

## Microbiological status of pig carcasses from slaughter houses in northern Germany

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Meat and meat quality are important subjects in the context of official food inspection. It has been prognosed that meat consumption in Germany, Austria and Switzerland will not increase, particularly in view of the recent BSE problem. It must even be assumed that there will be a tendency for further reductions up to the year 2000. Nevertheless, more important for production, trade and finally also for the consumer for whom the meat is produced, is the improvement of meat quality.

In order to gain or to regain the confidence of the consumer, a foremost aim must be to apply a policy of quality assurance during all steps of meat production. Prominent among infectious agents most commonly associated with food-borne infections are Salmonella, Campylobacter, Listeria, Yersinia and enterohaemorrhagic *E. coli*.

**Materials and methods**

During the course of a hygiene control programme, 362 meat samples and 624 swab samples from a slaughter and cutting plant were investigated. The investigations serve as an indication of total microbiological contamination of meat. The total aerobic microbiological count (KbE/cm<sup>2</sup>) was done with the plate method.

During slaughter, 102 skin samples, and during cutting 260 meat samples were investigated for Salmonella. Pre-enrichment was in peptone water (24 h at 37°C), and selective multiplication was in RV medium (24 h at 42°C). After that, subcultures were placed on Rambach and XLD agar (24 h at 37°C). 260 meat samples were investigated for the presence of Listeria. Listeria enrichment broth after FDA/IDJ-FJJ, Merck, was used for selective multiplication. The culture broth is incubated for 48h at 30°C. Then it is smeared thinly onto Listeria selective agar and incubated for 48h at 37°C.

**Results**

Table I shows the results of total microbial counts, and Salmonella and Listeria counts, respectively.

Tab. I

Source of sample	No. of samples	No. of KbE/cm <sup>2</sup>	Salmonella isolates	Listeria isolates
Swab	624	2.0x10 <sup>2</sup> - 6.8x10 <sup>6</sup>		
Meat surface	102	1.2x10 <sup>2</sup> - 3.8x10 <sup>4</sup>	0	1
Cut portion	260	2.0x10 <sup>2</sup> - 4.1x10 <sup>5</sup>	7	2

The evaluation of the microbiological contamination in slaughter houses is of pre-eminent importance, because the generated data can contribute significantly to long-term quality improvements.

During the initial stages of the present investigation, the control of cleaning and disinfection measures with the help of swab samples showed strong contamination (up to 6.8x10<sup>6</sup> KBE/cm<sup>2</sup>) at many places in the production line. With bacterial counts between 10<sup>2</sup> and 10<sup>4</sup> KBE/cm<sup>2</sup>, the microbiological status of pig carcasses corresponded to standard hygiene requirements. On the other hand, the hygiene status of cut portions was unsatisfactory, with a bacterial count of 10<sup>5</sup> KBE/cm<sup>2</sup>. Sanitation measures in the production unit and training of the personnel resulted in reduced total bacterial counts and enterobacteriaceae counts.

In addition to eggs and poultry meat, slaughter pigs are a more minor source of Salmonella infection in man. The results of investigations by different authors on contamination with Salmonella differ. For example, we show that 2.9% of investigated samples are positive for Salmonella. Thus our results do not conform to the results in the available literature. The results of investigating slaughter pigs in Germany show 6% to be Salmonella positive.

As far as the distribution of serovars is concerned, 5 isolates were shown to be *S. typhimurium*. One serovar proved to be *S. typhimurium* DT 104. This isolate was multiresistant to antibiotics. In addition, *S. bovis/morbificans* was isolated from cut portions of meat.

Listeria have a particular significance for human infection. Our investigations show a low level of Listeria findings. Using biochemical differentiation, we were able to demonstrate that two isolates were *L. monocytogenes*.

In Germany, meat consumption is still in the process of further reduction. This trend has also affected pork, the most widely consumed meat. In order to prevent a further fall in meat consumption, it is necessary to take action aimed at preventing the consumer from not buying meat for reasons of poor quality and poor hygiene.

## INTRODUCTION

The present study was conducted in order to determine the effect of different cooking methods on the quality and safety of pork chops. The study was carried out in a laboratory setting. The meat was cooked in a conventional oven, a microwave oven, and a pressure cooker. The quality of the meat was assessed in terms of color, texture, and taste. The safety of the meat was assessed in terms of the number of bacteria present. The results of the study are presented in the following sections.

## MATERIALS AND METHODS

The study was conducted in a laboratory setting. The meat was cooked in a conventional oven, a microwave oven, and a pressure cooker. The quality of the meat was assessed in terms of color, texture, and taste. The safety of the meat was assessed in terms of the number of bacteria present. The results of the study are presented in the following sections.

Table 1. Sampling data of carcasses from the different cooking methods.

Cooking Method	No. of carcasses	No. of carcasses with different bacterial counts		
		< 10 <sup>4</sup> CFU/g	10 <sup>4</sup> - 10 <sup>6</sup> CFU/g	> 10 <sup>6</sup> CFU/g
Conventional oven	10	3	4	3
Microwave oven	10	2	5	3
Pressure cooker	10	1	6	3

## RESULTS AND DISCUSSION

The results of the study are presented in the following sections. The quality of the meat was assessed in terms of color, texture, and taste. The safety of the meat was assessed in terms of the number of bacteria present. The results of the study are presented in the following sections.