SALMONELLA IN PORK (SALINPORK)
A NEW EU-PROJECT ON PRE-HARVEST AND HARVEST CONTROL OPTIONS
BASED ON EPIDEMIOLOGIC, DIAGNOSTIC AND ECONOMIC RESEARCH

LO FO WONG, D.M.A.¹, HALD, T.¹,², NIELSEN, J.P.², WILLEBERG, P.¹

The occurrence of foodborne infections caused by consumption of animal products, contaminated with *Salmonella enterica*, has drawn increasing attention worldwide (Acha and Szyfres, 1987). Pork has been identified as a potential reservoir of infection (e.g. Oosterom et al., 1982; Wegener and Baggesen, 1996) and is presently estimated to be responsible for about 15% of the human cases of Salmonellosis in Denmark (Anon., 1997). Part of recently completed Danish research project, entitled 'Reduction and control of salmonella-infection in pig herds', stood model for an international research program funded by the European Union, entitled 'Salmonella in Pork' or SALINPORK. This three-year program started on April 1st 1996 and involves institutes and universities from 6 EU-member states.

There are nine Participants and four sub-contractors involved in the project:

- The Royal Veterinary and Agricultural University, DK*
- The Danish Veterinary Laboratory, DK
- The University of Exeter, GB
- The Federation of Danish Pig Producers and Slaughterhouses, DK
- The University of Utrecht, NL
- The Animal Health Service, Southern Netherlands, NL
- The Free University of Berlin, DE
- The Aristotelian University of Thessaloniki, GR
- The National Veterinary Laboratory, SE
- The Central Veterinary Laboratory, Weybridge, UK *
- The European Salmonella Reference Laboratory, NL *
- The Product Board for Livestock, Meat and Eggs, NL *
- Lebensmittel- und Veterinäruntersuchungsamt, DE *

* coordinator

* sub-contractor.

OBJECTIVES.

The overall objective is to establish the epidemiological basis, to develop the diagnostic tools, and to evaluate options for control of *Salmonella* in pork at the pre-harvest and at the harvest levels. Specific objectives:

- to determine and compare the prevalence and types of salmonella-infections in pig herds in different EU regions.
- to determine and compare the prevalence and sero-types of salmonella-infections in pork samples from slaughterhouses in different EU regions, and to identify critical control points for salmonella-contamination.

¹The Royal Veterinary and Agricultural University, 13 Bülowsvej, DK-1870, Frederiksberg C.

²Danish Veterinary Laboratory, 27 Bülowsvej, DK-1790, Copenhagen V.
• to develop and evaluate improved biotechnological diagnostic tools for detection of salmonella-organisms, or antibodies to *Salmonella*.
• to evaluate on the basis of epidemiologic, diagnostic and economic criteria, the options for control of *Salmonella* in pork, and to propose practical methodologies for surveillance and control programmes in the EU.

**MATERIALS AND METHODS**

The project is structured in 4 different Work packages (WP), each with underlying tasks and subtasks:

WP I. Pre-harvest *Salmonella* epidemiology  
WP II. Diagnostic procedures  
WP III. Pork harvest *Salmonella* epidemiology  
WP IV. Control options and economics

Ad I. WP I includes:
* a **prevalence study**, to provide evidence for the sero-prevalence of salmonella infections in EU fattening pig herds, including variations within and among geographic regions.  
* a **herd-level risk factors study**, to identify herd-level risk factors  
* **Sources of salmonella in pig herds** to provide a risk source analysis on feedstuffs and purchased pigs.  
* **Faecal sampling in sero-positive herds**, to identify representative sero-types of *Salmonella enterica* in faecal samples from sero-positive herds.  
* **Follow-up in sero-negative and sero-positive herds**, to estimate the within-herd prevalence and their seasonal fluctuations.

Ad II. WP II includes:
* **Sero logical examination of serum**, to analyse serological samples for antibodies against *S. enterica*.  
* **Microbiological examination of salmonella**, to analyse the prevailing sero-types of salmonella and the clonal distribution within sero-types.  
* **Sensitivity and specificity of the mix-ELISA serological test**, to assess the applicability and efficiency of the mix-ELISA test on national samples.  
* **Development of new methods for detection of Salmonella enterica antigens**, to develop and improve diagnostic methods for *S. enterica* antigen detection in faeces, swab samples and tissues.  
* **New developments in serological salmonella detection**, to investigate different serological test methods.  
* **Reference material: a controlled inoculation study with salmonella**, to provide reference material.

Ad III. WP III includes:
* **Product surveillance and environmental analyses**, to provide evidence on the prevalence of salmonella infections in pork in EU slaughterhouses, and on potential hazards within the abattoir environment.

* **Estimation of the degree of cross-contamination** brought about by handling of the carcasses during the slaughter process.
Ad IV. WP IV includes:
* Public health potential for salmonella control in pork, to quantify the importance of pork as a potential source of human salmonellosis in the EU.
* Pre-harvest risk analysis, to identify practical methodologies for pre-harvest surveillance and control.
* Harvest hazard analysis, to identify practical methodologies for harvest surveillance and control.
* Economic assessments of pork salmonella surveillance, intervention programmes and human health costs, to provide a comprehensive economic analysis of the implications of possible pig-borne salmonella infections, both in relation to the costs of control in the pork meat supply chain, and to the economic costs of infections in the human population.

BENEFITS.

Technical:
- Use of integrated pre-harvest and harvest epidemiological knowledge for controlling human health hazards.
- Information necessary for implementing legislation with regard to Salmonella in pork.
- Improved methods for detection of Salmonella in pig herds and abattoir samples.

Scientific:
- Identical epidemiological studies in several member states, allowing country-specific and overall modelling.
- New information on subclinical infections of Salmonella in pig herds and Salmonella prevalence at slaughter.

Economic:
- At present, we estimate that the cost to the EU of pork-borne salmonellosis is minimum 0.8 billion ECU annually. The control of Salmonella may lead to substantial socio-economic benefits for the society.

It can be stated that most research milestones for the end of project year 1, set in the project protocol, have been achieved. Some delay in the follow-up study and the surveillance, control and economy-study, has been identified and plans to make up for lost time have been made.

REFERENCES.


