

BRIEFING DOCUMENT

Ergot alkaloids in flour

Updated January 2023

Overview

The EU has established maximum limits for ergot alkaloids in milling products, including wheat flour. These limits have applied from 01 January 2022, affecting flour milled or sold into the EU and Northern Ireland. The limits do not apply to flour milled and sold in Great Britain. UK Flour Millers wheat and flour monitoring data show that UK flour will comply with the limits, where applicable.

Background

Ergot is a fungal disease affecting grasses, including wheat. The disease produces small purple/black fungal bodies in grasses, known as sclerotia. These sclerotia contain the mycotoxins ergot alkaloids, which can be harmful to humans and animals if consumed in high quantities.

Following a scientific opinion from the European Food Safety Authority (EFSA), the European Commission (EC) set maximum levels for ergot sclerotia in cereals which took effect from December 2015. More recently, the EC has revised the maximum levels for ergot sclerotia in cereals as well as established maximum levels for ergot alkaloids (the mycotoxins found within ergot sclerotia), in cereal milling products. The new limits applied from 01 January 2022, affecting flour milled in EU member states and Northern Ireland (NI), or sold into these countries. These limits were established after the UK's exit from the European Union, so they have not been carried automatically into UK law and do not apply to flour milled and sold in GB. Ergot alkaloids are on the FSA priority list for risk assessment, but an indication has not been given as to when the FSA will carry out this work.

A summary of the limits for ergot sclerotia and ergot alkaloids is given below:

Ergot sclerotia limit	GB limit	EU and NI limit
Unprocessed cereals (with the exception of maize, rye and rice)	0.5g/kg (0.05%)	0.2g/kg (0.02%)
Unprocessed rye	3g/kg (0.3%)	0.5g/kg (0.05%) until 30.06.24 0.2g/kg (0.02%) from 01.07.24

Ergot alkaloid limit	GB limit	EU and NI limit
Milling products of barley, wheat , spelt and oats (with an ash content lower than 900mg/100g)	None	100µg/kg until 30.06.24 50µg/kg from 01.07.24
Milling products of barley, wheat , spelt and oats (with an ash content equal to or higher than 900mg/100g)	None	150µg/kg
Barley, wheat, spelt and oat grains placed on the market for the final consumer	None	150µg/kg
Rye milling products and rye placed on market for final consumer	None	500µg/kg until 30.06.24 250µg/kg from 01.07.24
Wheat gluten	None	400µg/kg
Processed cereal based food for infants and young children	None	20µg/kg

The ash content categorisation splits out maximum levels for white and wholemeal flour. White flours have an ash content lower than 900mg/100g, whereas wholemeal flours have an ash content higher than 900mg/100g. It is understood that maximum limits do not apply to cereal bran, although a limit may be established in the future.

Industry monitoring and compliance

The UK milling industry has undertaken a significant testing programme of ergot alkaloids in wheat and flour over a number of years. Wheat samples from mill intakes have been submitted for testing each harvest since 2012.

INTAKE WHEAT			Ergot alkaloids ($\mu\text{g}/\text{kg}$)	
Harvest year	Samples (n)	% samples containing ergot alkaloids	Mean level	Median level
2022	50	40%	63	<LOD
2021	51	71%	211	65
2020	51	40%	33	<LOD
2019	50	46%	49	<LOD
2018	50	28%	38	<LOD
2017	50	78%	90	8
2016	51	71%	79	8
2015	74	41%	174	<LOD
2014	75	45%	60	<LOD
2013	76	49%	64	<LOD
2012	51	25%	73	<LOD
Total	629	49%	79	<LOD

The wheat samples tested were taken from mill intake, i.e before they had been cleaned. As ergot alkaloids are found in the sclerotia, grain cleaning is effective at reducing the concentration of ergot alkaloids in wheat, particularly if colour sorters are used. Grain cleaning in mills consists of vigorous and repeated stages of separating wheat kernels from any other material on the basis of differences in size, shape, weight and colour (the latter if colour sorters are being used in the cleaning process). As such, the average ergot alkaloid concentration in wheat will be higher than in the flours milled from them.

Extensive monitoring of wheat flour by the UK milling industry shows the effectiveness of the cleaning process as average ergot alkaloid levels in flour are significantly lower than those found in intake wheat and are well below the EU maximum limits for both white flour ($100\mu\text{g}/\text{kg}$) and wholemeal flour ($150\mu\text{g}/\text{kg}$).

WHITE FLOUR			Ergot alkaloids ($\mu\text{g}/\text{kg}$)	
Harvest year	Samples (n)	% samples containing ergot alkaloids	Mean level	Median level
2021	8	100%	29	27
2018	5	100%	34	25
2016	30	80%	25	11
2015	32	53%	7	1
2013	50	64%	17	4
TOTAL	125	69%	18	5

'Harvest year' refers to the wheat harvest from which the flour was milled.

WHOLEMEAL FLOUR			Ergot alkaloids ($\mu\text{g}/\text{kg}$)	
Harvest year	Samples (n)	% samples containing ergot alkaloids	Mean level	Median level
2021	3	100%	34	33
2018	31	100%	66	35
2017	50	76%	37	12
2016	30	87%	67	31
2015	19	79%	25	13
TOTAL	133	85%	49	25

'Harvest year' refers to the wheat harvest from which the flour was milled.

The UK Flour Millers strategy and future work

A survey of UK millers' ergot sclerotia tolerances show that the majority have already been working to a stricter limit than the revised lower EU limit of 0.02%, with many applying a 0.01% or zero tolerance to ergot sclerotia. For most sites, these strict tolerances have been in place for some time and so disruption to wheat supply is not expected. The cleaning processes in place at UK mills will continue to keep ergot alkaloid levels in flours low.

Industry monitoring data show that UK flour will comply with the EU and NI limits, where these apply. The industry will continue to assess the ergot alkaloid content of the UK wheat crop through harvest monitoring. This will inform businesses of the need for any additional measures. If in the future the FSA considers ergot alkaloid limits should be established for flour milled and sold in GB, UK Flour Millers will keep milling businesses informed and prepared.

UK Flour Millers is a member of the UK Mycotoxin Stakeholder Group, where ergot issues continue to be discussed by stakeholders across the grain supply chain, including farmers, to determine seasonal risk and organise research projects focusing on controlling the disease in crops. UK Flour Millers has also provided guidance to farmers on how to control this disease.