



**Issue 21: July 2016: This e-bulletin is aimed at personnel in fisheries & aquaculture, at fish packers, processors, distributors, retailers, health professionals and finally consumers**

## **Survey on fish freshness at retail level**

Fish freshness is of paramount importance to consumers. They see fish as beneficial for health and lapses in the cold chain resulting in stale fish are unacceptable. A study was conducted in UCD (September 2015 - March 2016 inclusive) on the freshness of fish on sale at retail level. The objectives were fourfold: (i) conduct mini survey on temperatures prevailing in ice counters and retail chill cabinets in 12 retail stores; (ii) assess effect of temperature abuse (severe and mild) on TVBN values of ice counter fish; (iii) assess freshness of a range of fish species (ice counter and prepacks) from eight retail stores; (iv) disseminate outcomes to end-users.

### **Total volatile base nitrogen (TVBN)**

The TVBN test was used to estimate freshness of fish purchased from ice counters and as chilled prepacks in eight retail stores in Dublin. TVBN measures the nitrogenous compounds formed as fish spoil (Fagan et al. 2003). Commission Regulation (EC) No. 1022/2008 specifies a TVBN limit of <35mgN/100g fish for a number of species while industry opinion is that <15mgN/100g represents fresh fish and >35mgN/100g stale fish.

### **Ice counters, prepacks and retail cabinets**

Ice counters were well maintained with ample ice thereby ensuring fish at 0°C. Fish appearance was satisfactory except in two stores where fish appeared tired/desiccated. Skin packs were by far the most used form of packing followed by modified atmosphere air packs. Temperatures in retail chill cabinets ranged 1.5 to 2.5°C which is ideal for fish prepacks. Shelf lives on some fish prepacks were too long; this was confirmed by TVBN values (see below).

### **Severe and mild temperature abuse trials**

A severe temperature abuse trial was conducted to see how the TVBN test responded to different levels of fish abuse. Severe abuse was achieved by storing hake samples at 4-5°C for 0, 24 and 72h followed by 96, 72 and 24h at plus 20°C i.e. all samples were stored for 96h. A frozen sample (-20°C) was used as control. The results showed that the TVBN test responded well to the different

regimes with values of 76, 72 and 44mgN/100g fish for samples stored at plus 20°C for 96, 72 and 24h. The frozen sample had a value of 19mgN/100g fish.

Two trials were conducted on fish (8 species) purchased from retailer ice counters on a Monday and stored at 4-5°C for 0, 24, 48, 72 and 96h with TVBN testing each day. This equated to mild temperature abuse and mimicked consumers who bought fish from the ice counter on Monday and held it in the household fridge until cooking and consuming on Friday (day 4). The TVBN results showed that fish should be cooked/eaten on day of purchase (day 0) or the day after (day 1). If not, the fish should be frozen until required.

### Tests on prepacks and ice counter fish samples

In-store shelf life of prepacks [days to use-by-date (UBD)] was too long (5-8 days) in some cases, as indicated by TVBN values i.e. percentage of 22 prepack samples in the different TVBN categories were 9.1 (0-15), 31.8 (16-25), 13.6 (26-35) and 45.5 (>35mgN/100g fish). All samples were tested on or before their UBD. Corresponding percentages for 14 ice counter samples were 14.3, 21.4, 21.4 and 42.9. Seven of these samples were tested on day of purchase, 4 after 2 days at 4-5°C and 3 after 1 day at 4-5°C.

### Conclusions and recommendations

(i) Consumers should cook ice counter fish on day of purchase or the day after. If they cannot do so then the fish should be frozen until required for cooking; (ii) use-by dates on prepacked fish should be reviewed because in-store shelf lives of 5 to 7 days are too long for some species; (iii) over 44% of the 36 samples tested (22 prepacks and 14 samples from ice counters) had TVBN values >35mgN/100g indicating stale fish. (iv) reintroducing unsold fish to the ice counter for a second or third day is not recommended; (v) the current study was minimal in that it embraced only eight stores in County Dublin.

*A 10 page supplement (Issue 21a) to this article is available on line at <http://www.ucd.ie/foodandhealth/whatsnew/seahealth/> A pdf copy of the supplement is also available from [ronan.gormley@ucd.ie](mailto:ronan.gormley@ucd.ie)*

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#### References

Fagan, J.D., Gormley, T.R. & Ní Mhuircheartaigh, M.U. (2003). *LWT-Food Science and Technology*, 36(7), 647-655.  
Özyurt, G., Kuley, E., Özkütük, S. & Özogul, F. (2009). *Food Chemistry*, 114(2), pp.505-510.

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