UK FLOUR MILLERS

BRIEFING DOCUMENT

Aluminium in wheat and flour

Updated April 2022

Summary

Aluminium is a common metallic element. Everyone is exposed to low levels of it through food, air and water. Although toxic levels of aluminium are very rarely found in the food chain, regulatory agencies are aware of potential exposure levels. The UK Food Standards Agency (FSA) regularly measures aluminium in food through the UK Total Diet Survey. UK Flour Millers, carried out analyses of aluminium levels in wheat, flour and bran in 2008 and wheat samples are regularly analysed as part of the AHDB Contaminant Monitoring Project. These analyses show that levels of aluminium in wheat and flour are relatively low and milling does not appear to be a significant contributor.

This briefing note provides background information on aluminium, along with results of UK Flour Millers and EFM's surveys, the FSA's analyses, and the current approach of regulators to aluminium.

Background

Aluminium is the most common metallic element in the earth's crust but has no clear biological role. It is often included in the term potentially toxic elements (PTEs). Everyone is exposed to low levels of aluminium from food, air and water.

Aluminium is often used in cooking utensils, containers, packaging, appliances and building materials. It is also used in paints and fireworks; to produce glass, rubber and ceramics; and in consumer products such as antacids, astringents, buffered aspirin, food additives and antiperspirants. Within the milling sector, lorry trailers and most of the tubing within mills are manufactured from aluminium-rich alloys. Some of this is painted or coated with protective resins.

Aluminium is present in a range of foods and drinks, many of which (such as cereals and vegetables) are important parts of a healthy diet. It can be present naturally in food but is sometimes added during processing. In baking, the use of sodium aluminium phosphate is an important potential source of aluminium. It is also used in dried powdered foods and drinks and processed cheeses to improve texture.

Aluminium becomes mobile in acid soils so that plants can then absorb it from both soil and water. Some plants, such as tea, and some herbs and leafy vegetables can build up high levels of aluminium naturally.

Legislative levels

There are currently no maximum levels for aluminium in food that affect wheat, flour or flour-based products. In 2008, EFSA produced a scientific opinion on the safety of aluminium from food intake. The opinion found that it would be appropriate to establish a tolerable weekly intake for aluminium of 1mg/kg of body weight per week. The analysis found that cereals and cereal products, vegetables beverages and certain infant formulae appeared to be the main contributors to dietary aluminium exposure and it was estimated that in parts of the Europe population, the tolerable weekly intake may be exceeded. EFSA did not recommend the introduction of indicative or maximum levels for aluminium in food. EFSA were not able conclude on the specific sources contributing to the aluminium content of particular foods.

Now the UK has left the European Union, the responsibility for setting maximum levels applying to food products lies with the Food Standards Agency (FSA). These maximum levels affect only products sold in GB. Products sold in NI or EU Member States continue to be subject to EU maximum limits.

The FSA has not indicated it will change advice to consumers on the basis of aluminium monitoring data. Maximum levels affecting products sold in NI or EU Member States

Monitoring data

To better understand levels of aluminium within the flour supply chain, UK Flour Millers conducted a survey of aluminium levels in 26 samples of wheat and the flour/ bran milled from it. The results were as follows:

	mg/kg			
(n=26)	**Wheat (ex farm)**	**Wheat (at intake or first break)**	**Flour**	**Bran**
Mean	1.3	1.9	2.6	2.7
Minimum	<0.1	0.3	0.1	0.6
Maximum	4.1	7.8	8	7.5

A similar study was conducted by millers in France. The results were as follows:

	mg/kg			
	Stored wheat	**Wheat at mill**	**Flour out of mill**	**Flour at bakery**
Mean	12.3	6.1	2.9	2.9
Minimum	2.0	1.9	<0.5	<0.5
Maximum	30.0	21.0	7.3	7.1

As part of the AHDB Contaminants Monitoring Project, aluminium levels are analysed as part of a screen for heavy metals. The results are as follows:

Aluminium	**2011**	**2017**	**2018**	**2020**	**2021**
No. of samples	47	60	50	25	25
Mean (mg/kg)	2.7	4.4	5.8	10.8	11.5
Minimum (mg/kg)	0.5	<0.5	<0.5	<0.5	<0.5
Maximum (mg;/kg)	6.5	37.6	32.0	101.0	94.4
GB and NI/EU Maximum limit (ML)	None				

The FSA monitors also levels of aluminium in foods as part of the Total Diet Study. The results are listed below:

	Aluminium (mg/kg)				
Food type	**1987**	**1997**	**2000**	**2006**	**2015**
Flour (general)	-	-	-	-	5.19
Plain flour	5.1	-	-	-	-
Wholemeal flour	1.8	-	-	-	-
Self-raising flour	6.8	-	-	-	-
White bread	2.9	-	-	-	-
Brown bread	3.3	-	-	-	-
Wholemeal bread	2.3	-	-	-	-
Bread (general)	-	6.6	2.8	3.59	4.01
Miscellaneous cereals	-	5.2	19	17.5	3.67

Future work

UK Flour Millers will continue to monitor and report on the levels of aluminium in wheat and flour. Information will continue to be exchanged with the FSA.

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