

MINISTERIE VAN LANDBOUW
Bestuur voor Landbouwkundig Onderzoek
Rijkscentrum voor Landbouwkundig Onderzoek - Gent
RIJKSSTATION VOOR ZEEVISSERIJ
Oostende
Directeur : P. HOVART

**OZONATED WASHING WATER :
NO EFFECT ON SHELF LIFE OF COD FILLETS (*)**

W. VYNCKE

Mededelingen van het Rijksstation voor Zeevisserij (CLO Gent)
Publikatie nr 171/1981.

(*) Paper presented at the 11th Meeting of the West-European Fish Technologists Association, Copenhagen, August 1981.

MINISTERIE VAN LANDBOUW
Bestuur voor Landbouwkundig Onderzoek
Rijkscentrum voor Landbouwkundig Onderzoek - Gent
RIJKSSTATION VOOR ZEEVISSERIJ
Oostende
Directeur : P. HOVART

**OZONATED WASHING WATER :
NO EFFECT ON SHELF LIFE OF COD FILLETS (*)**

Mededelingen van het Rijksstation voor Zeevisserij (CLO Gent)
Publikatie nr 171/1981.

(*) Paper presented at the 11th Meeting of the West-European Fish Technologists Association, Copenhagen, August 1981.

1. INTRODUCTION.

Ozone, the most powerful oxidizing agent readily available to man, acts more rapidly over a wider spectrum of micro organisms than all other disinfectants. It is widely used for air and water disinfection and is considered an "add-nothing sterilant" (9). It has several potential food processing uses (10).

Data on the influence of ozone on the shelf life of fish are scarce. Salmon and Le Gall (7) reported favourable results with whiting (*Merlangius merlangus*) washed in ozonated water (concentration not reported). An extension of storage life of horse mackerel (*Trachurus trachurus*) and jack (*Caranx mertensi*) was also noted by Haraguchi et al. (4) when soaking the fish in 3 % Na Cl solution containing 0.6 ppm ozone.

Within the programme for quality research of our laboratory it was decided to carry out a series of screening tests to evaluate the usefulness of ozonated water in prologing the shelf life of cod fillets.

2. METHODS AND MATERIALS.

- Ozonated water : was produced with a laboratory ozonator (Litha). Concentration of ozone was determined by iodometric titration and maintained between 1.5 and 2 ppm at the start of the experiment. This concentration has a strong sterilizing effect (9).
- Fish : cod (*Gadus morhua*) caught in the Southern North Sea in October-November and about 6 days old at the start of the experiments was filleted and skinned by hand on a wholesaler's premises.
- Procedure :
The fillets were divided into three batches.

A first batch was covered with a sheet of parchment paper, packed in ice and put into a cold store maintained at 1°C. The second batch was dipped for one minute in tap water, drained for 5 min. and further treated as mentioned for the first batch. The third batch underwent a similar treatment but in ozonated water.

Every 2-3 days five fillets were removed for organoleptic, chemical and bacteriological analyses.

The experiment was repeated three times.

- Analyses :

- Organoleptic judgment : by a panel of 3-4 persons on raw odour and cooked flavour according to the Torry scheme (8).

The fillets (ca 250 g) were cooked 3 min in a microwave oven in a pyrex dish with loose lid.

- Chemical tests :

- Total volatile bases (TVN) : according to Lücke and Geidel (6) but using Antonacopoulos' still (1).
- Trimethylamine (TMA) : according to Dyer (3) as modified by Hasimoto and Okaichi (5).
- Total volatile acids number (VAN) : by the method of the AOAC (2) but with Antonacopoulos' still (1).
- Total viable count (TVC) : determined after three days' incubation at 20-22 °C after inoculation on trypton glucose extract agar in Petri dishes.

The first sampling was carried out immediately after dipping.

3. RESULTS AND DISCUSSION.

The average results are reported graphically in fig. 1 and 2.

Organoleptic assessment (fig. 1) showed a slight increase in shelf life of the washed fillets (about 1 day) due to the washing effect, which diminished TVC from 160.000 to 32.000/g (fig. 2).

There was however no difference between the samples washed in water only and those dipped in ozonated water.

Chemical tests (fig. 2) confirmed the sensory judgments : only a difference between the washed and unwashed fillets was noted.

The known strong sterilizing effect of ozone apparently had no influence on the spoilage rate of the cod fillets. A possible explanation is the very quick reduction of ozone to molecular oxygen, a phenomenon that is influenced by numerous factors including high protein content (10). Soluble protein at the surface of the fillets possible "protected" the spoilage flora present. It should be noted that at the end of the dipping period, only traces of ozone were left in the water. It is doubtful if increasing the ozone concentration would give significantly better results.

ABSTRACT.

Dipping fillets of cod (*Gadus morhua*) for one minute in water with an initial content of 1.5-2 ppm ozone did not improve shelf life as assessed by organoleptic, chemical and bacteriological quality tests.

SAMENVATTING.

Het onderdompelen van kabeljauwfilets (*Gadus morhua*) gedurende één minuut in water met een initiële ozongehalte van 1,5-2 ppm gaf geen verlenging van houdbaarheid. De filets werden hierbij organoleptisch, chemisch en bacteriologisch gekeurd.

REFERENCES.

- (1) Antonacopoulos, N. (1960) : Z. Lebensm. Unters. - Forsch. 113, 113.
- (2) Association of Official Analytical Chemists : Official methods of the AOAC, AOAC Washington, 13th Ed. 1980.
- (3) Dyer, W. (1945) : J. Fish Res. Bd. Canada 6, 351.
- (4) Haraguchi, T., Simidu, U. and Aiso, K. (1969) : Bull. Jap. Soc. Sci. Fish. 35, 915.
- (5) Hashimoto, Y. and Okaichi, J. (1957) : Bull. Jap. Soc. Sci. Fish. 23, 269.
- (6) Lücke, F. and Geidel, W. (1935) : Z. Lebensm. - Unters. 70, 441.
- (7) Salmon, J. and Le Gall, J. (1936) : Revue des Travaux de l'Office des Pêches Maritimes, 9 (1), 57.
- (8) Shewan, J., MacIntosh, R., Tucker, G. and Ehrenberg, A. (1953) : J. Sci. Fd. Agric. 4, 283.
- (9) Tenney, R. (1973) : Technical Quarterly Master Brewers Association of America 10 (1), 35.
- (10) Walter, R. (1976) : J. Food Sci. 41, 993.

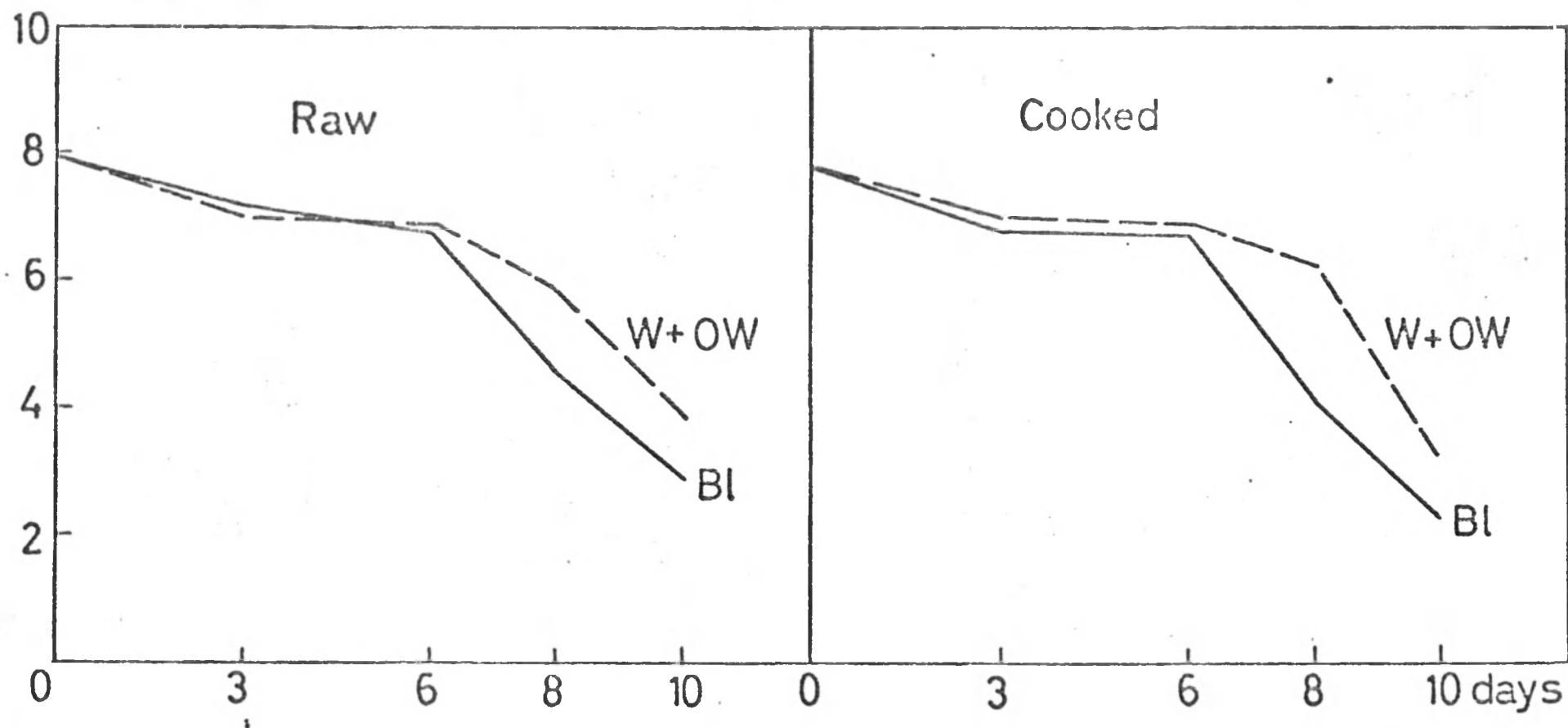


Fig. 1. Organoleptic scores (Bl : blank/unwashed ; W : dipped in water ; OW : dipped in ozonated water).

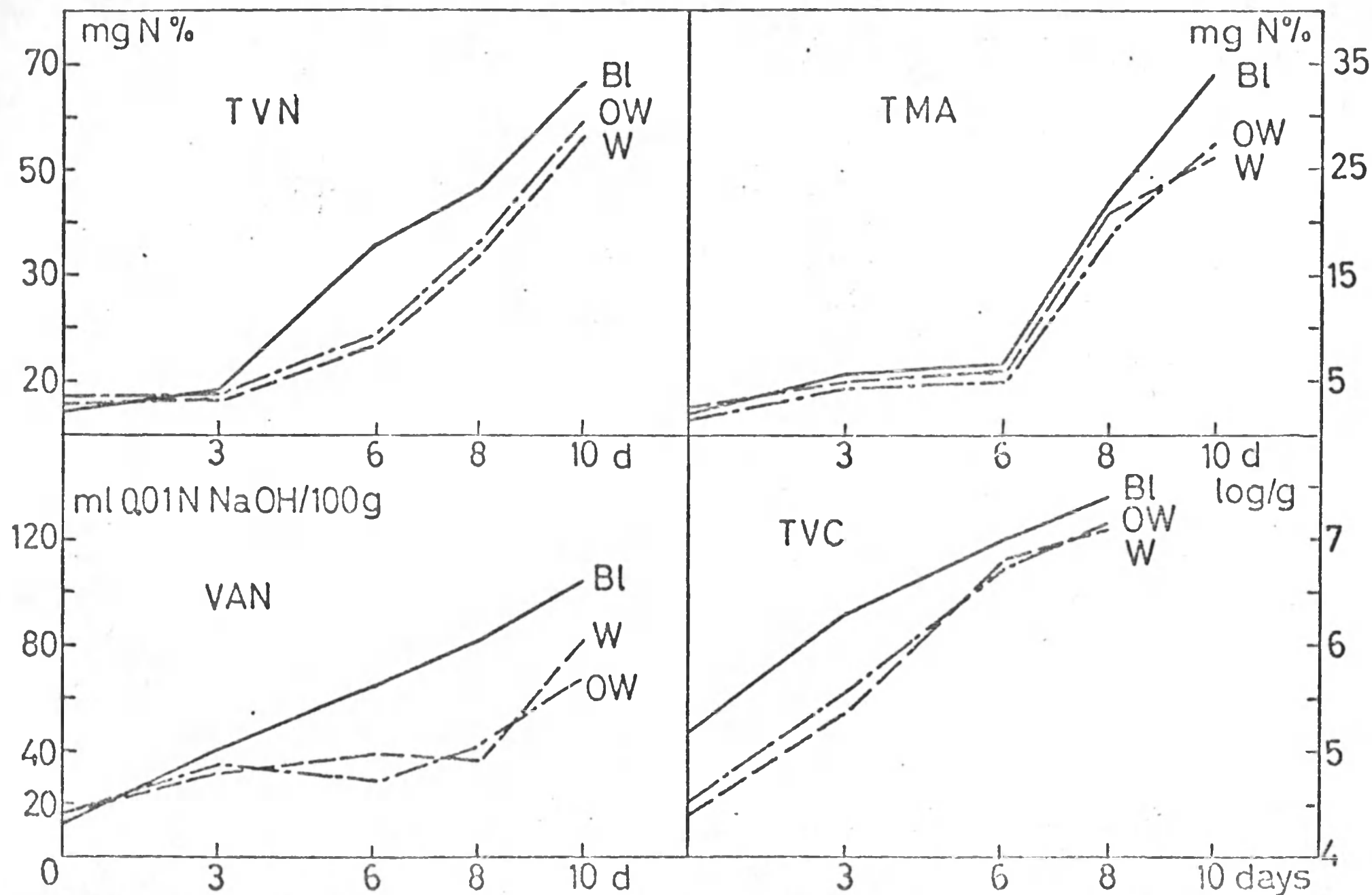


Fig. 2. Evolution of TVN, TMA, VAN and TVC during storage of cod fillets in ice (Bl : Blank/unwashed ; W : dipped in water ; OW : dipped in ozonated water).

