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<td><strong>Authors(s)</strong></td>
<td>Braida, Marina; Gormley, T. R. (Thomas Ronan)</td>
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Ready-meals with

Ready-meals, both chilled and frozen, are well established in the international market report Marina Braida and Ronan Gormley of Ashtown Food Research Centre in Dublin

Intel data shows that the value of the frozen ready-meals market in the UK has been reduced by the effect of price promotion, while chilled ready-meals continue to be a big rival in the market place. This has caused the main players to diversify into premium and luxury range prepared meals. The developing market for food in central and Eastern Europe may also represent an opportunity for increased sales of these products.

Most ready-meals are made up of a combination of carbohydrate (eg rice, potato or pasta), protein (fish or meat), vegetables and sauce. Despite increasing awareness of the health benefits from eating fish, ready-meals containing fish are less common than those containing chicken or beef and the appearance of such fish meals on the market are a relatively recent occurrence.

### Phases of sous vide and freeze-chilling

R&D on ready-meals has been a major focus at Ashtown Food Research Centre (AFRC) for a number of years. Much of the activity has been focused on freeze-chilling, which is a combination of freezing and chilling as the name suggests. This gives major logistical benefits for the processor as large amounts of a particular ready-meal can be produced, held in deep freeze, and then lots can be tempered and released into the chill chain as required. The consumer buys the meal as a chilled product.

R&D shows that freeze-chilling is a safe and suitable technology for most types of ready-meal and also for other products such as fresh fish fillets held in modified atmosphere packs (MAP).

Trials have also been conducted on fish processed by sous vide technology which ensures a gentle and low temperature process that causes minimal damage to the product in terms of nutritive value and sensory properties. A number of fish species in gourmet sauces have been processed at AFRC using sous vide technology with good outcomes.

### Going beyond ‘low fat’

We are in the era of ‘healthy choices’ and ready-meal companies are responding to this with meals containing reduced salt and calories. However, companies are only just beginning to realize the potential of ready-meals as carriers of functional (healthy) ingredients and nutraceuticals. Such meals have applications in all sectors of the community but especially to the elderly who may find meal preparation difficult and who may also be lacking in trace minerals and other nutritives (eg dietary fibre).

The production of such enriched meals is likely to be a major growth area in the near future especially when the inherent health benefits of fish are superimposed, in these items become ‘doubly’ attractive.

These drivers led to the current study at AFRC on the formulation, preparation and freeze-chilling of a gluten-free salmon lasagne containing nutraceuticals and also a sous vide processed ready-meal of the same formulation but with Rigati pasta instead of sheets (still gluten-free). The gluten-free aspect was introduced as intolerance to gluten and to flour-containing products is becoming more widespread in Europe. For example, one in 60 people in Ireland is a diagnosed coeliac and it is suspected that a much higher number are undiagnosed, ie latent coeliacs.

The research was conducted in association with Irish ready-meal producer, Dawn Fresh Foods as part of the EU-funded Seafoodplus project. For further information contact Ronan Gormley at ronan.gormley@teagasc.ie

### THE TRIAL - LASAGNE FORMULATION

The gluten-free lasagne contained salmon slices (40% of which was salmon paste), bechamel sauce, gluten-free pastas sheets and nutritious Chinese herbal tea. The trials were conducted with 30 panelists who were asked to score a commercial sample of conventional salmon lasagne and a gluten-free lasagne on world consensus guidelines for their evening meal. Based on these responses an average portion size was calculated as being 300 g.

The nutraceutical targets were based on 600 g of lasagne (ie per 164 g of lasagne sauce). These were: apple pectin (7%), garlic (0.5%), curcumin (0.5%), quercetin (0.5%), and curcuminoids (15mg), apple pectin (considered a functional food), curcuminoids (considered a functional food), garlic (considered a functional food), and quercetin (considered a functional food).

The texture of the bechamel sauce is tested on a viscometer

#### Béchamel sauce

Initially, the focus was on the Béchamel sauce component of the lasagne as it was used as the carrier for the nutraceutical. Psychophysical food taste panel tests were conducted to study how the sauce properties were influenced by the gluten free ingredients and by the nutraceutical inclusions. The gluten-free sauce was prepared by following a recipe from a control bechamel sauce for a specific period and contained steamed smoked salmon powder (5g), onion (7g), fromage blanc (5g) and sunflower oil (10g). The gluten-free bechamel sauce was slightly whiter than the wheat-containing sauce and had a higher whiteness, yellowness (0-10) ratio, (mean colour of 4.6 in L* a* b* space) and lower redness (0-10) ratio (mean colour of 5.3 in L* a* b* space).

A triangle taste panel indicated a difference between the sauces with 11 out of 19 correctly identifying the odd sample out. The extent of the difference was considered large by the panelists, moderate by 20% and too small to comment by three. However, the difference was not significant in a preference test with eight testers preferring the gluten-free sauce and a kANO method combining a choice test, a ranking test of the sequence in the trial, and a choice test to identify the most liked sauce. The gluten-free sauce exhibited shelf-life extending to 120 days on storage.

#### Effect of inclusions

A range of inclusions were added to the sauce, both individually and together (Table 1). All of the inclusions (individually) increased pan colour except the pectin.
a difference

place and competition is strong both in terms of choice and price. But in this special show that there is more than one way to add value to these products.

**Salmon lasagne with nutraceuticals**

Gouffin free pasta sheets were cooked in boiling water containing a small amount of salt for 60 seconds. The lasagne was formulated as described above and the cooked glove-free pasta sheets were teamed with salmon sauce in between, then was then layered with spinach and cheese. The finished product was then covered with a chiffon and baked at 150°C (302°F) and allowed overnight at 80°C for one day. It was then baked at 150°C overnight and served to a group of 24 subjects.

Several sensory tests were conducted, day 1, 6 and 12 and showed a total number of questions, criteria, opinions and acceptability criteria. A preferred sensory level of 7/10 and a score of 2.5 was determined. The score was then converted to a scoreable product. The sensory panel then assessed the product on a scale of 1 to 10.

The finished product is shown in the image. The finished product is the finished product.