

ANTIOXIDATIVE PROPERTIES OF RED PALM FAT (CAROTINO®) BLENDED WITH SELECTED PLANT EXTRACTS IN CHICKEN SAUSAGES

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Background

Health benefits of red palm oil based shortening as a food fortificant for vitamin A has been reported in the baking industry (Benade, 2000). Many plant extracts have lately been proven to be just as effective as synthetic antioxidants such as BHA and BHT. Novel procedures developed in the United States has shown the potentials of extraction and application of phytochemicals in lowfat ground beef. Lipid oxidation is still a major problem with muscle foods at chill and frozen storage temperature. Exploring the vast resources of plant-derived active compounds as replacement of synthetic antioxidants offer significant health benefit for consumers.

Objectives

This research explores the antioxidative properties of red palm fat (Carotino) rich in carotenoids and tocopherols, as well as the extracts from commonly used vegetables, namely tomato and celery in chicken sausages. The study also evaluated the synergistic effects of red palm fat (Carotino) with tomato and celery extracts respectively on their antioxidative properties in chicken sausages.

Methods

Chicken sausages were prepared using mechanically deboned meat and allotted into various treatment of either chicken fat, Carotino blended with chicken fat and with extracts of tomato and celery respectively. TBA analysis was carried out using the procedure by Crackel et al (1988) and the peroxide value (PV) was determined using Herwitz method (AOAC, 1984).

Results and Discussion

Figure 1 showed the TBA values of five treatment of MDCM sausages stored at 4°C for 12 days. The control sample with chicken fat showed the highest TBA value throughout the storage period. There were significant differences ($P < 0.05$) between the control sample and samples treated with Carotino, with Carotino plus celery extract and Carotino plus tomato extract respectively. Sausages blended with Carotino plus tomato extract showed the lowest TBA value from 0-12 days storage. It indicated that tomato extract was most effective in inhibiting the formation of malonaldehyde, thus delaying lipid oxidation in MDCM sausages. Sausages with Carotino fat plus celery extract also showed strong antioxidative property by the lower TBA values recorded throughout the chill storage. There are also natural antioxidants such as carotenoids and tocopherols in Carotino blended sausages that resulted in lowering of TBA values throughout the storage period. Thus, there may be synergistic effects of natural carotenoids and tocopherols acting with plant extracts such as tomato and celery in sausages as shown in Figure 1. Babji et. al (2001) and Wan Rosli et. al (2001) recently reported on the improved nutritional properties of chicken frankfurter., when chicken fat was substituted with red palm fat.

Figure 1 : TBA values of five type of MDCM sausages stored at 4°C for 12 days

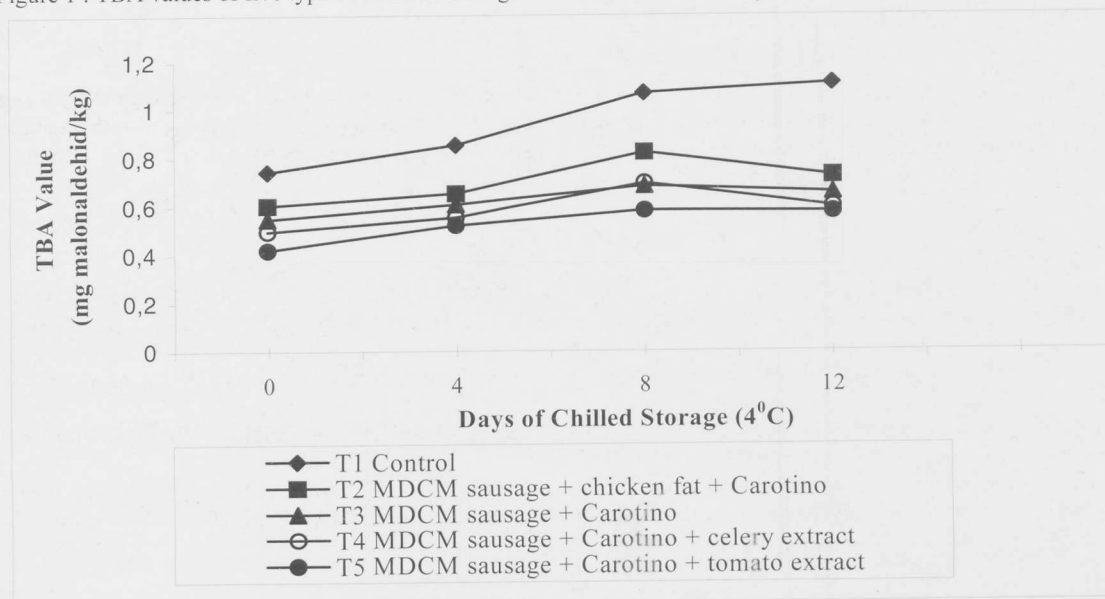


Figure 2 showed the Peroxide Values (PV) for all five treatments over the chilled storage of 12 days. The control sample (with chicken fat) showed high PV compared to samples with Carotino fat and plant extracts added to the sausages formulation. Sausages with Carotino fat plus 0.1% tomato extract (T5) showed the lowest PV during the test period. Differences in PV amongst treatment were significant ($P < 0.05$), particularly after 8-12 days of storage.

Figure 2 : Peroxide Values (PV) of five type of MDCM sausages stored at 4°C for 12 days.

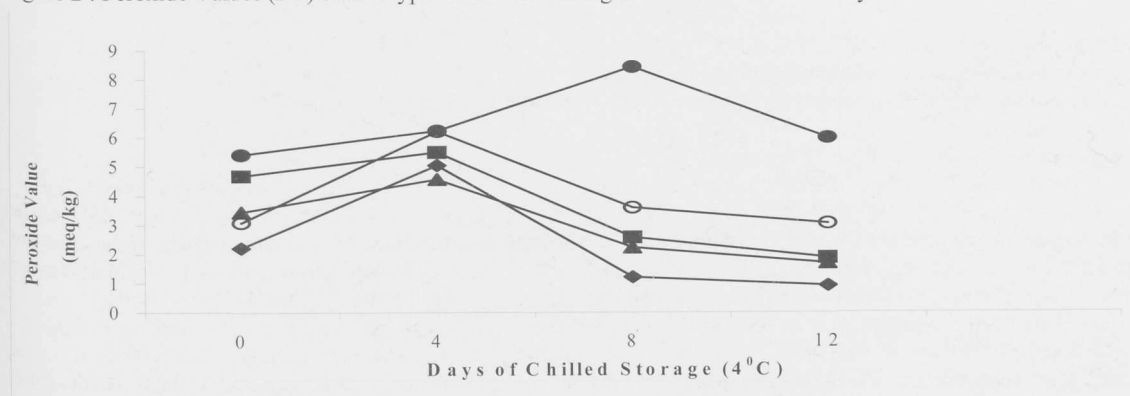


Table 1 showed the total plate count (TPC) for all the five formulated sausages. From 0-12 days, all samples showed increase in TPC, with the control sausages recording the highest count (3.2×10^6) at day 12. Sausages treated with Carotino plus tomato extract showed strong synergistic relationship in being antibacterial followed by Carotino plus celery extract respectively. Differences between samples for TPC were significant ($P < 0.05$).

Table 1 : Total plate count for five type of MDCM sausages stored at 4°C for 12 days.

Days	Formulations				
	T1	T2	T3	T4	T5
0	^D 3.5×10^{3a}	^D 2.8×10^{3b}	^D 2.4×10^{3c}	^D 1.7×10^{3d}	^D 1.5×10^{3e}
4	^C 7.8×10^{3a}	^C 5.6×10^{3b}	^C 4.2×10^{3c}	^C 3.5×10^{3d}	^C 3.6×10^{3d}
8	^B 2.6×10^{5a}	^B 1.4×10^{4b}	^B 8.9×10^{3c}	^B 6.5×10^{3d}	^B 6.7×10^{3e}
12	^A 3.2×10^{6a}	^A 8.5×10^{4b}	^A 4.6×10^{4c}	^A 2.8×10^{4d}	^A 2.6×10^{4e}

T1 : Control

T2 : MDCM sausage + chicken fat + Carotino

T3 : MDCM sausage + Carotino

T4 : MDCM sausage + Carotino + celery extract

T5 : MDCM sausage + Carotino + tomato extract

a – e : Values in the same row bearing the same superscript do not differ significantly at $p > 0.05$.

A – D : Values in the same column bearing the same superscript do not differ significantly at $p > 0.05$.

Conclusion

Red palm fat (Carotino) added to chicken sausages to replace chicken fat showed antioxidative property. When blended with tomato and celery extracts, antioxidative and antimicrobial properties were significantly increased in MDCM sausages. It can be concluded that natural antioxidants such as carotenoids and tocopherols as well as plant extracts such as those from tomato and celery, are beneficial to reduce oxidation and increase the shelf life and quality of chicken sausages.

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