

PREVALENCE OF LISTERIA MONOCYTOGENES COTAMINATED IN CHINESE BEEF CATTLE PROCESSING PLANTS

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Abstract –This study investigated the prevalence of *Listeria monocytogenes* contaminated in two beef cattle processing plants (A and B) located in Shandong Province. Overall, the prevalence between two plants was significantly different, with 14.0% (236 samples) and 46.4% (233 samples) from plant A and B, respectively. High positive percentage was found on carcasses of post-evisceration, post-washed and post-chilled procedures. Especially in plant B, the prevalence reached 81.3% in beef cuts. However, no stain of *L. monocytogenes* was isolated from transportation vehicles in both plants, and the positive rates in lairage pens, faces and cattle hides were below 3.0% in plant A and below 16.0% in plant B. It indicated other contaminated sources might exhibit in both plants. Therefore, specific measures should be taken to prevent and/or treat *L. monocytogenes* contamination in the two beef slaughter plants.

Key Words –*L. monocytogenes*, beef carcasses, detection.

I. INTRODUCTION

Listeria monocytogenes is a major foodborne pathogen that can cause listeriosis with a high mortality rate both for human and animals. It exists in various environments, including the meat production environments. Among those investigations conducted in several countries, this type of pathogen was found in animal faces and hides, even carcasses and retail meat [1, 2]. Previously, we made a survey evaluating the prevalence of *L. monocytogenes* in three beef cattle abattoirs located in northeast, northwest, and southwest of China [1], and found there was a big location variation of the pathogen prevalence. However, to our knowledge, there is no report on this issue conducted in middle-east of China. Therefore, in this study, the prevalence of *L. monocytogenes* was investigated in two beef cattle processing plants located in Shandong Province of China.

II. MATERIALS AND METHODS

The investigation was conducted in two commercial beef processing plants (A, B) located in Shandong Province of China. And total of 469 samples were collected over a period of 1 year (from October 2015 to September 2016). The samples were collected from transportation vehicles, lairage pens, faces, hides, post-evisceration carcasses, post-washed carcasses, post-chilled carcasses and beef cuts. Both plants involved in this study were equipped with a product line that can slaughter 30-40 animals per hour. Sample collection procedures and the detection of *Listeria monocytogenes* were based on a previous study [1]. Statistical analysis of the data was carried out using SAS (Version 9.0). The chi-squared test was used to determine significant differences between proportions. A value of $P < 0.05$ was considered significant.

III. RESULTS AND DISCUSSION

Overall, the prevalence between two plants was significantly different, with 14.0% (33/236) and 46.4% (108/233) in plant A and B, respectively (Table 1). Among the 459 samples collected, no stains of *L. monocytogenes* were isolated from transportation vehicles samples, and 2.63% (1/38) and 11.1% (3/27) were positive of this pathogen in samples collected from lairage pens of plant A and B, respectively. It indicated the contamination of *L. monocytogenes* started from pre-slaughter stage. Only one sample was positive in samples collected either from faces (2.5%, 1/40) or cattle hides (2.5%, 1/40) in plant A, while the number were higher, with 10.3% (3/29) and 15.6% (5/32) in plant B, which were consistent with the overall prevalence in faces and hides in previous surveys [4]. The positive percentage was increasing along with the extension of the slaughter processing line. Compared with pre-slaughter environment and cattle carriage, much higher prevalence of *L. monocytogenes* was found on post-evisceration carcasses (32.5%,

71.9%), post-washing carcasses (31.6%, 71.9%) and chilled carcasses (80%, 78.1%) in both plants (A, B). This indicated a serious contamination of *L. monocytogenes* in the two plants, as in previous studies showed a quite low prevalence on post-evisceration carcasses, chilled carcasses with the positive rates were 2.8% [4] and 4.1% to 11.3% [5,6], respectively. The situation was even worse in the beef cuts of plant B, the observed prevalence reached 81.3%. We also found similar results in a previous study, meat cuts from one of three investigated beef plants exhibited 100% positive rates of *L. monocytogenes*[3]. It reflects the poor hygiene conditions in the two beef plants, and also indicates that, besides faces and hides, other contaminated sources such as surfaces of equipments, knives, and workers hands, might exhibit in both plants, since the high prevalence across the entire processing procedures was assumed related with biofilm formation on the contacted surfaces along the processing line. Therefore, specific measures should be seriously taken to prevent and/or treat *L. monocytogenes* contamination in both beef slaughter plants.

Table 1 The prevalence of *Listeria monocytogenes* contaminated in two beef cattle processing plants in China

Sampling points	Plant A (%)	Plant B (%)
Transportation vehicles	0/30 (0)	0/17 (0)
Lairage pens	1/38 (2.63)	3/27 (11.1)
Feces	1/40 (2.5)	3/29 (10.3)
Cattle hides	1/40 (2.5)	5/32 (15.6)
Post-evisceration carcasses	13/40 (32.5)	23/32 (71.9)
Post-washing carcasses	12/38 (31.6)	23/32 (71.9)
Chilled carcasses	4/5 (80.0)	25/32 (78.1)
Beef cuts	1/5 (20.0)	26/32 (81.3)
Total	33/236 (14.0)*	108/233 (46.4)

Note:* means significant differences overall prevalence between plants A and B.

IV. CONCLUSION

High prevalence of *Listeria monocytogenes* were detected in both beef slaughtering plants. Unexpected, the highest detected rate was not found in faces and hides, but on the carcasses, even in one plant, the rate in meat cuts was above 81.3%. It indicated a poor hygiene status in both plants. Other contamination sources should be inspected in further study, as the high prevalence was assumed related with biofilm formation on the contacted surfaces along the processing line.

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