



Issue 29: February, 2019: This e-bulletin is aimed at personnel in fisheries and aquaculture, at fish packers, processors, distributors, retailers and finally, consumers.

Mackrooms: - a new product with health claims

Mackrooms are mushroom and smoked mackerel bites (cube shaped) which were developed in 2018 by 3rd year food science students in University College Dublin (UCD) as part of their 3-month product development module. Mackrooms are a blended re-formed product which is breaded, deep fried, frozen and can be marketed as high fibre, gluten-free, and also a source of vitamin D2 and omega-3 fatty acids. Mushrooms exposed to pulses of UV light during growing generate vitamin D2 which is highly absorbable by the human body and benefits the development of bones and teeth, and calcium absorption. Mushrooms are also a source of antioxidants ergothioneine and glutathione which are anti-inflammatory agents. Smoked mackerel is a good source of the omega-3 fatty acids eicosapentaenoic (EPA) and docosahexaenoic (DHA) acids which are beneficial for heart health, brain development and cognitive performance (see SeaHealth-ucd Issues 2, 3 and 27). Herbacel Citrus AQ - N was included to raise product fibre content; it is derived from citrus fruit and contains 90% fibre. Gluten-free batter and crumb were used for enrobing the cubes.

Product formulation

White button mushrooms and smoked mackerel were obtained locally and Herbacel and breading materials were sourced from commercial companies (see acknowledgements). A series of trials was conducted and the optimum formula was mushrooms (71%), smoked mackerel (19%), Herbacel (8%) and flavourings (2%); these were lemon zest, dill and black pepper in the ratio 1/4/1. Two Mackroom products were prepared i.e. A & B. For Mackrooms A, hand-chopped mushrooms received a pan fry (rapeseed oil) for 2min i.e. a flash fry. The chopped mushrooms in Mackrooms B received no pan fry. The ingredients were tumble-mixed with a spoon in a blender to attain a uniform mix followed by blending for 30sec. The blended material was still particulate post-blending i.e. not a paste, and 24g cubes were formed in an ice cube tray. This was placed in a cold room at -20°C. When needed the cubes were tempered to -5°C and were breaded with gluten-free ingredients i.e. immersion in a batter slurry (4 parts batter powder; 5 parts water), rolling in a golden gluten-free crumb followed by a short fry

(2min/175°C) in rapeseed oil to consolidate the batter/crumb. Frozen storage was in plastic bags at -20°C. Finish-frying for consumption was in rapeseed oil (175°C/3-4min) and the Mackrooms were weighed pre- and post-breading, and after finish-frying to assess weight gains/losses. The mean weight of a Mackroom cube was 24g post-forming, 30g post-breading and 27g post-frying. Literature data show that vitamin D2, EPA and DHA are quite heat stable with retention levels above 80% post-cooking.

Product testing

Proximate analysis showed that mushrooms have high moisture content (95%) and low levels of other components. Smoked mackerel is rich in protein (22%), oil (23%) and EPA+DHA (2.7%). Compositional values for Mackrooms A and B were similar. Carbohydrate content (23%) was due to Herbacel and breading materials, oil content (16%) a combination of oil from smoked mackerel and rapeseed frying oil; protein content was 6%. The EPA+DHA content of the Mackrooms was 0.5% and salt content was 0.95%. Texture profile analysis indicated that Mackrooms A were less firm, less springy, less gummy and less chewy than Mackrooms B but the reverse was the case for cohesiveness. Mackrooms A and B received sensory scores of 4.70 and 3.67 respectively. Both scores were above the mid-point (3) of the sensory acceptability line (0 to 6) indicating that both were liked. However, Mackrooms A was the chosen product.

Health, safety and shelf life

Mackrooms are a source of vitamin D2, anti-inflammatory antioxidants and can be claimed as high fibre (>6%) and gluten-free. Consuming 4 Mackroom bites will deliver about 0.5g of EPA+DHA which is the recommended daily intake (see SeaHealth-ucd Issue 27). Microbiological tests indicated the Mackrooms are safe and they have an estimated shelf life of at least 6 months as a frozen product and 4-6 days as a chilled product. Mackrooms can be served as a starter (2 cubes) or main course (4 cubes).

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*The previous 28 issues of Seahealth-ucd can be viewed at:
<http://www.ucd.ie/foodandhealth/newsevents/outputs/>*

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