REDUCED SPREAD OF PATHOGENS AS A RESULT OF CHANGED PLUCK REMOVAL TECHNIQUE

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SUMMARY

At conventional pluck removal the tongue is removed together with the pluck set. During this slaughter process pathogenic bacteria can be spread from the tonsils and pharynx to the carcass and organs. The Danish Meat Research Institute has in collaboration with a pig slaughterhouse investigated an evisceration technique where the tongue is left in the head. The head was not split during this slaughter process, and to avoid cross-contamination the tongue has to remain in the head until the head has been removed from the carcass. The effect of the altered pluck removal on the spread of pathogens from tonsils to carcass and pluck set has been examined. The examined parameter was the occurrence of Salmonella sp. and Yersinia enterocolitica 0:3 (Y.e.) in the tonsils, on the liver and diaphragm and on the carcass (sternum and cut face down to the sticking wound including some 5 cm of the adjacent rind in the area). Control and test batches were sampled three times with intervals of one week. From the control batch 723 Salmonella samples were taken from 241 carcasses and 741 Y.e. samples from 247 carcasses. From the test batch 699 Salmonella samples were taken from 233 carcasses and 738 Y.e. samples from 246 carcasses.

The altered pluck removal led to a considerable reduction of the spread of pathogenic bacteria on the fore end of the carcass. The frequency of carcasses contaminated with pathogenic bacteria was four times higher in the control batch compared to the test batch. On liver and diaphragm the frequency in the control batch was approx. two times higher compared to the test batch.

Introduction

At the conventional pluck removal where the tongue is removed together with the pluck set and used as the hanging media on the pluck conveyor spreading of pathogenic bacteria from the tonsils and pharynx to the carcass and to the pluck set (liver, heart) is unavoidable. In cooperation with a Danish abattoir the Danish Meat Research Institute has carried out a project where pluck removal was changed leaving the tongue in the head during slaughter. The effect of the changed pluck removal on spreading of pathogenic bacteria from tonsils to pluck sets and carcasses has been investigated.

Parameters for the investigation were the presence of Salmonella sp. and Yersinia enterocolitica 0:3 (Y.e.) in tonsils, on the liver and diaphragm and on the carcass (sternum and cut face down to the sticking wound including some 5 cm of the adjacent rind).

Samples have been taken both from conventional slaughter and from slaughter with changed pluck removal, for control and test respectively. For practical reasons the samples have been taken from two slaughterlines. The slaughterlines are identical and it is not predetermined to which of the two lines an animal is driven.

Materials and Methods

Pluck set removal - test batch. Between pulling free and removal the pluck set was shielded from drip from the snout. Pluck set (minus the tongue) was removed by cutting the larynx and transported on the conveyor hanging by this. The head was not split. The tongue and tonsils were left untouched during slaughter.

Sampling. In all, the control group comprised 723 samples from 241 pigs which were investigated for the presence of Slamonella sp. and 741 samples from 247 pigs for the presence of Y.e.

Samples of tonsils, liver/diaphragm and carcass were taken 3 times at weekly intervals for both the control and experimental groups. Every 6th pluck set and carcass was marked with identification on plucks removal and used alternately for determination of Salmonella Sp. and Y.e.

Control Batch. Sampling of tonsils was carried out using two cotton swabs as the pluck set was removed. Swabs were placed centrally, the tonsils being pressed arund these and gloves were changed between each sampling. The two swabs + 10 ml phosphate-sorbitol buffer/peptone water buffer were propagated.

After pluck separation, livers/diaphragms from the marked up pluck sets were collected in bags added phosphate-sorbitol buffer/peptone water buffer and shaken heavily after which the buffer was propagated.

Samples were taken from the carcasses after completion of slaughter. Samples were taken with a gauze pad from sternum and cut face down to the sticking wound including 5 cm of the adjacent rind, see Figure 1. The same gauze pad was used on both halves of the carcass. Gauze pad plus 100 ml peptone water buffer/phosphate sorbitol buffer were stomached for 1 minute and propagated.

Test Batch. Tonsils were swabbed after sampling the carcass. The tonsils were cut free of the palate and the throat opened so that cotton swabs could be inserted through the opening. Two swabs were used as before and the tonsils pressed around the swabs to ensure good contact. Gloves were changed between each samplingand all tools, knives and hooks were cleaned with alcohol and flamed between each carcass. The 2 swabs + 10 ml of phosphate-sorbitol buffer/peptone water buffer were propagated.

Results and Discussion

Yersinia. The incidence of positive Ye. samples in the control and test batches is shown for the 3 measuring points in Figure 2. It can be seen that 56% ±6% of the tonsils from pigs in the control group and 72% ±6% of tonsils from pigs in the experimental group contained Y.e. (95% frequencies ± confidence limits). Thus, there were significantly more pigs with a potential for spreading Y.e. in the experimental group. In spite of this a significantly lower incidence of Y.e. was found on the carcass of pigs from the experimental group (14% ±3% as against 40% ±6% for the control group).

The improvement was not as dramatic for liver and diaphragm but was still lower (although not satistically significant) in the experimental group.

Salmonella Sp. The incidence of positive salmonella findings in the control and test batches are shown in Figure 3. It can be seen that 15% of the tonsils of pigs from the control group contained Salmonella Sp. as against 2% for tonsils from pigs of the experimental group. The potential for spreading Salmonella was therefore least in the experimental group.

Figure 3 clearly shows that the changed procedure for removing the pluck set has also had an effect on the spread of Salmonella Sp. from tonsils to the carcass and liver/diaphragm. Especially spread to the fore-end carcass was much lower.

The low incidence of Salmonella in the tonsils of the experimental group makes it difficult to make a definite conclusion but the tendency shown supports the more reliable results shown by the Y.e. figures.

Changing the procedure for pluck set removal has not completely eliminated the spread of pathogenic bacteria and the possible reasons for this - either alone or in combination - are given in the following:

- The contamination of the posterior and belly portion of the carcass that can occur during bung loosening and gut removal can spread to the foreend during the subsequent treatment on the slaughter line.
- Salmonella sp. can occur in the sub-mandibular glands and be spread from there to the carcass. A similar process could also be valid of Y.e.
- On gut removal the oesophagus is cut across and drip from the opening could contaminate the pluch set and carcass with both Salmonella Sp. and Y.e., especially if the cut is made too close to the stomach opening.
- On removal of the pluck set the trachea and oesophagus are cut through and if tools are not disinfected between each pig a contamination of carcass and pluck set could occur via hands and tools.
- Contaimination of the liver and diaphragm could occur from the end of the oesophagus remaining on the pluck set.
- Scald water from the lungs must be expected to be contaminated with Y.e. and Salmonella Sp., if the animal contains these in the tonsils. Scald water released when the veterinary inspection cuts into the lungs could contaminate the rest of the pluck set.

Conclusion

The changed procedure for removal of the pluck set, were the tongue is left intact in the non-split head on the slaughter line has led to a marked reduction in the spread of pathogenic bacteria from tonsils to the foreend of the carcass and pluck set.

The incidence of positive findings for pathogenic bacteria on foreends was about a quarter of that seen in the control group in this work. The corresponding figure for liver/diaphragm was about a half.

Methods

Detection of Yersinia enterocolitica 0:3 was done according to Nordic Committee on Food Analysis, Method No. 117 (1987), with a modification of th enrichment step, as the swabs were transferred directly into 10 ml PSB. Furthermore, the biochemical verification was extended with the following reactions: raffinose(-), trehalose(+), salicin(-), citrate(-), CP(+) and tween 80(-). Detection of Salmonella ssp. was done according to NCFA Method No. 71, (1991), with a modification. Rambach was used as selective indicative medium.

References

Nordic Committee on Food Analysis, 1987, No. 117, Yersinia enterocolitica. Detection in Foods. 2nd ed.
Nordic Committee on Food Analysis, 1991: No. 71, Salmonella Bacteria. Detection in Foods. 4th ec.