

ASSESSMENT ON UTILIZATION POSSIBILITY OF *ENTEROCOCCUS FAECALIS* ISOLATES FROM NEONATES FOR FERMENTED SAUSAGES PRODUCTION AS STARTER CULTURES

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Abstract – This study aimed at assessing the utilization possibility of *Enterococcus faecalis* for production of fermented sausages as starter cultures. The *E. faecalis* isolates isolated from faces of 5-days-old healthy newborn babies, identified by 16SrDNA sequencing were used for fermented sausages production. Six treatments (4 different *E. faecalis* isolates, 1 commercial starter culture and 1 control) were prepared. The inoculation with *E. faecalis* showed a stronger acidification compared with the control. The treatments with *E. faecalis* showed significantly the highest flavor and acceptability scores. Based on the results obtained from this investigation, it could be suggested that the isolated *E. faecalis* could be applied for production of fermented sausages as starter cultures.

Key Words – acidifying, flavor, biogenic amine.

I. INTRODUCTION

Enterococci, a group of lactic acid bacteria (LAB), are frequently-found microorganisms in many sources (e.g. foods and gastrointestinal tract of humans and animals, etc. [1, 2]. Though the concern about the pathogenicity of enterococci, however, recent studies have demonstrated that some species of the *Enterococcus* genus (e.g. *E. faecalis*) have much lower pathogenicity potential or no virulence [1, 3]. Recently, studies have also shown the significant applications of some enterococci strains as probiotics for improving human health [4]. To date, there are relatively few published reports that deal with the utilization of the isolated *Enterococcus* strains as starter cultures and evaluation of their effects on the quality and safety in real fermented meat products. Since the *E. faecalis* is the nonpathogenic commensal in the mammalian gastrointestinal tracts, and are the first LAB that present in the infant's intestines. The strains have also been proven to have no or very low virulence factors expression [2]. Therefore, the aim of present study was to evaluate the utilization possibility of the *E. faecalis* isolates for fermented sausages production as starter culture.

II. MATERIALS AND METHODS

Isolation, identification and genomic sequencing of E. faecalis isolates

E. faecalis were isolated from faces samples of 5-days-old healthy newborn babies in different regions of South Korea. The culture, isolation, antimicrobial susceptibility tests and identification of the bacteria were performed following our previously developed method [2]. Among four isolates identified, one was specific for Korean Agriculture Culture Collection (KACC) *E. faecalis* 92130P (KACC92130P) and other three remaining isolates were named as *E. faecalis* isolate 2T115, 3B45 and 4B330. After identification, the *E. faecalis* isolates (each) was propagated in de Man, Rogosa and Sharpe broth and then collected, washed with 0.85% (w/v) saline solution and used for production of fermented sausages.

Formulation and treatment

Six treatments (4 different *E. faecalis* isolates, 1 commercial starter culture and 1 control) of fermented sausages were prepared in the present study. Each isolate at number of 10^4 cfu/g meat batter was added to each fermented sausages treatment (T) which was then named as: T1, T2, T3 and T4, respectively. The batch added with 0.02% (w/w) commercial starter culture without *E. faecalis* was served as the positive control. The ingredients and their used levels as well as the fermented sausages production procedures were same with those as described in our previous work [5]. At the end of ripening (day 30), the samples were analyzed for quality traits, lipid oxidation and sensory quality as described in previous study [5]. The data were analyzed by using the SAS system package.

III. RESULTS AND DISCUSSION

All the batches inoculated with the *E. faecalis* isolates presented lower pH values (5.5-6.0) compared to the control (6.08) ($P < 0.05$) (Table 1). However, the batch inoculated commercial starter culture showed lower pH value (5.53) ($P < 0.05$), meaning that the isolated *E. faecalis* isolates showed a slightly poorer acidifying capacity compared to commercial starter culture. Most batches inoculated with the *E. faecalis* isolates had higher total LAB (6.89-7.34 log₁₀ cfu/g) as compared with the control (6.58 log₁₀ cfu/g) or commercial starter culture (6.88 log₁₀ cfu/g) (Table 1). These results suggest that the inoculated *E. faecalis* isolates presumably were the predominant LAB in the samples. In general, the inoculation with *E. faecalis* isolates or commercial starter culture significantly increased the TBARS levels in the products in comparison with the control ($P < 0.05$) (Table 1). The results were consistent with our previous finding [5]. The inoculation seemed to not cause negative effects on the color (Table 1). Interestingly, all the inoculated batches had significantly higher flavor and taste scores compared to that of control ($P < 0.05$) (Table 1). Also, most batches with *E. faecalis* isolates presented similar or higher flavor scores as compared to that of the batch with commercial starter culture.

Table 1. Technological quality, color traits and sensory quality of fermented sausages as affected by the *E. faecalis* inoculation

Items	Treatment					
	Control	SC	T1	T2	T3	T4
Yield (%)	44.47±0.10ab	43.17±0.13bc	44.29±0.10ab	45.14±0.15a	44.14±0.15ab	41.91±1.14c
pH	6.08±0.02a	5.35±0.01f	6.00±0.02b	5.76±0.02c	5.58±0.03d	5.50±0.01e
Water activity (a _w)	0.87±0.00	0.87±0.00	0.87±0.00	0.87±0.00	0.87±0.00	0.88±0.00
Lactic acid bacteria (log ₁₀ cfu/g)	6.58±0.30d	6.88±0.25c	6.89±0.45c	6.92±0.37b	6.98±0.52b	7.34±0.46a
TBARS (mg MDA/kg)	1.34±0.12d	2.90±0.18b	1.50±0.15cd	1.58±0.23c	3.48±0.31a	1.69±0.16c
CIE L* (lightness)	45.31±0.65b	47.29±0.35a	46.70±0.22a	46.25±0.49ab	46.20±0.44ab	47.31±0.39a
CIE b*(yellowness)	9.75±0.21b	10.46±0.16a	10.49±0.21a	10.41±0.07a	10.70±0.14a	10.21±0.19ab
CIE a* (redness)	7.65±0.25d	9.03±0.19ab	8.16±0.17cd	9.05±0.21ab	9.31±0.26a	8.57±0.25bc
Color	4.45±0.24c	5.95±0.15a	5.58±0.18ab	5.33±0.18b	5.91±0.14a	5.74±0.15ab
Flavor	4.49±0.15d	5.30±0.34bc	5.50±0.40b	5.20±0.31c	5.70±0.2ab	5.86±0.14a
Taste	4.64±0.16c	5.89±0.17ab	5.61±0.17ab	5.44±0.16b	5.96±0.15a	5.58±0.14ab
Acceptability	4.69±0.17c	6.15±0.11a	5.71±0.12ab	5.44±0.17b	6.00±0.17a	6.13±0.14a

Means ± standard error in a same row with different superscript (a-f) are significantly different at $P < 0.05$.

SC: commercial starter culture; T1, T2, T3 and T4: 2T115, 3B45, 4B330 and KACC92130P. TBARS: thiobarbituric acid reactive substances.

IV. CONCLUSION

Based on the obtained results it is suggested that the *E. faecalis* isolates from neonate's faces origin may be used as starter culture or starter adjunct to increase the acidifying activity and improve organoleptic properties of mature fermented sausages.

ACKNOWLEDGEMENTS

This study was supported by 2016 year Postdoctoral Fellowship Program (Project No. PJ01086002) of National Institute of Animal Science, Rural Development Administration, Republic of Korea.

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