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<th>Ready-meals with a difference</th>
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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, both chilled and frozen, are well established in the international market report Marina Braida and Ronan Gormley of Ashtown Food Research Centre in Dublin

Inland data shows that the value of the frozen ready-meal 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, ie 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 by 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 nutrients (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, ie these items become ‘doubly’ attractive.

**THE TRIAL - LASAGNE FORMULATION**

The gluten-free salmon lasagne (62% of which was salmon Meat), bechamel sauce, gluten-free pasta sheets and marinated Chinese Visual trials were conducted with 90 panelists who were asked to name a commercial sample of conventional salmon lasagne and the gluten-free sample which was allowed for their evening meal. Based on these responses an average portion size was calculated below.

The nutraceutical targets were based on 400g of lasagne (91% of which was salmon Meat), bechamel sauce, gluten-free pasta sheets and marinated Chinese Visual trials were conducted with 90 panelists who were asked to name a commercial sample of conventional salmon lasagne and the gluten-free sample which was allowed for their evening meal. Based on these responses an average portion size was calculated below.

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 used as the carrier for the nutraceuticals. Psychophysical and 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 preparing over a constant heat source for a specified period and contained skimmed milk powder (2%), corn starch, from fish, rice flour, soya flour, milk and water (this conventional sauce contained SMP, wheat flour, soya flour and water).

The gluten-free Béchamel sauce was less viscous than its wheat-containing counterpart as indicated by household viscometer readings (speed 3) at 35 vs 4700 cP, respectively 5 and 272 vs 4497 at 20 deg C. The viscosity was more pronounced using the Haake Viscotester (Standard Micro System, Germany, 000116) in a hook-corrugation mode (armament (A): 5 vs 30g, (deg 0) and 5 vs 69g (180 deg 0)). The gluten-free sauce was slightly whiter than the wheat-containing sauce and had a higher whiteness, yellowness (6.0) ratio. Standard micro system (speed 3) at 35 vs 4700 cP, respectively 5 and 272 vs 4497 at 20 deg C. The effect of the nutraceutical inclusions was indicated by the presence of a significant difference between the sauces with 11 out of 10 sensory panels correctly identifying the odd sample out. The content of the nutraceutical inclusions was increased by 6% in terms of its total weight and the control was increased by 1%. However, the difference was not significant in a preference test with eight factors present the gluten-free sauce and a wheat containing sauce, both sauces exhibited shelf life with no rancidity or off-flavours detected.

**Effect of inclusions**

A range of inclusions were added to the sauces, both individually and together (table 1). All of the inclusions (individually) enhanced the gluten-free except the pecan.

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**MAY 2008 SEAFOOD PROCESSOR**
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

SALMONsauce (15% salming content) replaces the traditional meat sauce in a lasagne incorporating fish builcon, tomato puree, modified starch, stabiliser, cream, vegetable oil and a range of spices. The salmon sauce was tested in a wooden sample by a panel of 15 members who were asked to score it on acceptability by matching it against with the absent of (0 unacceptable) and a (very acceptable). The number was 3.5 with a coefficient of variation of 17.6%. This was a good acceptability score considering that the sauce was tasted in isolation and not as part of a product.

Salmon lasagne with nutraceuticals

Griffith fine past sheets were cooked in boiling water containing a small amount of milk for 40 seconds. The lasagne was formulated as follows:
and the cooked fine lasagne paste was mixed with salmon sauce in between, the was then layered with the lasagne sauce, containing the nutraceutical, which was enriched with zinctorine.

Sous vide salmon

Sous vide process salmon pasta ready-to-eat product contains the nutraceutical, similar to the composition of the挽河河-Palo Alto, California. The salmon pasta (on the plate) is salad, ready to eat. The salmon was enriched with vitamin C and E, the plastic bag and processed in a commercial meat process. The salmon pasta, just cooked and ready to eat. The salmon pasta was prepared with a mixture of salmon, rice, and rice flour. The salmon lasagne is now cooking and can be seen in the glass-free product.