ANTIOXIDANT ACTIVITY OF *MORINGA OLEIFERA* LEAF POWDER IN SOUTH AFRICAN PORK DROËWORS

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The effect of including 0 (control), 0.5, 1 and 2% *Moringa oleifera* leaf powder (MLP) in pork droëwors on antioxidant activity (ferric reducing antioxidant power (FRAP)) and lipid oxidation (thiobarbuturic acid reactive substances (TBARS)) during drying (0, 1.5, 5.75, 27.25, 72 h) was determined. The FRAP increased proportionally ($P < 0.05$) with increasing levels of MLP inclusion. Measured TBARS values were higher ($P < 0.05$) in the control than the MLP treatments from 5.75 – 72 h during drying. No significant effect of inclusion level was observed between MLP treatments, indicating that 0.5% MLP inclusion is sufficient to inhibit lipid oxidation in pork droëwors.

Key Words – drying, natural-antioxidant, traditional meat products

I. INTRODUCTION

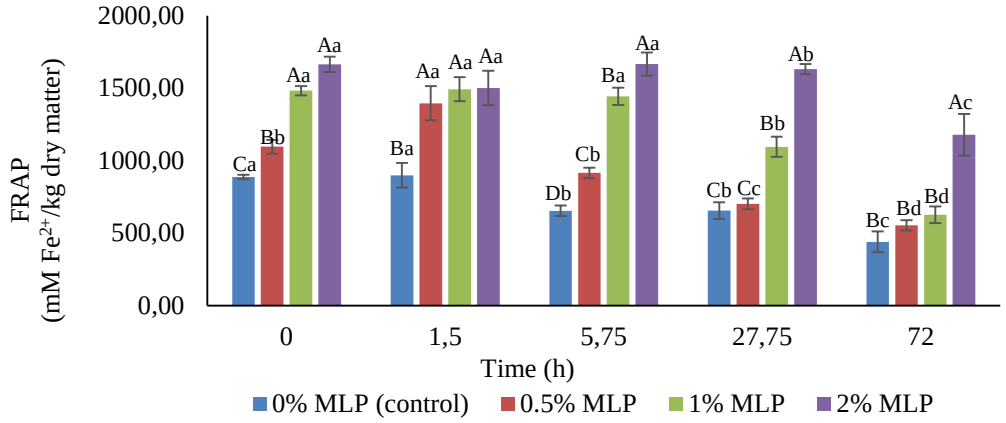
Droëwors are shelf-stable, ready to eat dried sausages; produced and consumed widely in South Africa. They are traditionally made from beef and animal fat, although meat from other species such as ostrich and game are increasingly being used [1]. Traditional droëwors recipes, however, advise against the use of pork because it is reportedly prone to rancidity when dried. Synthetic antioxidants are commonly used in meat processing to minimise the detrimental effects of lipid oxidation [2]. However, recent reports on the carcinogenicity of processed meat [3] have increased consumer concern about their safety. This study aimed to determine whether the inclusion of natural-antioxidant-rich *Moringa oleifera* leaf powder [4] in pork droëwors would inhibit lipid oxidation during processing.

II. MATERIALS AND METHODS

Four droëwors treatments (500 g/ treatment) containing lean pork meat and pork fat (80:20), salt (2%), pepper (0.5%) and either 0 (control), 0.5, 1 or 2% MLP were prepared. Each treatment was minced separately through a 2 mm screen into natural sheep casings, and hung vertically in a drying chamber at 35 °C and 40% relative humidity for 72 h. Triplicate sausages from each treatment were sampled (± 50 g) during drying (0, 1.5, 5.75, 27.25, 72 h) for analysis of FRAP and TBARS, according to the procedures detailed in Pouza *et al.* [5]. Data were analysed using PROC GLM procedures of SAS [6]. Pair wise comparisons of least square means were done using t-tests (PDIFF option).

III. RESULTS AND DISCUSSION

Figure 1 shows that FRAP increased proportionally with increasing levels of MLP inclusion. This can be attributed to the antioxidant compounds (including phenols, α-tocopherol, β-carotene) in MLP [4]. The FRAP decreased with time during drying, showing an inverse tendency with respect to TBARS progression. The TBARS values of all treatments were similar ($P > 0.05$) in the initial phase of drying from 0 to 5.75 h (Table 1). Thereafter, TBARS of droëwors enriched with MLP were significantly lower than the control treatment. At each sampling point, there were no significant differences in the TBARS between the treatments containing 0.5, 1 and 2% MLP.



[ABCD]Means of different treatments with different superscripts at each time are significantly different ($P < 0.05$)
[abcd]Means of the same treatment with different superscripts across sampling points are significantly different ($P < 0.05$)

Figure 1 Ferric reducing antioxidant power (FRAP) of MLP enriched pork droëwors

Table 2 Evolution of TBARS (mg MDA/kg DM) in pork droëwors during drying

Time (h)	TBARS (mg MDA/kg dry matter)			
	0% MLP (n=3)	0.5% MLP (n=3)	1% MLP (n=3)	2% MLP (n=3)
0	$0.47^{Aa} \pm 0.033$	$0.40^{Aa} \pm 0.059$	$0.40^{Aa} \pm 0.055$	$0.52^{Aa} \pm 0.040$
1.5	$0.46^{Aa} \pm 0.071$	$0.39^{Aa} \pm 0.066$	$0.54^{Aa} \pm 0.073$	$0.49^{Aa} \pm 0.096$
5.75	$0.54^{Aa} \pm 0.113$	$0.36^{Aa} \pm 0.030$	$0.38^{Aa} \pm 0.030$	$0.43^{Aa} \pm 0.038$
27.25	$0.42^{Aa} \pm 0.044$	$0.27^{Ba} \pm 0.029$	$0.28^{Ba} \pm 0.034$	$0.32^{Ba} \pm 0.031$
72	$0.69^{Ab} \pm 0.240$	$0.20^{Ba} \pm 0.030$	$0.24^{Ba} \pm 0.034$	$0.29^{Ba} \pm 0.010$

[AB]Means in the same row with different superscripts are significantly different ($P < 0.05$)
[ab]Means in the same column with different superscripts are significantly different ($P < 0.05$)

IV. CONCLUSION

Inclusion of 0.5 - 2% MLP in pork droëwors formulations increased antioxidant activity during processing proportionally to inclusion level. However, inhibition of TBARS formation was similar with increasing MLP levels. Therefore, 0.5% MLP inclusion is sufficient to inhibit lipid oxidation in pork droëwors.

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