-5 in a gram of the tissue. It is used in routine daily examination of pork in our slaughterhouses in the past 20 years - 30-40 random pig samples per 4,000 – 5,000 pigs are taken daily from our local abattoir. In the past decade we have not seen any cases of Trichinella by using this Trichinoscopy method. Before 1990 we occasionally saw Trichinella in the pork, but not in the recent 10 years.

We have a few photos of the Trichinoscopy method - these are the muscles samples from the diaphragm of the pig. This is the Trichinoscope - we use a thick glass slide to place the muscle samples and mount it on the stage and then by magnification we see the worms

inside the muscle. If you see a worm you will see a transparent oval cyst with a serpent-like coiled nematode inside.

The second method is the indirect method such as the ELISA method. This is more sensitive and using purified antigens it can detect infection levels as low as 1 larva per 100g of pork tissue.

Surveillance exercises

Three surveillance exercises were carried out in 02-03 using the ELISA method in abattoirs. A total of 1,200 randomly selected pig blood samples (age 4-8 months, known as roasters and porkers) were collected from a slaughterhouse where 4,000 - 5,000 pigs were killed daily in three separate periods - December 02, May 03 and August 03. December is winter in Hong Kong, May to August is supposed to be summer time, so we covered both the warm and cold seasons.

Blood samples were collected during slaughtering process i.e. the sticking process. The blood samples were properly labelled with trace back farm numbers and stored in the blood serum bank in our veterinary laboratory. These blood samples were tested with ELISA kits[1] for the detection of the presence of antibody for Trichinella and using the secretory antigens from the T. spiralis it could detect antibodies against Trichinellosis caused by the other Trichinella species too. It required less than 2 hours to test 50 blood test samples by one person manually. In the surveillance exercises, all the porcine blood samples showed negative results. As a conclusion, the ELISA method used supported the findings in Trichinoscopy method.

There is a drawback of this ELISA method. A low rate of false negative may result, due to a low rate of antibody production in lightly or moderately infected pigs. It may take several weeks for the antibody to reach a detectable level after infection, so if you take the test when the antibody level is not so high you may run into a false negative result.

Future Work

We are going to do surveillance on older animals like the sows and boars as they live longer, so hopefully the chance of them getting the infection is higher and antibodies are thought to be able to last for months or years in infected pigs.

So, for our work recommendation - continue surveillance in the slaughterhouses using direct and indirect methods to detect parasites in the pork and trace back to the farm of origin for remedy. The improvement of farm bio-security and management to prevent pigs from consuming rodent and garbage swill. The public are advised to cook the pork thoroughly before consumption - we recommend people cook their meat until it changes colour from pinkish to white, and fortunately people in Hong Kong do not eat raw pork. Actually most of them know the risk of parasites inside the pork - like Cysticercosis, Trichinellosis and Toxoplasmosis as well. There is continuous education of the public to be aware of the Trichinella hazard in pork, and people handling pork are advised to wash their hands before eating or handling food. We also deliver booklets to butchers and the people working in the abattoirs to remind them to be aware of hygiene. Smoking, salting, drying and microwaves heating methods may not always be safe to kill the parasites.

[1] The test kit used is from Safepath USA, Trichinae Microwell Immunoassay Kit

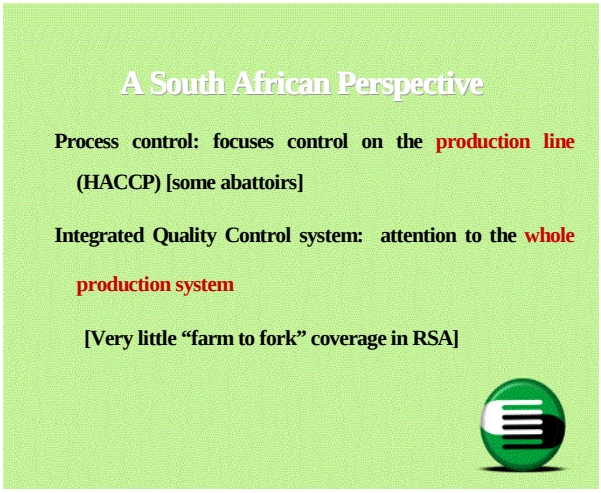
SPEAKER: **PROFESSOR COURTNEY (TUBBY) VEARY**
UNIVERSITY OF PRETORIA, SOUTH AFRICA

TOPIC: **SOUTH AFRICAN PROSPECTIVE OLD AND NEW**

In 1995 the implementation of the Abattoir Hygiene Act was decentralised in terms of the new constitution of our country to the nine departments of agriculture under the directors of Veterinary Service of each province. The Meat Safety Act was promulgated in 2000 to replace that Act. In South Africa the veterinary profession cannot claim to be the only health professional involved in all stages of food production and has not yet assumed a leadership role.

The Act on the Marketing of Agriculture Products now allows for the marketing of agriculture products within a free market system. The assets of the former marketing boards were paid over into trusts. Once that Marketing Board was the Meat Board, which controlled slaughter stock flow to regulated markets using permits as and when required, maintained stability in the price of meat, controlled a slaughter stock insurance scheme which paid out 80% of the average price for consignment for condemnations. It was estimated that approved abattoirs serving the regulated markets at that time killed 98% of the red meat slaughtered, all of which was inspected by authorised meat inspectors.

Services in the rural areas were limited and confined to the recognised municipal areas of control around towns and villages. It is only in recent years that progress has been made in applying the full stages of development of safety control systems envisaged. Passive control with no end product control. End product control is focussed on the product, process control focussing on the production line and the integrated quality control system where attention is paid to the whole production system.



The aim of the Meat Safety Act is to promote meat safety and the safety of animal products, and to establish and maintain essential national standards in respect of abattoirs. In control of meat hygiene in South Africa, slaughter is only permitted at approved abattoirs. This does not apply to slaughter for own consumption or for cultural or religious purposes, but in theory meat from such animals may not be sold.

With limited control due to the security risk in certain well populated informal dwelling areas, considerable cultural slaughter takes place for game.

In terms of the essential national standards, the abattoir owner must procure a meat inspection service for that abattoir. The meat inspection services are to be performed by the national or provincial executive office staff, an authorised person or an assignee, but independently from the abattoir. One such would be assignee is the International Meat Quality Assurance Service (IMQAS) currently operating illegally due to legal technical problems with the authorisations.

Meat Safety and Quality Assurance

IMQAS

Shareholders

RMAA (Red Meat Abattoir Association): 47%

The representative organisation of the abattoir industry and the provider of abattoir procedures training and a data collection/collation system

SAMIC (South African Meat Industry Company): 47%

The representative organisation of the red meat industry

NERPO (National Emergent Red Meat Producers Organisation) 6%:

The representatives of the emergent red meat producers in South Africa

Services

Meat inspection:

- **Ante mortem inspection**
- **Post mortem inspection**
- **Veterinary meat inspection**

Veterinary supervision of meat inspection services

(including ostriches and game)

Services

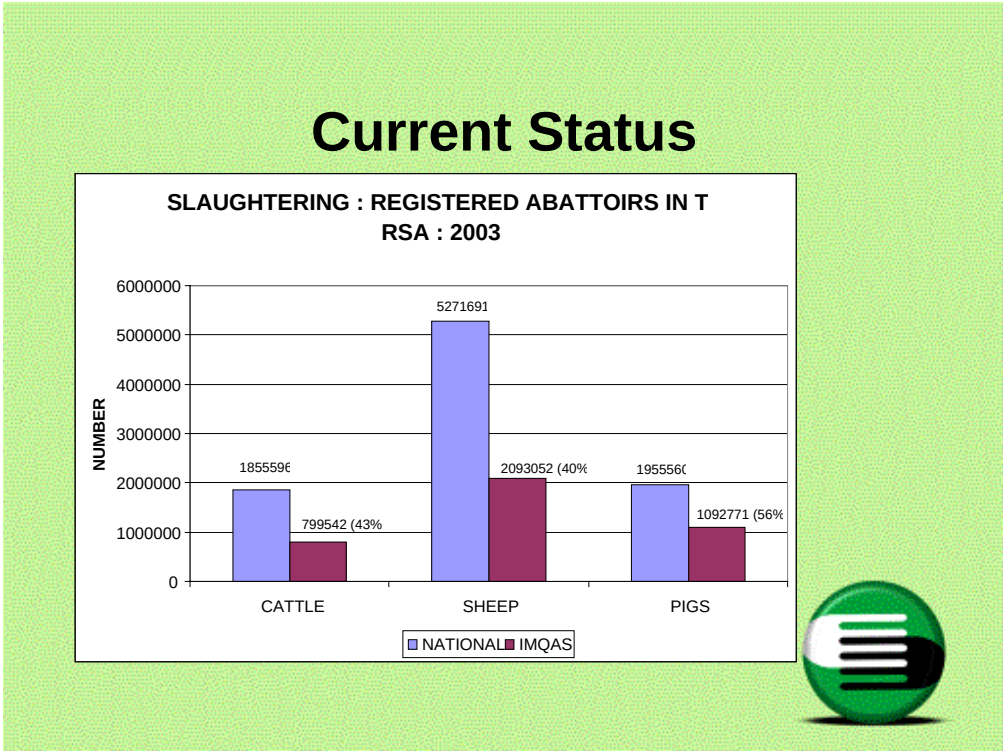
- **Meat classification**
- **Hygiene supervision and audit**
- **Supervision of abattoir processes**
- **HAS evaluation**

IMQAS plays an important role in meat hygiene services. The conventional veterinary involvement, meat classification of grading, supervision and audit and hygiene, supervision of abattoir processes, HAS evaluation. Laboratory tests to ensure safety and quality and HACCP implementation.

Services

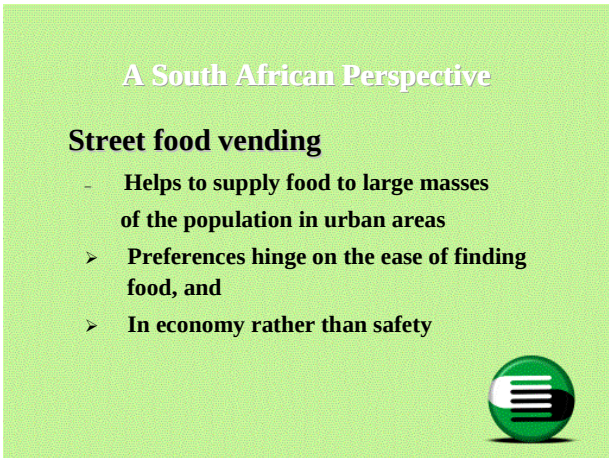
- Laboratory tests to ensure quality & safety of meat
- HACCP implementation

Current status - 171 personnel in 92 abattoirs throughout the nine provinces, and than indication of the involvement of IMQAS as a private organisation vis-a-vis inspection services generally in the country.



Also required by the essential national standards is that no dead animal or animal suffering from a condition that may render the meat unsafe for human and animal consumption may be presented at an abattoir for slaughter, hence a degree of cold slaughter and re-direction of unhealthy animals and hospital cases to informal slaughter to avoid outright condemnation. There is obviously no examination by a person performing a meat inspection service before slaughter and no need for information as to its ownership. It allows for the by-passing of the stipulation that the use, application and presence of specified substances and residues in meat and in animal products must be detected and monitored using prescribed methods. Even under controlled slaughter circumstances, annual reports reveal that the anti-body residues monitoring programme is now seriously running behind schedule.

Another essential national standard demands the treatment, removal or disposal of condemned material, effluent, refuse and emissions must be carried out as prescribed. The Directorate of Veterinary Services is very concerned about the disposal of condemned material from abattoirs and on the right is the so-called “magic pit” - you place stuff into today and you return tomorrow morning and, by magic, it has vanished. The biggest frustration remains that the regulations according to the Meat Safety Act have still not been provocative and this poses a problem in terms of abattoir monitoring.



Street vending of offal outside abattoirs was rife and seldom scrutinised by the health officials of the relevant municipality. Street food vending has arisen as a consequence of social,

political and economical pressures. The microbiological results on street vended food in South Africa showing that the quality and safety of street food was acceptable inspite of unhygienic food handling practices and unsanitary environmental conditions under which vendors operated. This is encouraging as most handlers of street vendered foods in Africa are largely ignorant of basic food safety issues.

As in the Sudan, a large proportion of South African rural population eats home slaughtered beef and goat meat including raw offal, which has no veterinary inspection. In contrast to most other African countries, the bulk of rural household income in South Africa does not derive directly from smallholder agriculture. Research shows that a high percentage of rural households are in fact net consumers of food even though many of them are engaged in food crop agriculture. There is however, a vast emerging livestock industry in South Africa.

A South African Perspective

Developing/emerging: Commercial

± 4.8 million cattle (± 8.8 million cattle)

3.4 million sheep (25.7 million sheep)

4.1 million goats (2.3 million goats)

0.4 million pigs (1.3 million pigs)

The emerging sector of the meat industry experiences many problems, communication is difficult with no effective communication media, a relatively low degree of literacy and various languages to contend with amongst the different ethnic groups.

Currently in South Africa limited surveillance and data collation is done other than on an ad-hoc basis and precipitated by the needs and demands of export countries, export markets.

Standardised provincial reporting has limited value in assessing potential hazards for the consumer. Similarly the standardised provincial reporting of laboratory tests conducted has limited value as the emphasis is confined to the number and type of

LABORATORY TESTS: STANDARDISED PROVINCIAL REPORT

TEST CONDUCTED	2002	2003
Total Bacterial Counts	6 037	6 417
Salmonella	1 164	671
Staphylococcus	1 894	1 086
Escherichia coli	2 218	2 227
Clostridium	450	336
Sterility: By-Products	47	392
Bacteriological water analysis	1 060	1 320
Antibiotic residue examination	350	252

test conducted rather than the results.

The Agricultural Research Council was contracted to develop and implement bacteriological monitoring programme of all abattoirs in the Guateng province. Samples were collected over a 12 months period from 857 red meat carcases and 45 poultry carcases. That gives an idea of the phases of that particular work and the prevalence for salmonella and E. coli. The prevalence of E. coli 0157 in slaughter animals in Guateng was 18.9%. Other countries are reported to have a prevalence of between 5 and 17%. There was a general lack in traceability of slaughter animals and for this reason, regional prevalence data could not be determined.

ISOLATION OF *Salmonella* STRAINS

ANIMAL	PHASE 1 [Winter]		PHASE 2 [Summer]	
	Specimens	Prevalence %	Specimens	Prevalence %
Poultry	45	4.44	-	-
Ovine	368	1.09	284	1.41
Porcine	296	5.07	318	3.77
Bovine	214	1.40	234	1.28

ISOLATION OF *E. coli* spp.

ANIMAL	PHASE 1		PHASE 2	
	Specimens	Prevalence %	Specimens	Prevalence %
Poultry	45	75.6	45	73.3
Ovine	1 848	79.9	147	69.4
Porcine	148	45.3	191	53.9
Bovine	107	35.5	114	50.0

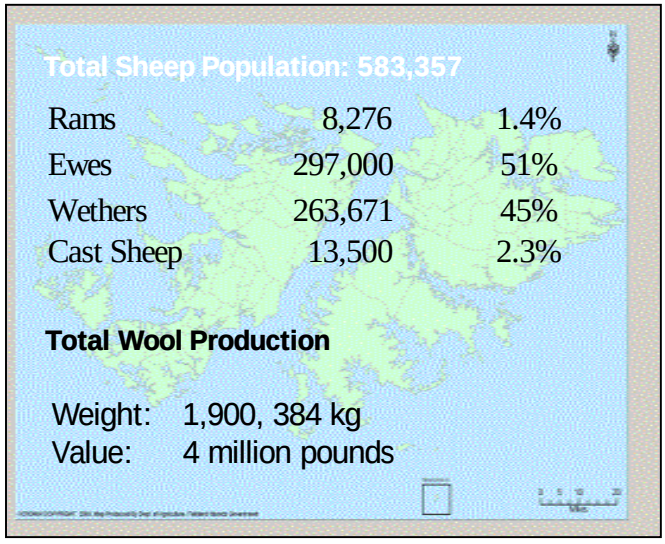
Animal health aspects – the brucellosis survey in 2003 indicated the prevalance in cattle of 2.7%, the prevalence of TB in South African commercial cattle and herds had dropped to below 0.01%. This excludes cattle herds belonging to rural communities and subsistence farmers. BSE testing has to date been negative on samples submitted.

SPEAKER: **MR JOHN LONGSTREETH**
FALKLAND ISLANDS

TOPIC: **SHEEP MEAT PRODUCTION IN THE FALKLAND ISLANDS**

The Falkland Islands is situated 400 miles off the south east corner of South America. They have an oceanic climate, very poor soil, very poor herbage of terribly low nutritional value.

The stocking of sheep on the islands is one sheep per four and half acres so the main production is of wool and not meat. Some 45% of the national flock are male castrates - these are the wool producers and at the end of their useful life which is some 6-8 years, we had some thirteen and a half thousand sheep to slaughter, in fact its a larger number than that now. The traditional method was to march them over the cliff or to shoot them and put them on the beach, so called "oceanic disposal".



To address this problem, an abattoir was built. The value of the wool production is some £4 million a year and for a small island community, that is quite a lot. This was the abattoir that was set up as the most sophisticated knackers yard in the world to dispose of the sheep and to produce sheep meat for exports.

The abattoir was built in 2001/02 and received EC approval for export of sheep meat in 2002. We have had two seasons of exports, 2003 – 15,000 sheep, 117 metric tonnes of meat. Last year we managed to produce just over 21,000 sheep, mainly wethers, about 2000 lambs with a total weight of 235 metric tonnes. There is a significant improvement in the selection of animals for slaughter and we are very pleased to gain a contract with MoD and Falkland mutton surprised them all as being the best available. Falkland meat, organic by nature not by law.

While I was there, it was suggested that some form of risk analysis might be carried out on the Falkland's meat and particularly sheep meat. This may not be scientific but it is what we have done based on OIE returns, condemnation data and the food poisoning returns from the Department of Health.

O.I.E Returns

- No list **A diseases** have ever been reported in the Falkland Islands.
- List **B diseases** reported are:
  - Paratuberculosis
  - BSE (in a single imported animal from the UK in 1989, no further cases since)
  - Ovine epididimytis (eradicated 1991)
  - Avian TB and Avian Chlamydiosis

  The Falklands is free of bovine TB and Brucellosis.
- List **C Diseases** reported are:
  - Listeriosis
  - other Clostridial diseases
  - Contagious pustular dermatitis
  - Strangles
  - Toxoplamosis
  - Coccidiosis
  - Caseous Lymphadenitis (+++)
  - Swine Erysipelas.

A summary of OIE returns over the years shows no list A, and of list B - one of particular importance was paratuberculosis but that was in bovines. Of the 21,000 sheep that we slaughtered this year, we did not see any visual evidence of paratuberculosis, but it is not recognised as a condition in the Falklands. Of the list C diseases, one with a large number of pluses, Caseous Lymphadenitis certainly is of great importance in the abattoir. Some 12 to 13% of all the sheep processed had Caseous Lymphadenitis, varying from so-called boils, from the size of your fist down to ones that are just over the size of a broad bean.

It is easily addressed in the dressing process, the inspector or the trimmer just before him can take it off quite easily. We only saw it in the wethers and ewes, we did not see it in any of the lambs because they are not subject to shearing. The lambs are slaughtered in their original coat, because the pelts are worth quite a bit of money so we did not see any sheared lambs, which is a good reason for not having CLA. I do not know the general opinion, but the opinion over there is that it was a shearing disease from dirty shearing, dirty instruments and also inhalation of the bacteria in the rather unsanitary shearing sheds. Two interesting conditions of no particular importance are black liver and peaty kidney - these are both thought to be plant toxins but they do not sell the offal over there so it is not a problem.

Falkland Island Sheep Kill Data 1

- Total number of sheep killed through abattoir: **21,858**
- Number of sheep rejected: **60**

Condition	Total No. with Condition	% by Condition	% of Total Killed
Caseous Lymphadenitis	2775	31.74	12.7
Cysticercus tenuicollis	2079	23.78	9.5
Black Liver*	1658	18.97	7.6
Pleurisy/Pneumonia	736	8.42	3.4
Contamination	516	5.90	2.4
Trauma (bruising, fracture & dislocations)	351	4.02	1.6
Peaty Kidney*	230	2.63	1.1

** Black Liver and Peaty Kidney are conditions seen quite commonly in older sheep in the Falklands. The cause is unknown but is thought to be connected with certain plant toxins.*

Falkland Island Sheep Kill Data 2

Other conditions seen were all at a level < 1% of the total killed. These included:

- Cysticercus ovis
- Nephritis/Nephrosis
- Peritonitis
- Arthritis
- Oedema/Emaciation
- Hydatidosis
- Lungworm
- Metritis
- Pyaemia/Generalised abscessation.

Hydatid controls have been in place since 1965

Of the other things we saw with less in 1% incidence, the interesting one is hydatidosis - in the 1960's, some 50% of the national flock were affected with it and there were quite a few cases in the human population. Strict controls on disposal were bought in and now the level is down to minute proportions. We, in fact, saw six hydatids this year in very old sheep, 12 –13 years old.

Department of Health Food Poisoning Data

Year	No. of cases	Organism	Source
1999	1	Campylobacter spp.	MPA
2000	1	Salmonella spp.	MPA
2001	2	Campylobacter spp.	MPA/Local
	1	Salmonella spp.	Local
	1	Shigella spp.	Fisherman
2002	1	Campylobacter spp.	Local
	1	Salmonella spp.	MPA
2003	1	Salmonella spp.	Local

NB: In excess of 50% occurs at military base (@ 1,700 +) where all meat is imported! No Falkland meat is used.

Department of Health data – this is a pretty healthy place the Falklands, there is only one case reported. You will notice that the source of most is MPA, which is the military base and no Falklands meat is supplied to them. It is all imported, now Falklands will be supplied to MPA but via London.

Salmonella cases are quite interesting, not from a meat point of view, but they usually come from eating undercooked duck eggs or seabird eggs. Penguin and albatross eggs are still harvested and eaten and this is where most of the salmonella comes from.

We looked at the provision of meat, mutton and lamb to the local population, and whether there was a risk in it - and the Stanley population is 1850 and Camp population is 450. The Stanley population gets it from retail outlets supplied by the approved abattoir. The abattoir works to EU Directive 64/443. The micro results were well within the acceptable level this year. The environmental results were so good we could not believe it - cleaning was so good we had to put some dirty stuff in to see whether the laboratory could detect it. The other meat comes direct from farms to the final consumer. This is a rural killing house and due to the low value of the product, the average value of a wether is about £5. So, nobody is going to sell anything that is not perfect. They can throw it away, they can dump it on the beach, they can give it to the dogs. If the top end is ok or the bottom end is ok they can eat it themselves, but they do not sell it so there is an in-built quality system in place already. You are not going to get a repeat sale if you sell rubbish, so market forces dictate quality.

We have the ideal situation for a simple audit HACCP. The only constraint being inaccessibility of some of these settlements - the roads are primitive, flying is very good but a bit expensive. Here is an idea of one of the settlements - you can see the shearing of the sheep shed down by the water where the sheep is sheared, the managers house and a couple of shepherds cottages. That is a typical Falklands settlement.

So really the eating of Falklands meat we concluded is without risk, and there is really only one risk over there!