

APPLICATIONS OF THE *MUCOR FLAVUS* SP. BIOSTARTER SHORTENS THE TIME OF DRY AGING OF BEEF

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I. INTRODUCTION

Dry-aging of beef is one of the two popular methods of aging beef. During this process, muscle proteins were degraded, causing significant changes in sensory quality, primarily an increase in its tenderness [1]. An interesting issue seems to be the possibility of shortening the aging time of beef while maintaining high sensory quality of meat [2]. The aim of this study was to analyze the possibilities to applications of the *Mucor flavus* sp. biostarter shortens the time of dry aging of beef. We supposed that a fungal biostarter influenced on it was shorted the time of dry aging of beef.

II. MATERIALS AND METHODS

The research material consisted of 6 samples from individuals crossbred from Holstein-Friesian cows with bulls of meat breeds. Three samples were the control group (C; n=3), while the next 3 were the test sample (Mf; n=3), which was inoculated with the *Mucor flavus* sp. biostarter. Both samples were put into the dry-aging fridge (DryAger, Bad Saulgau, Germany) for 21 days. The physicochemical parameters (pH, colour parameters), chemical composition of muscle, determination of the cutting force and sensory quality were evaluated after aging. The obtained data were calculated using STATISTICA version 13.3 software (TIBCO Software Inc. 2017). Differences between groups were identified using t-Student's test, at $P < 0.05$.

III. RESULTS AND DISCUSSION

After during dry-aging, the pH value increases and the red colour was less (parameter a^*). The results from proteolytic transformations during maturation and myoglobin transformations [1]. Results presented in Table 1 showed that 21 days beef aged with *Mucor flavus* sp. appeared as better palatability and less shear force after grilling with significant differences ($P < 0,05$). Similar results were obtained by Colle *et al.* [2]. The lower shear force after heat treatment in the Mf group corresponds to the better juiciness of the meat. Also, similar sensory quality results were obtained over 21 days as in the Przybylski *et al.* [3] research over 28 days. In addition, the biostarter group had better overall acceptability than the non-biostarter group. The weight losses during aging between the control samples and those with biostarter are non-significant. Nevertheless, shortening the maturation time by 7 days in the final phase reduces weight loss by about 3-4%, as demonstrated by Przybylski *et al.* [3]. In addition, shortening the aging time also means lower expenses for maintaining the dry-aging fridge.

IV. CONCLUSION

The results showed a significant effect of the fungal biostarter on the possibility of shortening the dry-aging time of beef. The beef aged with the biostarter for 21 days was more palatability in sensory evaluation and it has less shear force after grilling compared to dry-aging without biostarter. The reducing the aging time of beef can have a positive effect on reducing costs by improving the economic aspect (reducing losses) and the microbiological quality of meat.

Table 1. Meat characteristics after 21 days of aging

Traits	Control group without Biostarter	Mf group with Biostarter +	P-value
pH ₁	5.60	5.59	0.86
L* ₁	34.5	38.2	0.34
a* ₁	24.0	20.9	0.14
b* ₁	21.6	23.2	0.48
pH ₂₁	5.73	5.88	0.18
L* ₂₁	39.0	35.8	0.33
a* ₂₁	14.4	15.2	0.39
b* ₂₁	14.0	14.3	0.71
Protein content [%]	17.3	17.9	0.64
Fat content [%]	23.4	14.8	0.19
Collagen content [%]	1.34	1.03	0.42
Shear force after grilling [N]	92.9	81.3	0.03
Penetration force after grilling [mm]	12.0	10.9	0.26
Odour A ¹ (1-9)	5.92	6.53	0.14
Odour B ² (1-9)	6.82	7.1	0.35
Softness of aged meat (1-9)	7.08	7.1	0.97
Juiciness of aged meat (1-9)	7.02	7.51	0.2
Palatability of aged meat (1-9)	6.75	7.45	0.03
Overall acceptability (1-9)	6.67	7.42	0.05
Weight losses [%]	10.9	11.9	0.32

*the results marked with the letters *a*, *b* are different statistically significantly ($P < 0.05$)

¹odour raw material (beef after aging; before heat treatment)

²odour after heat treatment

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REFERENCES

- Šulcerová H., Sýkora V., Nedomová Š. & Mihok M. (2017). Aging of beef rumpsteak on sensory quality, color appearance and texture properties. *Journal of Food Science* 11(1): 380-385.
- Colle M. J., Richarda R. P., Killinger K. M., Bohlscheid J. C., Gray A. R., Loucks W. I., Day R. N., Cochran A. S., Nasados J. A. & Doumit M. E. (2016). Influence of extended aging on beef quality characteristics and sensory perception of steaks from the *biceps femoris* and *semimembranosus*. *Meat Science* 119: 110–117.
- Przybylski W., Jaworska D., Płecha M., Dukaczewska K., Ostrowski G., Sałek P., Sawicki K. & Pawłowska J. (2023). Fungal Biostarter Effect on the Quality of Dry-Aged Beef. *Foods* 12: 1330.