

POS -07

Proximate and Sensory Characteristics of Beef Sausages Containing Okara as Fillers/Extenders

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Abstract

Okara, also known as ‘soy pulp’ or ‘tofu dregs’ is the white or yellowish residue consisting of insoluble parts of the soybean which remains after pureed soybeans are filtered in the production of soy milk and tofu. In this study, the effect of different inclusion levels of okara on the proximate composition and sensory quality of beef sausages was evaluated. Okara was used to replace fresh beef in sausage at 0, 10, 20, 30 and 40%, in treatments T₁, T₂, T₃, T₄ and T₅ respectively. The Crude protein content of the sausages progressively decreased with increasing inclusion levels of okara. Sensory characteristics of T₁ (control) did not vary significantly ($p < 0.05$) with those containing 10 and 20% okara inclusion level. However, sausages containing 30% inclusion level of okara was recommended due to their superior scores for colour, flavour and juiciness and hedonic rating by the consumers.

Keywords: Beef, sausage, okara, soybeans, sensory quality

Introduction

Okara, also known as ‘soy pulp’ or ‘tofu dregs’ is the white or yellowish pulp (residue) consisting of insoluble parts of the soybean which remains after pureed soybeans are filtered in the production of soy milk and tofu. About 1.1 to 1.8 kg of Okara is produced per kg of soybean used to make soymilk (Liu, 1997). It is highly prone to putrefaction, due to its high moisture and nutrient profile, and this has limited its commercial use (O’Toole, 1999; Soy20/20, 2005). On a dry basis, okara contains 25.4-28.4% protein, 9.3-10.9% fat, 40.2-43.6% insoluble fibre, 12.6-14.6% soluble fibre and 3.8-5.3% soluble carbohydrates (Liu, 1997). The protein fraction is of high quality, with good water holding and emulsifying qualities (Grizotto *et al.*, 2012; Stanojevic *et al.*, 2013) and health promoting effects (Jimenez-Encrig *et al.*, 2008). These chemical and functional characteristics suggest it can serve as a good extender/filler in sausage making.

This project was therefore designed to evaluate the effect of different inclusion levels of okara on the proximate composition and sensory quality of beef sausages.

Materials and Methods

Fresh beef was bought from reputable dealers (Shoprite®) in Owerri. The meat was minced and cured with a solution containing an equivalent of 0.1g of Sodium nitrite, 1g of Sodium nitrate and 0.5 g of Sodium ascorbate per 1 kg of meat. Okara was produced following the methods described by Aladi *et al.* (2017). Okara was used to replace beef in the sausage at 0, 10, 20, 30 and 40%, in Treatments T₁, T₂, T₃, T₄ and T₅ respectively. Other non meat ingredients include, 10 g of cassava starch and 0.5g of table salt and 1 g of pepper per 100g of each beef-okara mixture. The mixture was blended for 10 minutes and then put into casings made of aluminium foil and kept refrigerated for 3 hours.

After this, the sausages were cooked for 30 under steam and allowed to cool to 26 °C. 1 cm thick samples were cut and served to a sensory evaluation panel. The panellist were asked to masticate the samples and score it for appearance, colour, tone colour, texture, hardness, tenderness, basic test, flavour intensity, juiciness, off flavour intensity, off flavour, and hedonic using a 9 point category rating as described by AMSA (2016). Samples were also collected and subjected to proximate analysis (Table 1) according to the methods described by AOAC (1999).

Table 1: Ingredient Composition of the Experimental Sausage (Experiment 2)

Ingredients (g)	T ₁	T ₂	T ₃	T ₄	T ₅
Meat	100.00	90.00	80.00	70.00	60.00
Okara	0.00	10.00	20.00	30.00	40.00
Garri	10.00	10.00	10.00	10.00	10.00
Pepper	1.00	1.00	1.00	1.00	1.00
Salt	0.50	0.50	0.50	0.50	0.50

Results and Discussion

Result of sensory panel scores are shown in Table 2. The sensory characteristics of the sausages in T₁ did not vary significantly ($p < 0.05$) with those containing 10 and 20% inclusion level of okara. Sausages with 30 % inclusion level okara recorded the highest scores for colour, flavour and juiciness and were preferred most by the consumers. Appearance scores did not vary with inclusion of okara up to 40 %. Inclusion of okara progressively decreased crude protein content of the cooked sausages from 22.04 in T₁ to 20.06 in T₃ (Table 3). Variation in moisture content was not significant ($p < 0.05$) nor consistent with inclusion levels of okara.

Table 2: Sensory scores of freshly cooked sausage

Parameters	T ₁	T ₂	T ₃	T ₄	T ₅	SEM
Appearance	7.00	6.00	5.60	6.20	6.80	0.48
Colour	6.80 ^{bc}	6.00 ^c	7.20 ^b	8.40 ^a	6.80 ^{bc}	0.38
Tone Colour	7.20 ^b	6.60 ^b	6.80 ^b	8.40 ^a	6.80 ^b	0.39
Texture	5.20 ^b	6.00 ^{ab}	5.80 ^a	6.80 ^a	4.80 ^b	0.49
Flavour	5.80 ^{bc}	6.20 ^b	6.20 ^b	8.20 ^a	4.80 ^c	0.44
Juiciness	5.80 ^b	5.80 ^b	4.80 ^b	8.20 ^a	6.20 ^b	0.51
Hedonic	6.00 ^b	6.20 ^b	6.00 ^b	8.40 ^a	6.00 ^b	0.42

^{abc} Means within rows with different superscript differ significantly ($p < 0.05$).

Table 3: Proximate composition of fermented-cooked sausage

Parameters	T ₁	T ₂	T ₃	T ₄	T ₅
Moisture %	55.22	59.41	54.00	64.36	57.71
Crude Protein %	22.04	21.90	20.04	20.06	20.15
Crude Fat %	10.28	8.75	14.16	7.07	8.46
Crude Fibre %	0.84	0.96	0.97	0.84	0.97
Total Ash %	3.59	3.21	4.17	3.57	3.59
NFE %	8.03	5.77	6.66	4.10	9.12

Conclusion and Recommendation

The results of this study indicate that Okara can be included in beef sausage up to 40% level without negatively affecting consumer preferences. However inclusion level of 30 % is recommended for its optimal scores for juiciness, flavour and hedonic rating.

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