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<th><strong>Title</strong></th>
<th>Ready-meals with a difference</th>
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<tbody>
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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 competition, 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 realise 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 nutritive (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.

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.

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**THE TRIAL - LASAGNE FORMULATION**

The gluten-free lasagne contained salmon sauce (40% of which was salmon) with a béchamel sauce, gluten-free pastas sheets and sauce. Consumer tests were conducted with 50 panelists who were asked to score a commercial sample of conventional salmon lasagne and the freeze-chilled gluten-free lasagne. A difference in scores was observed for the two versions of the lasagne with a definite advantage for the gluten-free lasagne.

The nutraceutical targets were based on 400g of lasagne (56% of which was salmon), 300g of béchamel sauce, 400g of gluten-free pasta sheets and sauce. Visual tests were conducted with 50 panelists who were asked to score a commercial sample of conventional salmon lasagne and the freeze-chilled gluten-free lasagne. A difference in scores was observed for the two versions of the lasagne with a definite advantage for the gluten-free lasagne.

The gluten-free lasagne sauce was less Antoni Van Leeuwenhoek, et al (2004) showed that the average amount of gluten in commercial gluten-free lasagne was only 4% and this is likely to be a big challenge for the gluten-free industry.

**Béchamel sauce**

The texture of the béchamel sauce was tested on a viscometer (Beckman, Fullerton, CA) and a shear stress of 220 Pa s was found to be the optimum temperature for the gluten-free lasagne sauce. The gluten-free lasagne sauce was tested for its moisture content and found to be significantly lower than the conventional lasagne sauce and had a higher whiteness, yellowness and colour (Hunter colour meter, Hunterlab, RI) of 70.9, 21.0, 0.0 and 6.3, 4.5, 9.5 respectively of 121.3 and 9.3.

A triangle taste panel included a difference between the sauces with 11 out of 12 tasters correctly identifying the odd sample out. The effect of the difference was considered large by the tasters and was noticed by 9 out of 12 tasters correctly identifying the odd sample out. The effect of the difference was considered large by the tasters and was noticed by 9 out of 12 tasters correctly identifying the odd sample out.

**Effect of inclusions**

A range of inclusions were added to the sauce, both individually and together (Table 1). All of the inclusions (individually) increased the canine except the propanol.

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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 with nutraceuticals

Grilled free pasta sheets were cooked in boiling water containing a small amount of salt for 4-5 minutes. The lasagne was assembled as normal above and the cooled grilled-free pasta sheets were layered with salmon sauce in between. The dish was then baked with the heated salmon sauce, containing the nutraceuticals, which was supplied with marinade. The lasagne was then frozen (-18°C) and allowed overnight at 4°C for one day. It was then tempered at 5°C overnight and kept for 2-4°C for a thin piece for eight hours. Sensory evaluation tests were conducted on day 1, 3, 5, and 7 and showed a total number of participants, sub-samples, and test panels. The results indicated that the nutraceuticals-free salmon lasagne showed a preference ratio of 75/25 and a score of 2.90 versus 3.33 for the latter.

The differences were used to conclude on higher content salmon than to the blank with the exception. The grilled-free pasta was also tested by participants who graded the whole nutraceutical salmon lasagne and they concluded that there was no difference in the salmon sauce. The test showed a positive effect on the fish, which contained the nutraceuticals. The company is now testing and de-

Sous vide processed salmon pasta

The finished product: salmon lasagne