

QUALITY CHARACTERISTICS OF WHEAT NOODLES FORTIFIED WITH SPENT HEN MEAT POWDER

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ABSTRACT

Meat from spent hens was used to fortify wheat noodles. Spent hen has a problem of disposal in the fast-food industry due to its inherent tough meat while on the other hand wheat noodles lack quality proteins and fibre. Ten (10) spent hens (Shikabrown[®] with golden gene traits) of age about 1.5 years were processed to powder in two forms; breast part and other parts (consisting of thighs and drum sticks) were added into wheat flour in noodles formulation for protein enrichment. The chicken meat powder levels were 10% for 60% wheat flour, 12.5% for 57.5% wheat flour and 15% for 55% wheat flour with 29% of water and 1% of salt. Sensory characteristics of spent hen meat noodles were significantly different ($P < 0.05$) in colour scores between the concentration and chicken parts, also in juiciness and overall acceptability within the chicken parts but not in concentration, while the score for flavour and saltiness were not significant ($P > 0.05$). Comparison of the proximate analyses of the commercial, un-enriched (control) and enriched noodles were evaluated in this study. The dry matter content was observed higher in un-enriched noodle (94.04%), while higher protein content (15.55%) occurred in enriched noodle which could satisfy the dietary protein needed for human growth. Un-enriched (control) and enriched noodles recorded higher values of ash content than commercial noodles. Addition of 10% spent hen meat powder to wheat noodles enhances its nutritive and organoleptic value hence could be a good nutritive tool in improving the nutrient intake of its consumers.

Keywords: Spent hen meat noodles; refined wheat flour; sensory attributes

INTRODUCTION

Globally, there are about 2.6 billion spent hens that are used in the pet food industry and not much for human consumption (Navid *et al.*, 2011). Meat from spent hens tends to be tough, non-juicy and low in fat. Due to its generally unacceptable toughness and brittle bones, the use of spent chicken meat has long been a problem for the poultry industry. Due to these problems, it has been suggested that the meat can be processed and used for other products (Cakmak *et al.*, 2013). Noodles are popular products all over the world due to its ease of cooking, handling and convenience in carrying from one place to another. It is a food of choice for children, women, and highly mobilized population. The consumption of snack foods such as noodle is increasing day by day due to rapid urbanisation and sociological changes (Akhilesh, *et al.*, 2014). Incorporation of meat in such snack food can improve its nutritional qualities especially with respect to amino acid, flavour, odour and taste. Although a lot of work has been done to improve the functional properties and nutritive value of noodles through changes in formulations and processing; possibility of incorporation of meat in noodles as a source of protein remains almost unexplored. This study therefore aimed towards evaluation of quality of spent hen meat used in fortification of wheat-based noodles.

MATERIALS AND METHODS

Source of materials

Ten (10) spent chicken layer birds (Shikabrown[®] with golden gene traits) of age about 1.5 years were purchased from National Animal Production Research Institute (NAPRI), Shika, Zaria. Refined wheat flour and common salt were procured from Samaru, Zaria, Kaduna State.

Processing of spent layer birds

The carcasses were cut into different parts which were grouped into two for the purpose of this study. The first part was the breast part while thigh and drumstick were called the other parts. These cut up parts were rinsed in water, boiled for 35 minutes without adding water to it. After cooking, the skin was removed, and the parts were hand deboned and then cut into smaller pieces in separate containers and was oven dried at 60°C for 1 hour 30 minutes. The processed spent layer meat was used in different proportion (10%, 12.5% and 15%) which were incorporated into wheat flour at 60%, 57.5%, 55%, respectively while the control treatment was 70% wheat flour. Each of the treatment was mixed in 29% of water and 1% of salt for each treatment.

Table 1. Formulation of spent hen meat noodles

Parameters (%)	Meat powder (%)	Flour (%)	Water (%)	Salt (%)
Control	0	70	29	1
BP/WF	10	60	29	1
BP/WF	12.5	57.5	29	1
BP/WF	15	55	29	1
OP/WF	10	60	29	1
OP/WF	12.5	57.5	29	1
OP/WF	15	55	29	1

BP/WF = Breast part with wheat flour, OP/WF = Other parts (thigh and drumstick) with wheat flour

Sensory characteristics

This analysis was carried out and recorded on sensory evaluation score cards using 5-point hedonic scale of very good (5), good (4), fair (3), poor (2), and very poor or rejected (1) by a 30-member panel trained at the Department of Animal Science, Ahmadu Bello University, Zaria. The panellists judged the samples for colour, flavour, juiciness, saltiness and overall acceptability.

Chemical characteristics

Dry matter, protein, ether extract and ash content were determined according to the standard procedures of AOAC (2005).

Statistical Analysis

All data generated were subjected to analysis of variance (ANOVA) and Duncan's Multiple Range Test (DMRT). Significant differences in means were separated using contrast analysis of SPSS 9.0 (2002).

RESULTS AND DISCUSSION

Sensory characteristics

Table 2 shows the effect of spent hens' meat concentrations on sensory characteristics of wheat flour noodles. Concentration of the spent hen meat powder (SHMP) in the noodles affected ($p < 0.05$) the panellists' evaluation for colour, juiciness and overall acceptability of the noodles. However, SHMP did not affect flavour and saltiness of the mix. Noodles with 15% inclusion level of chicken powder were higher ($p < 0.05$) in colour score than other inclusion levels of chicken powder but for flavour, juiciness and saltiness, significant ($p > 0.05$) changes were observed. Increase in colour score with an increase in SHMP inclusion levels were observed which could be due to better binding between refined wheat flour and chicken meat at this level. It could also be due to better emulsion properties and these findings are in agreement with reports of Verma *et al.* (2014) who studied incorporation of animal proteins in flour-based products. The scores for flavour and saltiness in noodles enriched with

different concentrations of chicken meat powders were observed to follow the same trend. This is not surprising, as flavour is a complex sensory attribute which involves both taste and odour of product and is a prime indicator of product quality. Surrender *et al.* (2019) reported that flavour score increased with addition of chicken meat powder (CMP) at 20% and 30% levels of incorporation.

The absolute values for flavour, juiciness and saltiness with noodles incorporated with chicken meat powder at 12.5% level were observed to be lower than the 10% chicken meat powder inclusion level. Increasing the levels of chicken meat powder in wheat noodles did not positively influence the noodles acceptance by the panellist. This same trend was reported by Surrender *et al.* (2019).

Table 2. Effect of spent hen meat powder concentration on sensory characteristics of wheat noodles

Sensory evaluation score of spent hen meat noodles					
Parameters Conc. (%)	Colour	Flavour	Juiciness	Saltiness	Acceptability
0	2.77 ^c	3.09 ^b	3.27 ^b	3.59 ^a	4.41 ^a
10	3.16 ^b	4.11 ^a	3.86 ^a	3.82 ^a	4.11 ^{ab}
12.5	3.50 ^b	3.89 ^a	3.66 ^{ab}	3.68 ^a	4.21 ^{ab}
15	4.02 ^a	4.09 ^a	4.05 ^a	3.82 ^a	3.98 ^b
SE _±	0.241	0.369	0.371	0.327	0.241
Chicken parts					
Other part	3.76 ^a	4.12 ^a	4.06 ^a	3.79 ^a	4.30 ^a
Breast part	3.36 ^b	3.93 ^a	3.65 ^{ab}	3.76 ^a	3.95 ^b
SE _±	0.289	0.396	0.392	0.379	0.322
Interaction					
Conc*Parts	**	NS	*	NS	*

^{ab}Means followed by the same letter(superscript) within the same column and subset were not different statistically ($p>0.05$). Conc. = concentration, SE = Standard error, NS = Not significant, **= highly Significant, ($P<0.01$) *= Significant at $p\leq 0.05$

The chicken parts used in noodle preparation did not have any effect ($p>0.05$) on flavour and saltiness which could be due to a lower inclusion of chicken meat powder present in the formulation. However, noodles prepared with chicken breast meat powder were rated lower ($p<0.05$) for colour and overall acceptability by the taste panel.

Chemical characteristics

Table 3 shows the comparison of the proximate composition among commercial, un-enriched (control) and enriched noodle with chicken meat powder for dry matter, crude protein and ash. The higher dry matter observed with wheat noodles having chicken meat powder over the commercial noodles shows that adding meat powder in wheat noodles will not have any deleterious effect on the shelf life of the noodles. Chukwuebuka *et al.* (2014) stated that noodles are expected to last more than a year from the date of manufacturing and consequently must be left with as little moisture as possible to limit rate of bacterial attack. The crude protein contents of the noodles fortified with chicken meat powder were observed to be significantly higher ($p<0.05$) than both the control and commercial noodles. This result is an indication that the much-needed nutrients for human growth could be obtained by enriching wheat noodles with protein sources (in this case chicken meat powder) and is in line with the report of Verma *et al.* (2014). The very low ash content ($p<0.05$) observed in the commercial noodles when compared to the prepared noodles suggest that mineral supplements may be required by those eating commercial noodles.

Table 3. Proximate composition of commercial, un-enriched and enriched noodles

Parameters (%)	Commercial noodle	Un-enriched noodle	Enriched noodle	SEM
Dry matter	94.04 ^c	94.78 ^a	94.31 ^b	0.057
Crude protein	9.05 ^b	9.33 ^b	15.55 ^a	0.193
Ash	0.03 ^b	1.55 ^a	1.55 ^a	0.048

^{abc}Means followed by the same letter(s) within the same column and row are not different statistically ($P=0.05$), SEM = Standard error

CONCLUSION

It is concluded that the addition of 10% spent hen meat powder to wheat noodles enhances its nutritive and organoleptic value hence could be a good nutritive tool in improving the nutrient intake of its consumers thereby facilitating growth especially of children in poor nations.

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