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Relative bacterial levels at different sampling sites of beef carcasses measured with the Ølgaard method

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SUMMARY: The relative bacterial levels of five sampling sites in five beef carcasses were studied daily during nine month at the end of the slaughtering line using the Ølgaard swab/agar plate method. Of the total material of 755 carcasses, the mo contaminated site was the shoulder and the least contaminated was the lateral round. The means of the relative bacteri counts per sample were 89 and 5.5 respectively. In flank groin, lateral forerib and neck the corresponding values were 5 36 and 27 respectively. Although great daily random variation was observed at each sampling site, the monthly means consisting of about 80 samples - stayed at quite a constant level; the exception was flank groin, in which a great variation the monthly means was observed during the last six months. The technological conditions stayed unchanged during th survey. It is suggested that the variation of the monthly means in flank groin may have been caused by the working hab of individual workers.

INTRODUCTION: One of the difficulties in assessing the hygienic level of a beef slaughtering line is caused by the gre variation of the bacterial levels in different carcasses and at different sampling sites. However, it has been shown that whe adequate numbers of carcasses are used there occurs a significant interaction between contamination and sampling si (STOLLE, 1989). The difference in contamination levels between sites is found to derive from technological condition (STOLLE, 1989), and changes in slaughtering line technology have been shown to affect the distribution of contamination o the beef carcass (WHELEHAN et al., 1986). It is generally agreed that the most contaminated areas are the front quarter a the lateral parts. Typical contaminated sites vary in different slaughterhouses. Because of this, the selection of sampling si affects the result and makes it difficult to compare the hygienic level of different slaughterhouses (ROBERTS et al., 198 However, it has been suggested that during a microbiological surveillance program it is acceptable to restrict sampling si to typically contaminated sites when controlling the hygienic level of a single beef slaughtering line (STOLLE, 1989). T purpose of this study was to monitor the variation in contamination levels of different sampling sites in one beef slaughteri line during a long surveillance period, with no change in technological conditions.

MATERIALS AND METHODS: The study was carried out during nine months from February to October 1990 in a sing Finnish slaughterhouse. Five carcasses were sampled daily at the end of the slaughtering line. The samples were taken fr five different sites. The sampling sites were lateral round, flank groin, lateral forerib, shoulder and neck (Fig. 1). During o month about 400 hundred samples were taken. The total number of samples was 3775, taken from 755 carcasses.

The sampling was performed using the Ølgaard swab/agar plate method (ØLGAARD, 1977). A sample was taken using cotton wool swabstick moistened in physiological saline and a 1 cm^2 metal template. After wiping the carcass five times swab was wiped across the agar plate surface, keeping the stick at the same angle all the time. Plate count agar (Or Diagnostica, Espoo, Finland) was used. The plates were incubated aerobically at 30°C for two days.

In reading the results, samples under 100 colonies were counted directly and the rest were estimated using a compara disc according to the Ølgaard method. Bacterial numbers per sample were transformed to logarithmic units. The resu obtained with this method should not be regarded as actual bacterial counts but rather as relative bacterial levels.

RESULTS AND DISCUSSION: Of the total material, the most contaminated site was shoulder and the least contaminated was round. The means of the relative bacterial counts per sample of these sites were 89 and 5.5, respectively. In flank groin, forerib and neck the values were 54, 36 and 27, respectively. Since the relative bacterial levels of the same sampling sites varied greatly from day-to-day, monthly means (about 80 samples/site) were used in analyzing the results. The monthly means of the relative bacterial counts at four sampling sites, excluding flank groin, remained at quite a constant level during the whole survey period. In flank, however, great variation was observed in the monthly means of the relative bacterial numbers during the last six months. The minimum was 18 in July and the maximum 450 in September. The results are expressed in logarithmic units in Fig. 2.

It can be seen from the results that three out of five of the sampling sites (shoulder, neck and forerib) gave almost identical information about the variation in carcass contamination level. This supports the suggestion made by STOLLE (1989) that it is legitimate to restrict sampling sites to those typically contaminated when controlling the hygienic status of a specific slaughtering line. An interesting exception among the sampling sites monitored was flank groin. One explanation for the great monthly variation may be the differences in working habits between individual workers. The area of flank groin was found occasionally to be touched by one of the meat inspector assistants. The impact of details of working procedure on the contamination of beef carcass is rarely discussed in the literature.

CONCLUSIONS: The relative bacterial levels at different sampling sites of beef carcasses measured with the Ølgaard method usually seems to be quite constant in continuous monitoring of a slaughtering line when no changes in the technological conditions occur. However the details of working procedure may cause unexpected variation in bacterial levels at some sampling sites. It seems obvious that when a restricted number of sampling sites is used, changes which affect only a small area of the carcass may remain unnoticed or may lead to false conclusions concerning the microbiological status of the carcass as a whole.

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Figure 1. Sampling sites: 1 Lateral round, 2 Flank groin 3 Forerib, 4 Shoulder, 5 Neck.

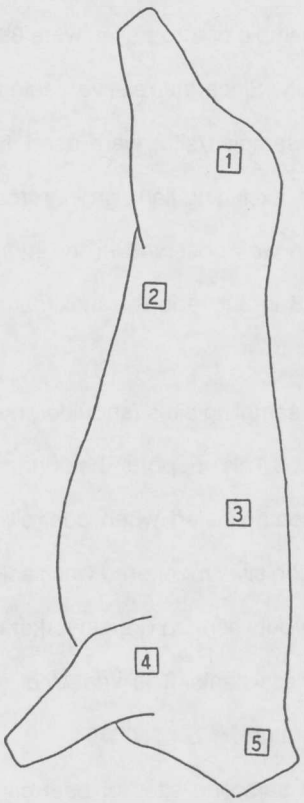

Figure 2. Relative bacterial levels of five sampling sites during nine months expressed in monthly means. Sites: -+- Lateral round, -+- Flank groin, -✳- Forerib, -⊡- Shoulder, -x- Neck.