

Pizza as a potential value-addition vehicle for *moromi*

By Kwang Li Sin^a, Lina Tan^b and Gerard M. O'Brien^a

^aSchool of Agriculture, Food and Rural Development, Newcastle University Singapore

^bSchool of Chemical & Life Science, Nanyang Polytechnic, Singapore



INTRODUCTION

Okara (or *moromi*) is a by-product from the production of soy-based products such as soymilk and soya sauce¹. *Moromi* is the soy pulp that is left over after the removal *via* pressing of soy sauce, and is usually discarded as food waste². In Singapore alone, an estimated 30 tonnes of *okara* are effectively discarded daily³. Studies indicate that *okara* is rich in insoluble dietary fibre and isoflavones (which have been linked to several health benefits)¹. *Moromi* is dark in colour and has a strong 'soy sauce' type aroma. This study was focused on adding value to *moromi* through incorporation in pizza base.

MATERIALS & METHODS

The ingredients used in pizza base were: water, bread flour (with or without *moromi*), oil, yeast, thyme and sugar. The ingredients used in the pizza topping were: tomato paste, mozzarella-type cheese, pineapple chunks and olive oil.

Table 1. Proportions of bread flour / *moromi* in pizza base

Ratio	Control (w/w%)	10% <i>moromi</i> (w/w%)	12.5% <i>moromi</i> (w/w%)
Bread flour	100.0	90.0	12.5
<i>Moromi</i>	0.0	10.0	87.5

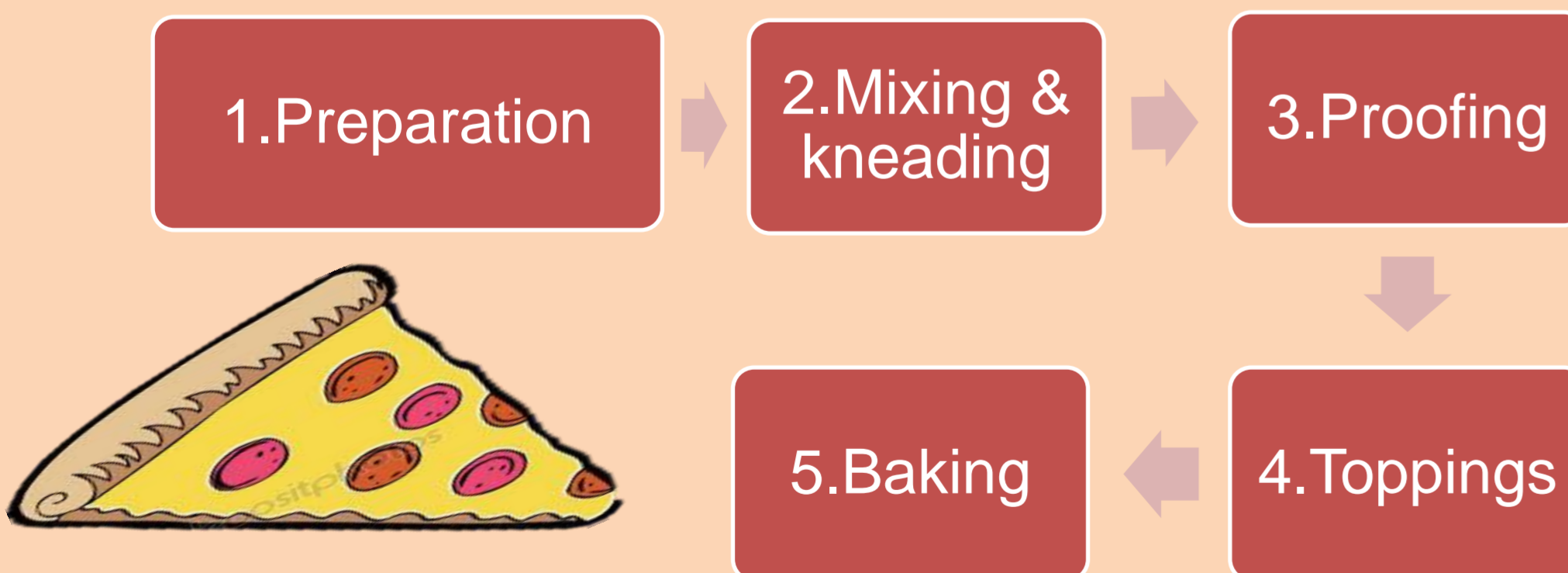


Figure 1. Process of pizza making

RESULTS

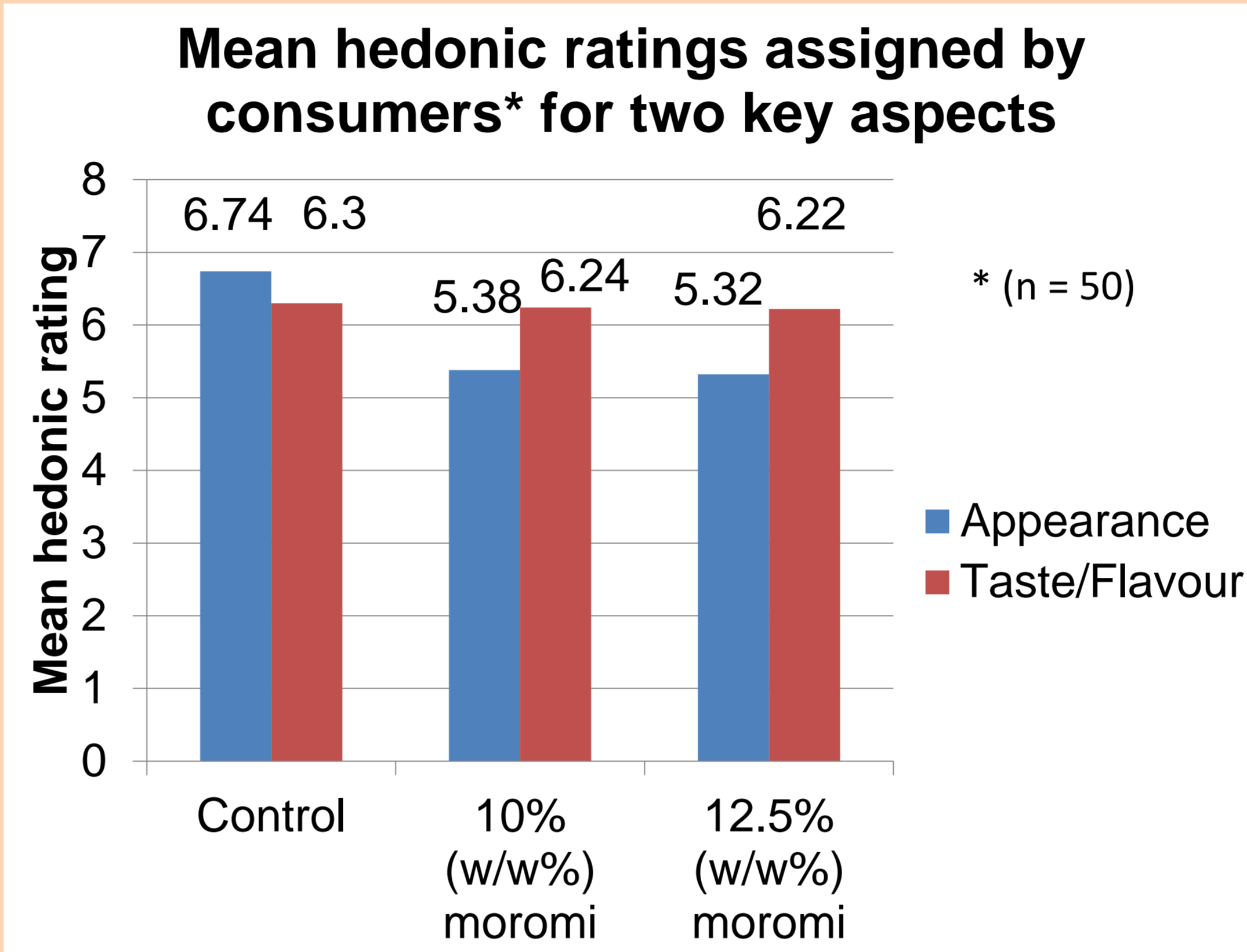


Figure 2. Mean values of ratings for appearance and taste/flavour of the three product formulations

A consumer trial was conducted (n = 50). Hedonic rating was used to determine consumers' liking for the appearance, smell, texture and flavour/taste of the pizza. The 9-point rating scale ascended from 'dislike extremely' to 'like extremely'. Mean hedonic ratings for appearance (Figure 2) varied between 'like moderately' and 'neither like nor dislike', while those for taste / flavour were all around 'like moderately'. After testing for equality of means, the results underwent ANOVA test of means, consistent with previous reported practice in similar trials⁴. While ANOVA and 'post-hoc' (Tukey) test indicated no significant difference between the formulations in terms of liking of flavour/taste, the appearance of the control was significantly better-liked than that of the *moromi*-containing pizzas. In response to a separate question, the percentage of participants willing to purchase each individual product formulation (if it were available commercially) ranged from 52 – 60%, with no significant difference indicated (P = 0.706: Pearson chi-square).

DISCUSSION & CONCLUSION

When seeking to add value to an under-utilised food ingredient, a key sought-after property of any food product vehicle is a high incorporation-rate (e.g. 10% or above) of that ingredient. In this regard, the results of this exploratory study appear somewhat promising. In terms of perceived taste/flavour and expressed purchase intention, it would appear that up to 12.5% (w/w) of breadmaking flour in the pizza base can be replaced with *moromi*, with no significant negative effect. Less encouraging, however, is the fact that the appearance of the *moromi*-containing base did not meet with the same high degree of approval. Hence, further work is required with the aim of improving consumers' perception of appearance. If successful, the *moromi* pizza product could result in both reduced manufacturing cost (owing to partial substitution of flour) and a reduction in the waste generated through the discarding of *moromi* after pressing.

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Contact Information

Name: Dr. Gerard O'Brien

Email: gerard.o'brien@ncl.ac.uk