

*Original Research***Standardization and Evaluation of Wheat Flour-based Noodles Enriched with Different Levels of Eggs****P. N. Bhumre*, S. V. Londhe, C. K. Choudhary, P. A. Shinde and A. S. Nemade**

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Abstract

The aim of present study was to prepared egg noodles with incorporation of different levels of chicken eggs (0, 10, 20 and 30%) replacing with wheat flour. The investigation of physico-chemical and sensory attributes were carried out. Proximate composition content increased significantly in wheat flour-based noodles enriched with chicken eggs as compared to control noodles. The results showed non-significant ($P>0.05$) increase in pH and true density of noodles made with 30% chicken eggs in wheat flour-based noodles. There was non-significant ($P>0.05$) decrease in bulk density. The highest sensory attributes scores were recorded for control noodles, but scores were more for noodles 30% chicken eggs as compared to noodles made with addition of 10% and 20% chicken eggs. Among the cooking parameter, the cooking time increased significantly and also water uptake and swelling index decreased non-significantly.

Key words: Chicken Egg, Noodle Extruder Machine, Wheat Flour**How to cite:** Bhumre, P., Londhe, S., Choudhary, C., Shinde, P., & Nemade, A. (2019). Standardization and Evaluation of Wheat Flour-based Noodles Enriched with Different Levels of Eggs. International Journal of Livestock Research, 9(7), 135-142. doi: 10.5455/ijlr.20190103111243**Introduction**

Nowadays, consumer wants a convenient mix which is simple to prepare, convenient, healthy, containing natural foods where egg is a viable option for all these characteristics. Eggs have many functional properties including emulsifying, aerating and thermal setting characteristics, which account for its wide use in foods. The characteristic of thermal setting is especially important. The functions of emulsification and aeration are not unique to eggs but the combination of all three functions in a single natural food is unique. Eggs in the shell are convenient to household uses but not for industrial uses. Shell eggs lose their freshness quickly, even when refrigerated and eventually spoil. Eggs are classified among the rich protein foods together with milk, meat, poultry and fish and are also an excellent source of essential fatty acids. The high nutritional value, the low caloric content, blandness and the easy digestibility are the characteristics that make eggs

ideal for young or old people, healthy or convalescent (Gutierrez *et al.*, 1997). Therefore, development of noodles using refined wheat flour enriched with egg may provide a nutritious, convenient and ready to cook food item. Hence, considering the complementary nutritive value that egg can offer, the present study was aimed to develop egg enriched noodles. Present study standardizes and evaluate the physico-chemical parameters and sensory evaluation of the wheat flour-based noodles enriched with different levels of eggs.

Materials and Methods

Fresh chicken eggs were purchased from Department of Poultry Science, College of Veterinary and Animal Sciences, (MAFSU) Parbhani, India. The fresh eggs were washed and cleaned with distilled water. The eggs were broken in a glass jar and blended with salt water, wheat flour at appropriate concentrations to prepare it as dough for experiment. Chicken eggs noodles were prepared as per method of the Hanna Khoreigh (2011) and More (2017) with slight modification was used for preparation of chicken eggs noodles throughout the study.

Table 1: Basic formulation of wheat flour-based chicken eggs noodles (g)

S. No.	Ingredients	Control	T ₁	T ₂	T ₃
1	Eggs	0	10	20	30
2	Salt	2	2	2	2
3	Wheat flour	98	88	78	68
4	Water requirement (ml)	50	40	35	30

Wheat flour-based noodles were prepared by incorporating different levels (0%, 10%, 20%, and 30 %) of eggs. The products were evaluated on the basis of various attributes *viz.*, color, mouth feel, texture, flavor and overall acceptability by using 9-point hedonic scale (Nelson and Trout, 1964). Proximate composition determined by following the method of AOAC (1995). In physio-chemical parameter pH was determined using digital pH meter by AOAC (1995). Bulk density (Sahay and Singh, 2001) and true density calculated. And cooking parameters Cooking time of wheat flour-based noodles (control) differ significantly ($P < 0.05$) with incorporation of various levels of chicken eggs.

Statistical Analysis

The data generated during the study were analyzed by Analysis of Variance technique following standard procedure (Snedecor and Cochran, 1989).

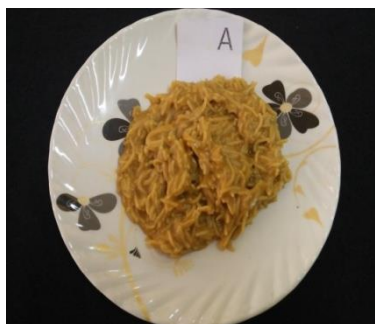


Fig. 1: Cooked wheat flour noodles (Control)



Fig. 2: Cooked noodles enriched with eggs (Wheat flour-based 10%)



Fig. 3: Cooked noodles enriched with eggs (Wheat flour-based 20%)



Fig. 4: Cooked noodles enriched with eggs (Wheat flour-based 30%)

Results and Discussion

Sensory Quality

The result of present study revealed from Table 2 that incorporation of chicken eggs upto 20% level have significant effect on appearance score of the product, further addition upto 30% eggs have non-significant effect ($P>0.05$) on appearance. Chicken eggs incorporated with 30% in wheat flour-based noodles recorded highest sensory scores for appearance as compare to control and other treatments. This might be due to higher water binding capacity of egg. Present findings are in agreement with Kumari *et al.* (2015) for effect of incorporation of lungru on physico-chemical, microbiological and sensory quality of chicken patties. Incorporation of chicken eggs upto 20% level have significant effect on flavor score of the product, further addition of 30% eggs have non-significant effect ($P>0.05$) with that of control. Present findings are in agreement with Kapse (2016), who reported highest flavor scores in wheat flour-based chevon noodles having highest 20% level of chevon meat.

The sensory scores of juiciness for the wheat flour-based enriched with chicken eggs differs significantly ($P<0.005$) as compare to control. The highest juiciness scores were recorded for noodles incorporated with chicken eggs at 30%. Present findings are in close agreement Kapse (2016), who reported highest juiciness scores in wheat flour-based chevon mincemeat enriched noodles. Texture scores of the wheat flour-based noodles incorporated 30% level of chicken eggs did not differ significantly ($P>0.05$) with control. The

highest texture score was observed to control followed by 30% chicken eggs incorporated noodles. Similar findings were recorded by Kumar *et al.* (2011) for chicken meat mince enriched noodles and Kapse (2016) for process standardization of chevon enriched noodles.

Overall palatability scores of the wheat flour-based noodles incorporated 30% level of chicken eggs differs significantly ($P < 0.005$) with 10% and 20% added chicken eggs in wheat flour-based noodles and did not differ significantly with control. Among the treatments, the (control) wheat flour noodles recorded highest overall palatability scores followed by wheat flour-based noodles incorporated 30% level of chicken eggs which could be attributed to higher scores for other sensory parameters *viz.* appearance, flavor, juiciness and texture. The present findings are in agreement with those of Breen *et al.* (1977), Kapse (2016) and More (2017) reports with the incorporation of animal proteins in flour-based noodles.

Table 2: Effect of addition of chicken eggs on sensory attributes of wheat flour-based noodles

Levels of Chicken Eggs	Sensory Attributes				
	Appearance	Flavour	Juiciness	Texture	Overall Palatability
0%	7.56±0.08 ^a	7.60±0.10 ^a	7.46±0.03 ^a	7.36±0.18	7.60±0.05 ^a
10%	6.50±0.28 ^b	6.30±0.33 ^{ab}	6.00±0.00 ^c	6.46±0.31	6.16±0.16 ^b
20%	6.66±0.33 ^b	6.50±0.28 ^b	6.16±0.16 ^c	6.46±0.24	6.46±0.29 ^{ab}
30%	7.16±0.16 ^a	7.16±0.08 ^a	7.30±0.15 ^b	6.96±0.03	7.23±0.23 ^a
SE ±	0.79	0.23	0.37	0.22	0.2
CD	0.24	0.76	0.11	NS	0.68

Means with common superscript did not differ significantly ($P < 0.05$); NS = Non-Significant

Proximate Composition

The observations in respect of proximate composition of wheat flour noodles enriched with chicken eggs are presented in Table 3.

Table 3: Effect of addition of chicken eggs on proximate composition characteristics of wheat flour-based noodles

Levels of Chicken Eggs	Moisture (%)	Protein (%)	Fat (%)	Ash (%)
0%	11.83±0.03 ^d	13.11±0.03 ^b	1.89±0.29 ^c	0.85±0.01 ^d
10%	40.33±0.38 ^c	13.73±0.02 ^a	7.50±0.28 ^b	1.01±0.04 ^c
20%	55.00±4.50 ^b	13.91±0.05 ^a	11.83±0.92 ^a	1.26±0.02 ^d
30%	63.55±1.83 ^a	14.14±0.15 ^a	12.53±0.48 ^a	1.38±0.01 ^a
SE±	2.47	0.084	0.56	1.5
CD	8.19	0.278	1.86	0.15

Means with common superscripts did not differ significantly ($P < 0.05$)

The average values of proximate composition (Moisture, protein, fat and ash) showed increasing trend with increase in amount of chicken eggs wheat flour noodles. The increase in moisture content was significant ($P < 0.05$) within all treatments. The highest moisture content was observed for noodles incorporated with

30% chicken eggs in wheat flour-based noodles and lowest value for wheat flour noodles (control). The increase in moisture content with increase in chicken eggs might be due to high moisture contents in chicken egg as compared to wheat flour. The findings are in close agreement with the observation of Ossom *et al.* (2016) who recorded more moisture in beef burger with higher levels of egg albumen.

It is revealed from Table that protein content were increased gradually with incorporation of chicken eggs upto 10% but thereafter value of protein increases significantly ($P < 0.05$). The highest value was recorded for 30% chicken eggs incorporated with wheat flour noodles. Similar increasing trend was observed by Peranginagin *et al.* (1995) for dried noodles incorporated with Surimi and Kapse (2016) for wheat flour-based noodles incorporated with chevon meat. The fat and ash content differs significantly ($P < 0.05$) with incorporation of various levels of chicken eggs upto 20% levels, within treatment of 20% and 30% levels differs non significantly. The highest fat and ash content was recorded for wheat flour noodles incorporated with 30% level of chicken eggs and lowest value for wheat flour noodles (control). Increasing trend in fat and ash content of the product might be due to higher contents of fat and ash in chicken eggs as compared to wheat flour (explain in detail the reason of increasing trend in fat and ash content). Similar observations were also recorded by Verma *et al.* (2012) during the preparation of chicken meat noodles and Kapse (2016) for wheat flour-based noodles incorporated with increase in amount of chevon meat.

Physico-chemical Properties

The data with respect to physico-chemical characteristics of wheat flour noodles (control) and noodles incorporated with chicken eggs (10%, 20% and 30%) are presented in Table 4. It is observed from Table 4 that the addition of chicken eggs in wheat flour-based noodles slightly increases the pH. The noodles incorporated with chicken eggs (30%) showed highest value for pH and lowest pH was recorded for wheat flour noodles (control). Products with low pH have better shelf-life because it creates an acidic medium, making it inappropriate for bacterial growth and reproduction. These findings are in very well agreed with Ossom *et al.* (2016) for beef burger added with different levels of egg albumen.

Gradual decline in bulk density was noticed with addition of chicken eggs in wheat flour-based noodle. The highest bulk density was recorded for wheat flour noodles (control) and lowest bulk density for 30% chicken eggs added wheat flour-based noodles. The non-significant ($P > 0.05$) decreasing trend was recorded for bulk density due to addition of chicken eggs in wheat flour-based noodles. These findings are very well agreed with observation of Kumar *et al.* (2011) for chicken mince enriched noodles and Kapse (2016) for chevon enriched noodles. Non-significant ($P > 0.05$) increasing trend was observed for true density due to addition of chicken eggs in wheat flour-based noodles. Noodle prepared with addition of 30% chicken eggs showed higher value than control and other treatments. The results are corroborated with Kumar *et al.* (2011) who

observed increase in true density of chicken mince incorporated noodles and Kapse (2016) for preparation of chevon enriched noodles.

Table 4: Effect of addition of chicken eggs on physico-chemical characteristics of wheat flour-based noodles

Levels of Chicken Eggs	Physico-chemical Characteristics		
	pH	Bulk Density (g/ml) (uncooked)	True Density (g/ml) (uncooked)
0%	5.12±0.002	0.35±0.014	1.23±0.031
10%	5.32±0.007	0.34±0.026	1.26±0.323
20%	5.37±0.004	0.30±0.029	1.28±0.006
30%	5.66±0.002	0.29±0.015	1.31±0.007
SE ±	1.79	0.022	0.42
CD	NS	NS	NS

Means with common superscripts did not differ significantly ($P < 0.05$); NS = Non-Significant

Cooking Characteristics

The observations in respect of cooking characteristics viz., cooking time, water uptake and swelling index of control and wheat flour-based noodle incorporated with different levels of chicken eggs (10%, 20% and 30%) are presented in Table 5.

Table 5: Effect of addition of chicken eggs on cooking characteristics of wheat flour-based noodles

Levels of Chicken Eggs	Cooking Characteristics		
	Cooking Time (minutes)	Water Uptake (ml/g) (cooked)	Swelling Index
0%	9.100±0.58 ^b	1.85±0.17	2.31±0.03
10%	13.66±0.88 ^a	1.78±0.11	2.26±0.02
20%	14.00±1.00 ^a	1.72±0.32	2.25±0.03
30%	15.00±0.57 ^a	1.66±0.04	2.14 ±0.05
SE ±	0.78	0.19	0.03
CD	2.59	NS	NS

Means with common superscripts did not differ significantly ($P < 0.05$); NS = Non-Significant

Cooking time of wheat flour-based noodles (control) differ significantly ($P < 0.05$) with incorporation of various levels of chicken eggs. However, chicken eggs incorporated (10%, 20% and 30%) did not differ significantly ($P < 0.05$). Increasing cooking time with addition of chicken eggs might be due to more heat treatment was required for the cooking of noodles incorporated with chicken eggs. Present findings are in agreement with Kumar *et al.* (2011) for chicken enriched noodles and More (2017) for quail minced meat enriched noodles. The water uptake of wheat flour-based noodle incorporated with different levels of chicken eggs did not differ significantly ($P < 0.05$). The water uptake decreases with addition of chicken eggs. The highest water uptake was recorded for wheat flour noodles (control) and lowest value was

recorded for 30% of chicken eggs added in wheat flour-based noodles. Similar findings were observed by Kumar *et al.* (2011) for chicken enriched noodles and Kapse (2016) who reported highest water uptake for control and lowest value recorded for 30% chevon mincemeat enriched noodles.

The swelling index of the wheat flour-based noodles incorporated with different levels of chicken eggs did not differ significantly ($P < 0.05$). The swelling index of control and wheat flour noodles enriched with chicken eggs was comparable irrespective of the levels of chicken eggs. The highest level for swelling index was recorded for wheat flour noodle (control) and lowest value was recorded for wheat flour-based noodles added with 30% chicken eggs. These findings are in very well agreed with the observations of Kumar *et al.* (2011) for chicken meat enriched noodles and More (2017) for quail minced meat enriched noodles.

Conclusion

The acceptable quality wheat flour-based noodles enriched with 30% chicken eggs were prepared without adversely affecting the sensory qualities. The physico-chemical characteristics and protein content of the product was increased with addition of chicken eggs in wheat flour-based noodles. Noodles enriched with 30% chicken eggs in wheat flour are cost effective as compared to noodles enriched with 20% chicken eggs in wheat flour.

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