REPLACING BACK FAT WITH MELON SEED MEAL IN LOW-FAT BEEF SAUSAGE

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Introduction

The meat industry worldwide is positively responding to the growing demand of consumers for low-fat meat products. The consumer concern is attributed to the positive correlation that exists between fat intake and incidence of coronary heart disease. Consequently, new processed meat products with lower caloric densities have been developed. Abiola and Adegbaju (2001) replaced pork back fat with rind in pork sausage without adverse effect on processing yield. Non-meat ingredients such as mushroom (Akobundu and Eluchie,1992) and olive oil (Bloukas *et al.*, 1997) were also used in the manufacture of low-fat meat products. In a related study, Abiola *et al.*, (2004) incorporated Melon Seed Meal (MSM) in low fat chicken sausages. Melon seed is a protein-rich oil seed which serves as a popular condiment in soup and stew particularly in developing countries. Earlier studies indicated that the seed contains high amount of unsaturated fatty acid and linoleic acid thereby indicating possible hypocholesteronic effect. Very limited research has been conducted on the use of MSM in meat products. The objective of this study was to determine the effect of replacing back fat with MSM on quality characteristics of low-fat beef sausages.

Materials and Methods

The melon seeds used were purchased from the market . The seeds were shelled and oven dried in an electric oven (Model 38060 KAYSERI/TURKEY TE-5604) at 50^{0}C for 30 minutes. The dried seeds were air-cooled for 30 minutes after which they were ground in a fabricated milling machine (2.00mm screen) to form MSM. Thigh muscle and back-fat of freshly slaughtered cattle were obtained from a slaughter slab. The meat and fat were cut into pieces and later ground separately in a Kenwood Chef food processor Model A901. Four batches of beef sausages (3kg/batch) were prepared at room temperature. The back fat in each batch of sausage was replaced with MSM at 0, 33, 66 and 100% levels. Equal amounts of wheat flour, seasoning, and water were added to each batch of sausage.

Samples of the sausages were stuffed separately into 35mm diameter cellulose casing and tied at the ends. After labelling, the samples were refrigerated at 2°C for 24 hours while some samples were cooked in a water bath at 70°C for 20 minutes and later air cooled for 30 minutes. Treatment in both cases was replicated three times and the study was repeated twice.

Cooking losses were based on pre- and post-cooking weights of samples while refrigeration losses were also based on the pre- and post-refrigeration weights of samples. The cooked beef sausages were organoleptically evaluated by 5 trained panelists for colour, flavour, juiciness, tenderness and overall acceptability on a 1-7 hedonic scale (1 = unacceptable, 2 =very poor, 3 =poor, 4 =fair, 5 =good, 6 = very good and 7 = excellent).

Data collected were subjected to analysis of variance while means were compared using the Duncan's New Multiple Range Test (Steel and Torrie, 1980).

Results and Discussion

Results of weight losses during cooking and refrigeration are shown in Table 1. Cooking weight losses were generally low and the values obtained ranged between 0.69%-1.77% in all the products. Lower cooking weight losses were obtained on MSM sausages compared with the control. Troutt *et al.*, (1992) also recorded lower cooking losses compared with the control when texture-modifying ingredients were incorporated in low-fat ground beef. In the present study, refrigeration weight losses ranged between 4.51%-8.77%. Lower refrigeration weight losses were also recorded for MSM sausages compared with the control. These findings corroborate the report of Abiola *et al.*, (2004) which indicated that MSM decreased refrigeration weight losses in chicken sausages. In a related study, Abiola and Adegbaju (2001) observed that replacement of pork back fat with rind decreased both refrigeration and cooking weight losses in pork sausage.

All the MSM sausages were superior in all sensory traits evaluated (Table 2). Highest scores of 5.93, 5.47, 5.27 and 5.53 were recorded for colour, flavour, juiceness and overall acceptability respectively. In a similar study, Abiola *et al.*, (2004) indicated that MSM improved overall acceptability of the finished products.

Conclusion

MSM can replace 100% fat in beef sausage to produce lower cooking and refrigeration weight losses and improve overall acceptability. Such formulation will satisfy the demand of consumers for low-fat meat products.

Table 1: Cooking and Refrigeration Weight Losses in Beef Sausages.

	Cooking loss				Refrigeration loss			
	Replacement levels of melon seed meal				Replacement levels of melon seed meal			
	0%	33%	66%	100%	0%	33%	66%	100%
Initial Weight (g)	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Final weight (g)	49.12	49.65	49.56	49.65	45.62	47.36	47.74	46.86
Weight Loss (%)	1.77^{a}	0.69^{a}	0.89^{b}	0.69^{b}	8.77^{b}	5.29^{b}	4.51^{a}	6.28^{a}

a, b Means in the same row with different superscripts are significantly different ($P< 0.05$)

Table 2: Sensory Evaluation of Cooked Beef Sausage.

	Replacement levels of melon seed meal			
PARAMETERS	0%	33%	66%	100%
Colour	4.27^{b}	5.67^{a}	5.27^{a}	5.93^{a}
Flavour	4.53	4.87	4.93	5.47
Juiciness	4.80	5.13	5.13	5.27
Tenderness	5.13	5.27	5.27	4.80
Acceptability	4.73	5.20	5.47	5.53

a, b Means in the same row with different superscripts are significantly different ($P<0.05$)

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