



Issue 39: May, 2022: This e-bulletin is aimed at personnel in fisheries and aquaculture, at fish packers, processors, distributors, retailers and finally, consumers.

Composition of smoked oily fish on sale in Dublin

The composition of fresh oily fish on sale in retail outlets in Dublin was featured in SeaHealth-ucd Issue 27 while the health benefits of smoked oily fish were extolled in SeaHealth-ucd Issue 36. The latter was a desk study as laboratory facilities were not available due to the Covid-19 pandemic. However, this was upgraded in 2021/2022 in a laboratory trial where the composition of smoked oily fish on sale in retail outlets in the Dublin area was compared with the corresponding data on the nutritional labels. It is important to establish this relationship as many consumers read food product nutritional labels for health and food intake reasons.

Procedure

Fifty samples of smoked oily fish were purchased over a 20-week period (late September 2021 to end January 2022) from four supermarket chains in the Dublin area. The study on smoked salmon was robust (39 samples), that on smoked mackerel less so (7 samples) while that on smoked trout (2 samples) and smoked herrings (2 samples) was only of a spot sample nature. Each smoked sample was minced (1min), packed in a vacuum sealed bag and stored (-20°C) until required for testing. The name, brand, retailer, nutritional information given on the package, date purchased and sell-by date was recorded for each sample. The samples were defrosted (4°C/24h) prior to testing; 50g of each was used for proximate analysis and 50g for fatty acid analysis. Proximate analysis was conducted by procedures used routinely in Science Centre South (UCD), salt content by the procedure of Fox (1963) and polyunsaturated fatty acid (PUFAs) content by the FAME (fatty acid methyl ester) method of Brunton *et al.* 2015). Focus was on the content of EPA (eicosapentaenoic), DHA (docosahexaenoic), DPA (docosapentaenoic) and ALA (alpha-linolenic) omega-3 fatty acids. The health benefits of EPA and DHA are well known (SeaHealth-ucd Issues 2, 3, 24, 36) while those of DPA continue to emerge as potentially highly positive. EPA, DHA and DPA are of marine origin whereas ALA is an omega-3 of plant origin and is poorly converted to EPA/DHA in the body (Barceló-Cobijn & Murphy, 2009).

Comparison of data means (UCD vs on-pack labels)

Mean data for the four smoked species are presented in Table 1. The UCD omega-3 data are the summed levels of EPA+DHA+DPA+ALA. There was very good agreement between the UCD analytical results and the nutritional data on the corresponding on-pack labels. This is a highly positive result and is reassuring for consumers. However, there was a difference between the UCD (0.62) and the on-pack (0.06%) omega-3 data for smoked trout. However, only two samples were compared and only one had an on-pack declaration for omega-3 content. The UCD analytical data for protein, oil, omega-3 and salt contents were largely as expected for these species of smoked oily fish. The oil content of 8.88% is low for Atlantic salmon; however the data set also had some samples of smoked Pacific salmon which have much lower oil content and thus

contribute to a lower mean value. Smoked salmon, herring and especially smoked mackerel are excellent sources of omega-3 fatty acids with a 100g serving supplying well above the minimum recommended daily intake of 0.25-0.50g [European Food Safety Authority (EFSA); British Nutrition Foundation (BNF)].

Table 1: Comparison of UCD analytical data versus nutritional label data on product packs (means for both data sets)

| Smoked species | % Protein | | % Oil | | % Omega-3s | | % Salt | |
|----------------|-----------|------|-------|------|------------|------|--------|------|
| | UCD | Pack | UCD | Pack | UCD | Pack | UCD | Pack |
| Salmon (n=39) | 22.3 | 23.3 | 8.88 | 9.70 | 1.28 | 1.83 | 2.31 | 2.46 |
| Mackerel (n=7) | 20.8 | 21.1 | 25.6 | 25.5 | 4.97 | 4.56 | 2.03 | 1.90 |
| Trout (n=2) | 20.9 | 22.2 | 7.36 | 7.95 | 0.62 | 0.06 | 2.53 | 2.58 |
| Herrings (n=2) | 22.6 | 24.8 | 12.2 | 12.2 | 1.96 | 3.83 | 2.23 | 1.80 |

Comparison of individual sample data (UCD vs on-pack labels)

The largest number of discrepancies between the UCD analytical data and on-pack nutritional labels was in omega-3 content i.e. only 13/50 of the samples tested were within 0.8% of the omega-3 values given on nutritional labels. This was probably due to the fact that the UCD analytical data were individually measured for each of the 50 samples whereas the on-pack nutritional data are probably based on two or three analyses i.e. it would be impossible for processors to have analytical values for each pack. Also, some processors may use nutritional data from the published literature. Similarly the variability in the other data sets for individual samples i.e. UCD versus on-pack nutritional labels were 42/50 (protein), 38/50 (oil) samples within 3% of each other and 29/50 (salt) samples within 0.4% of each other. A tabular Supplement (39A) is available on request which quantifies variation within individual data sets in terms of ranges, standard deviations and coefficients of variability.

Conclusions

The UCD analytical results showed that 100g of the smoked oily fish species provided mean omega-3 contents of 1.28 (smoked salmon), 4.97 (smoked mackerel), 0.62 (smoked trout) and 1.96g (smoked herring), and as such are a valuable source of these desirable fatty acids in the human diet. Mean values for protein, oil, omega-3 and salt contents determined analytically (UCD) for the four smoked species were similar to the corresponding data means on the nutritional labels. Agreement between individual samples was more variable especially for omega-3 content.

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References

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The previous 38 issues of Seahealth-ucd can be viewed at:
<https://www.ucd.ie/foodandhealth/more/seahealthucd/>



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