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Can natural umami ingredients enhance the flavour of a minced meat meal formulation, used in recipes for older adults?

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Umami has been recognised for over a century and is now known as the fifth taste, alongside, salty, sweet, sour and bitter⁽¹⁾. Monosodium glutamate (MSG), a glutamate salt, is the most common source of umami and is known to increase palatability of foods through flavour enhancement^(2,3), increase food intake⁽⁴⁾, improve immunity and physical strength in both sick and healthy older people⁽⁵⁾. However, as direct addition of MSG to food has raised some concerns, this research seeks to identify alternate natural sources of umami that may be used to enhance the flavour of foods for older adults, especially those at risk of malnutrition.

In this research, a meat formulation developed from a typical UK recipe of cottage pie was selected to be representative of a complex food in real meat system. It consisted of minced meat, onion, olive oil, stock, tomato puree, plain flour and salt. Different natural sources rich in umami (yeast extract 1, yeast extract 2, soy bean paste and tomato paste) were used and the amounts added were determined by the Equivalent Umami Concentration equation⁽⁶⁾ equivalent to MSG at 0.5% (w/w). These ingredients were individually added into the meat formulations, to investigate whether they enhanced umami intensity. The four modified meat products alongside the meat control and meat with added 0.5% MSG were evaluated by thirteen panellists, using a quantitative descriptive profile.

Minced meat meal formulation	Mean umami score (0–100)	Mean sweet score (0–100)	Mean sour score (0–100)
Control	19.3*†	26.9†	7.7†
MSG	24.7*	24.7†	7.0†
Yeast extract 1	23.4*	29.7†	8.9†
Yeast extract 2	22.9*	24.8†	7.4†
Soy bean paste	25.1*	24.4†	8.8†
Tomato paste	14.4‡	48.0*	23.2*
<i>P</i> value‡	<i>P</i> = 0.0088	<i>P</i> < 0.0001	<i>P</i> < 0.0001

*†Mean values within the same column with different superscripts are significantly different as determined by Fisher's LSD test at *P* < 0.05.

‡The *P* values in the table represent the significance between products as determined by ANOVA.

Six groups of sensory attributes (appearance, smell, taste, flavour, mouthfeel and after effect) were developed from a consensus vocabulary session; the panel were asked to score each attribute on an unstructured line scale, 0–100 mm. Thirty-two of fifty-seven attributes showed significant (*P* < 0.05) differences between the meat products, including umami intensity (*P* = 0.0088). Overall, results of this study showed the potential to use the natural ingredients rather than MSG to enhance umami intensity, as all, but one of the modified products, had a mean umami score higher than the control and similar to the formulation where MSG was added directly. However, where tomato paste was added to meat, the umami score was significantly (*P* < 0.05) lower than other enhanced formulations. This unexpected effect may be caused by sweetness and/or sourness suppression; hence, sweet and sour tastes were found substantially (*P* < 0.0001) higher where tomato paste was added. Future work, therefore, is to investigate whether sugar and acid compounds suppress umami perception in real food systems.

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