EFFECT OF NATURAL ANTIOXIDENTS ON THE TEXURAL PROPERTIES OF GAME MEAT PATTIES DURING STORAGE

Peter Mukwevho*[1], Vhutali Netshikhudini[1]

[1] Department of Consumer and Food Sciences, University of Pretoria, Hatfield, Pretoria, South Africa.

*Corresponding author email: peter.mukwevho@up.ac.za

I. INTRODUCTION

Game meat production, in South Africa, is faced a significant loss due to waste during harvesting and processing. To reduce waste and improve the utilization of meat, meat restructuring can be applied. During meat restructuring, ingredients such as antioxidants, salt, and soya protein isolates can be incorporated in the meat to improve the meat's flavor and shelf-life (1). The benefit of restructuring meat is that it allows for the use of low-quality meat or trimmings that can be processed into even more valuable products (2) and this helps reduce waste. In this study, the natural antioxidants (black pepper and rosemary) were used in place of Butylated hydroxytoluene in Springbok meat patties and their Textural properties and water activity were analyzed.

II. MATERIALS AND METHODS

Springbok meat trimmings were used to produce patties incorporated with black pepper (15%) and rosemary (15%). Three formulations (each formulation had 0.5% transglutaminase, 2% salt) with treatment one formulation containing a synthetic antioxidant (0.1%) (BHT) was treated as control. The treated meat treatments were stuffed into a plastic casing (diameter × height = 50 mm×70 mm) for the restructuring purpose. The stuffed samples were kept in a refrigerator at 4°C for 4 hours to let the transglutaminase enzyme work. After the 4 hours, the samples were sliced (30 ± 1 g weight, 46 mm × 16 mm) and stored in polyethylene packages (190 × 300 mm) at −40ºC for 15 hours until core temperature reaches to −18ºC. After that samples were stored at −18ºC freezer and 80% relative humidity. About 48 hours later, samples were thawed at 4ºC for 3 hours. The samples were analyzed for textural properties and water activity on day 1, 3, 5 and 7 days. The water activity of the samples was determined using Novasina (Neuheimstrasse, Lachen, Switzerland) water activity meter. The temperature for the chamber system of the meter was set at a temperature of 26ºC. The meat samples that were used had a diameter of 22mm as they were cut by corkborer number 14. An Analysis of Variance (ANOVA) was performed on the data and compared at $P \leq 0.05$ using Fisher's least significant difference (LSD) test following the general linear model (GLM) procedure. Analysis was carried out in (triplicates).

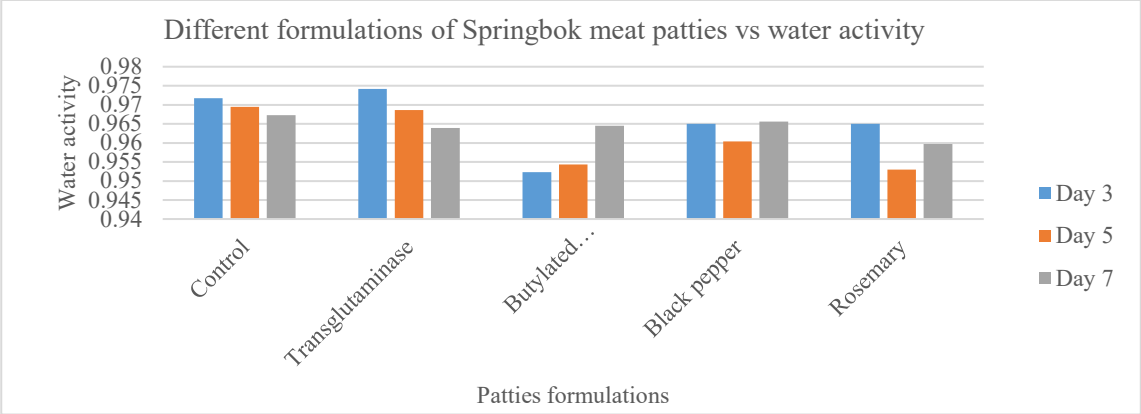
III. RESULTS AND DISCUSSION

Table 1 shows the effects of processing ingredients on the textural petties of Springbok patties. The samples tend to be less springy during storage. There were no significant differences in terms of springiness in relation to the different formulations. This was expected as the same amount of transglutaminase was used in all the formulations. Transglutaminases enzymes catalyze the formation of a peptide bond between lysine or other amino acids and glutamine which may affect protein elasticity. Figure 1 shows the effect of storage on the water activity of the patties. It can be seen that the water activity decreased during storage with the exception of the Butylated hydroxytoluene treated sample which had an opposite effect. This maybe due to the water absorption capacity of the natural antioxidant during storage. This needs further investigation as Butylated hydroxytoluene does not affect water activity because it acts on the lipid phase.

Table 1 – The texture profile of different formulations of Springbok meat patties indicating the springiness and maximum stress.

		Formulations				
		Control	**Transglutaminase**	**Butylated hydroxytoluene**	**Black pepper**	**Rosemary**
Springiness (mm)	**Day 3**	0,96±0,06^{cd}	0,96±0,09^{d}	0,82±0,01^{a}	0,89±0,00^{ab}	0,90±0,03^{bc}
	Day 5	0,43±0,39^{a}	N.D	0,88±0,013^{ab}	0,96±0,03^{bc}	0,97±0,05^{c}
	Day 7	1,04±0,07^{ab}	N.D	1,06±0,048^{bc}	1,14±0,37^{c}	0,99±0,01^{a}

Figure 1. Different formulations of Springbok meat patties vs water activity



IV. CONCLUSION

The study indicates that when natural antioxidants such as black pepper and rosemary are added to restructured Springbok low-value cuts, the resulting meat patties have some benefits to Water activity and textural properties (springiness) when synthetic antioxidants are incorporated during 7-day storage. It is recommended that processors of meat products take into consideration using natural additives like the ones used in this study to improve the physicochemical properties of restructured meat products in accordance with the findings.

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