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

**R&D ROUND-UP**

**Ready-meals with**

Intral 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 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 nutritious 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, 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.

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**The trial - Lasagne formulation**

The gluten-free salmon lasagne (60% of which was salmon mince), béchamel sauce, gluten-free pasta sheets and nutritious Chinese- and Japanese-inspired ingredients form the basis of the world-beating, nutritious meal retailing model. For these reasons an average portion size was calculated as below:

- The nutritional targets were based on 600g of lasagne for an adult (146g of bechamel sauce). These were:
  - Total protein (g) 27.7
  - Total fat (g) 14.3
  - Carbohydrates (g) 57.5
  - Sodium (mg) 163
- The salmon used was selected for being fatty and naturally high in omega-3 fatty acids.

**Béchamel sauce**

INITIALLY, the focus was on the béchamel sauce component of the lasagne as it was used as the carrier for the nutraceuticals. Physicochemical 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 ensmotronning a contrast heat source (for a specified period) and contained stimulated malt powder, oat flour, corn flour, sunflower oil and water. (This conventional sauce contained 38% wheat flour, sunflower oil and water.)

The gluten-free béchamel sauce was less viscous than its wheat-containing counterpart as indicated by a measured viscometer reading of 14.9 vs 46.9 Pa{s} in the 10.77 vs 9.97 Pa{s} respectively at 20°C and in 0.2 and 0.3 Pa{s} respectively at 70°C. The effect was more pronounced using the HAAKE Brabender system (Stable Micr Systems, Darmstadt, Germany). As anticipated, the gluten-free sauce had a higher protein content (7% vs 2% of total solids), lower fat content 7% vs 2% of total solids) and lower moisture content (93% vs 92% of total solids). A triangle taste panel indicated a difference between the sauces with 11 out of 11 testers correctly identifying the old sample out. The extent of the difference was considered large by nine testers and moderate by two. Of those, eight testers picked the gluten-free sauce and a ninth whose containing sauce both sauces exhibited shear thinning, in the former emulsion

**Effect of inclusions**

A RANX of inclusions were added to the sauce, both individually and together (table 3). All of the inclusions (moderately) improved the overall acceptability of the product.
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

The finished product: salmon lasagne

Sous-vide processed salmon pasta

Salmon sauce

Sous vide processed salmon pasta ready-meal with nutraceuticals

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