BUTTER-AGED AND OTHER FAT COATINGS TO AGE MEAT

Jonatã H. Rezende-de-Souza[1], Kathelen L. C. R. Jacinto[1], Isaac L. Vieira[1], Gabriela L. Oliveira[1], Dyana C. Lima[1] and Sérgio B. Pflanzer[1*]

[1] Department of Engineering and Food Technology, School of Food Engineer, University of Campinas, Brazil
*Corresponding author email: spflanzer@gmail.com

I. INTRODUCTION

Meat tenderization is often attributed to aging, a process that is primarily facilitated by enzymes like calpains [1]. To enhance the flavour of the aged meat, innovative techniques like the Butter aging process have been developed, wherein meat is coated with butter prior to aging. However, due to the elevated cost of butter, alternative and more cost-effective options are being explored. Consequently, this study aims to evaluate the quality of beef striploin aged using different lipid coatings as substitutes for butter.

II. MATERIALS AND METHODS

The experiment involved 30 pieces of striploin (*Longissimus lumborum*) allocated into five treatment groups. The treatments included butter (Butter-Aged - BA), lard (Lard-Aged - LA), edible bovine tallow (Tallow-Aged - TA), cocoa butter (Cocoa Butter-Aged - CA), and vacuum aging (Wet-Aged - WA) as the control treatment. The WA was vacuum-sealed using Cryovac® BB 2620 (50 microns) and aged for 8 days, while the other treatments were dry-aged for one day before being coated with the corresponding material and then aged for an additional 7 days. All groups were aged for a total of 8 days. During the experiment, the thickness of the covering fat was measured using a calliper, and the adherence rate of the covering fat and process yield were calculated based on weight differences. The experiment also included microbiological analyses (mesophile, psychrotroph, lactic acid bacteria, and enterobacteria counts), physicochemical analyses (meat surface water activity, instrumental tenderness and instrumental colour), and sensory analyses (structured hedonic evaluation acceptance test). The statistical analysis was carried out using Statistica 10.0 software, and variance analysis and Tukey's test were employed for inter-treatment comparison.

III. RESULTS AND DISCUSSION

The microbiological quality of all treatments was satisfactory, with similar mesophilic (5.59-5.84 log.CFU/g^{-1}), psychrotrophic (7.45-7.60 log.CFU/g^{-1}), lactic bacteria (5.79-6.58 log.CFU/g^{-1}), and enterobacteria counts below 3 log.CFU/g^{-}across all treatments. The thickness of the covering fat was consistent across all treatments at 1±1 cm, with a fat adherence rate of 33±2%. The final yield was greater ($P<0.05$) at the WA, with no difference between the treatments with coating (Table 1).

The water activity of the surface region of samples from the WA was greater *(*$P<0.05$) than LA, CA, and TA, but similar to the BA. This may be caused regards butter has a high hardness at refrigeration temperatures, acting as a good barrier against water loss and preserving the exudate in the meat-fat system [2]. In contrast, other fats showed disorganized crystallization conditions that resulted in small cracks and superficial dehydration of the meat. After cooking, the weight loss was higher in WA, since it was the treatment that had almost no water loss during aging.

The different aging methods did not affect instrumental tenderness and colour (Table 1), or sensory characteristics (Table 2), indicating that the LA, TA and CA are viable coating materials alternatives to milk butter without compromising the quality of the final product.

Table 1. Process yield and quality traits of beef striploin aged with different lipid sources coating.

Treatment	Yield (%)	Aw surface	CL (%)	SSF (kg)	L*	a*	b*
WA	100 [a]	0.99 [a]	24.2 [a]	15.9	43.2	22.8	16.8
BA	83.7 [b]	0.99 [ab]	20.7 [ab]	12.8	43.9	19.7	14.9
LA	83.4 [b]	0.99 [b]	19.7 [ab]	14.1	45.4	19.4	14.1
TA	85.7 [b]	0.99 [b]	18.8 [b]	13.0	42.2	19.2	14.3
CA	84.9 [b]	0.99 [b]	18.4 [b]	13.8	43.3	20.8	15.6
SEM	1.19	0.0002	0.67	0.83	0.83	0.48	0.55
P-value	<0.001	<0.001	<0.050	0.841	0.893	0.062	0.617

[a,b] Different letters on the same column indicate a significant difference ($P<0.05$); CL – Coocking Loss; SSF – Slice Shear Force; WA – wet-Aged; BA – butter-aged; LA – lard-aged; TA - tallow-aged; CA - cocoa butter-aged

Table 2. Sensory quality attributes of beef striploin aged with different lipid sources coating.

Treatment	Aroma	Flavour	Juiciness	Tenderness	Overall acceptance
WA	4.98	4.91	5.18	5.46	5.23
BA	5.13	4.98	5.00	5.30	5.11
LA	5.20	4.96	5.02	5.57	5.20
TA	4.59	4.39	4.93	5.20	4.64
CA	4.98	4.79	4.91	5.30	5.07
SEM	0.08	0.07	0.07	1.21	0.07
P-value	0.101	0.105	0.083	0.507	0.062

WA – wet-Aged; BA – butter-aged; LA – lard-aged; TA - tallow-aged; CA - cocoa butter-aged

IV. CONCLUSION

The aging of beef with lipid coating does not have a significant impact on the quality of the meat compared to vacuum aging. Additionally, the study demonstrated that it is possible to substitute milk butter with other lipid sources without affecting the quality of the final product. Therefore, using alternative and more affordable lipid sources can be a cost-effective solution for the industry without compromising the quality of the meat.

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