

**COMMITTEE ON TOXICITY OF  
CHEMICALS IN FOOD, CONSUMER  
PRODUCTS AND THE ENVIRONMENT**



**STATEMENT ON  
THE SAFETY-IN-USE OF CHLORINE AND  
CHLORINE DIOXIDE AS FLOUR  
TREATMENT AGENTS**

**Chlorine**

1. In 1993 the Committee reviewed the results of a 90-day study in rats fed fractions of cake made from chlorinated flour (BCCCA, 1993). No adverse toxicological effects were reported in this study and larger safety margins were derived than from previous studies. However, the results indicated that chlorinated material was deposited in peri-renal fat samples and the predominant chlorinated compound was tentatively identified as 9,10-dichlorooctadecanoic acid (DCOA). The Committee advised at that time that it was necessary for Industry to confirm the presence, and to quantify the levels, of DCOA in these samples.
2. The Committee has now reviewed the results of analytical studies carried out to address this request (United Biscuits, 1995). These studies are of limited value due to problems with the methodology, the small number of samples analysed, and results which are difficult to interpret. They provide some further evidence that DCOA is a major constituent of chlorinated material in the fat pads from rats fed the lipid fraction of cake made from chlorinated flour but also indicate that other, unidentified materials may be present. These may also be important in toxicological terms. The Committee *considers* that further information is still required on the persistence and turnover of chlorinated compounds, particularly DCOA, in the body fat of rats fed fractions of cake made from chlorinated flour.
3. The Committee is aware of literature data which indicate that chlorinated fatty acids can cross the placenta and be mobilised into milk in rats (Cunningham and Lawrence, 1977). Decreased weaning weights were reported in a very limited study in which lipids from chlorinated flour were fed to rats through three generations (Daniels, 1963). It considers that further reassurance is required about the potential reproductive toxicity of chlorinated flour and *recommends* that a multigeneration study is carried out in rats. Since the 90-day study indicated that most chlorinated material was contained in the lipid fraction of cake made from chlorinated flour, and as this is the fraction most likely to be absorbed, it would be adequate for the multigeneration study to be carried out on this fraction alone. The results of this study should be submitted within 3 years.

4. The COT has been advised by the Committee on Mutagenicity of Chemicals in Food, Consumer Products and the Environment that studies it has reviewed (BCCCA, 1993) provide adequate reassurance as to the lack of any mutagenic potential resulting from the use of chlorine to treat flour used to bake cakes and that it requires no further work. Studies carried out in the 1970s in which animals were fed diets containing cake made from chlorinated flour (refs) showed no effects of concern, although the safety margins which can be derived from these studies are less than ideal because of the limitations on the amounts of cake which could be fed. These data, the lack of toxic effects seen in the BCCCA study and the larger safety margins provided by this study, are sufficient to enable the Committee to *advise* that chlorine as a flour treatment agent remains temporarily acceptable pending receipt and evaluation of the studies described above.

### Chlorine Dioxide

5. In 1990 the COM advised that both chlorine dioxide and its breakdown products should be regarded as potential mutagens. On the basis of this advice, the COT recommended that analytical studies should be carried out on the fate of chlorine dioxide following reaction with flour and on residues of chlorine dioxide itself, using a sensitive method of detection. It further recommended that these studies should ideally be done on both treated flour and on bread baked from it under commercial conditions. The need for further toxicity studies would be considered once the results of the analytical studies were evaluated. The COT also recognised that the mutagenicity studies which the COM had asked for on chlorine would be relevant to the evaluation of chlorine dioxide.

6. The COM is now in the process of reviewing the results of new mutagenicity studies on extracts of flour treated with chlorine dioxide (FMBRA, 1994). Initial advice is that the results are reassuring but the COM has asked for further details of the studies to be supplied before a final conclusion can be reached.

7. The COT considers that analytical work is still required to determine whether potentially harmful reaction products and residues are present in flour following treatment with chlorine dioxide. Therefore, the Committee *reaffirms* its requirement for the analytical work described in paragraph 5. Further toxicity studies may be required following receipt of the results of the analytical work. The Committee *recommends* that the current temporary approval for the use chlorine dioxide as a flour treatment agent should be extended for a further 12 month period pending receipt and evaluation of this analytical work.

## REFERENCES

BCCCA (1993). The safety of cake baked with chlorine treated flour. Submission from the Biscuit, Cake, Chocolate and Confectionary Alliance.

Cunningham HM and Lawrence GA (1977). Placental and mammary transfer of chlorinated fatty acids in rats. *Food Cosmet Toxicol* **15**(3), 183-186.

Daniels NMR, Frape DL, Russell Eggitt PW and Coppock JBM. (1963). Studies of the lipids of flour. II-Chemical and toxicological studies on the lipid of chlorine-treated cake flour. *J Sci Fd Agric* **14**, 883-893.

FMBRA, 1994. Absence of genotoxicity in fractions of chlorine-dioxide treated flour. Submission from the Flour Millers and Bakers Research Association.

United Biscuits Ltd (1995). Submission from United Biscuits Ltd enclosing reports from Reading Scientific Services Ltd.