WATCH Meeting 25th October 2001

Reducing Exposure to Allergens in Bakeries
Joint Project with ABIM

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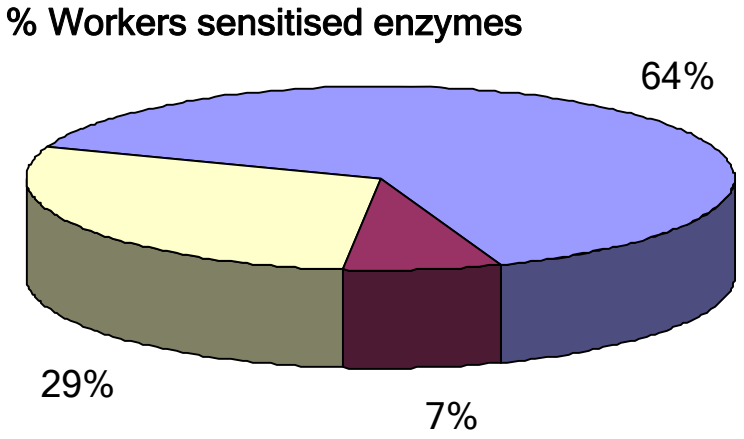
Exposure to allergens in baking

- **Summary:** HSE / HSL undertook series of flour dust and exposure survey in large, medium and small bakeries from 1998 to 2005. This worked supported the setting in May 2001 of the Flour dust exposure limit (now WEL) 10 mg/m^3 8HrTWA. Subsequent work quantified exposure to microbial enzyme allergens, and examined whether flour dust exposures had reduced following introduction of the WEL.

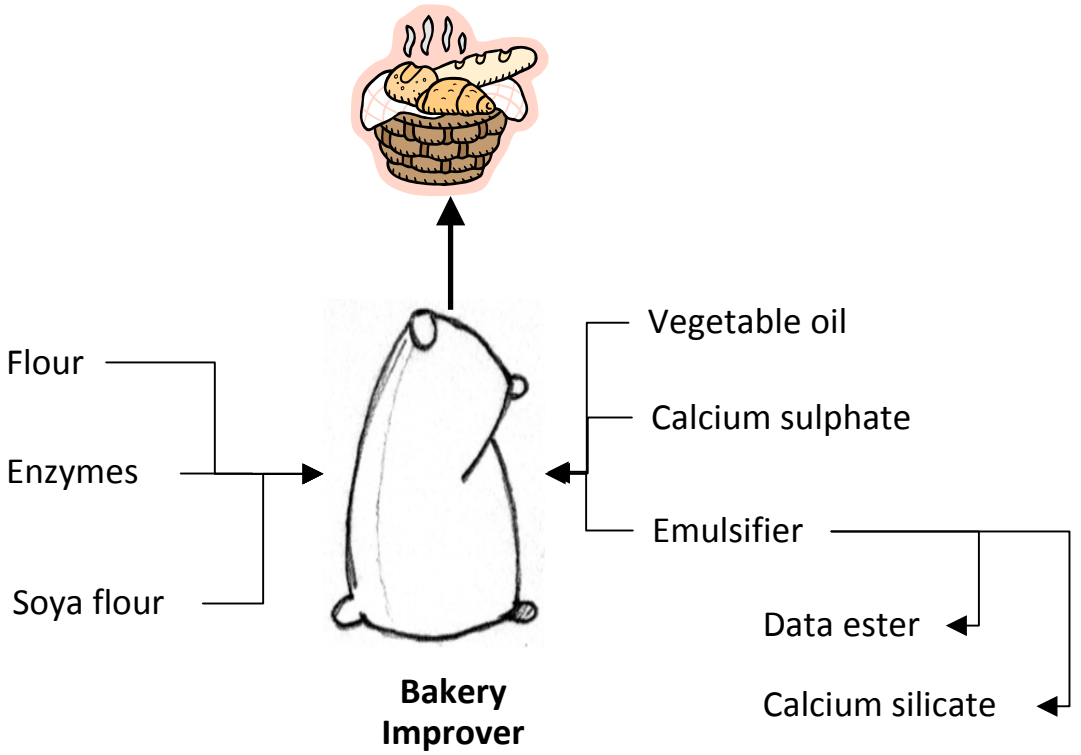


- 87% +ve to wheat & enzymes
- 48% +ve to wheat only
- 13% +ve to enzyme only

- Fungal & bacterial amylase
- Hemicellulase/ Cellulase/ Xylanase
- Glucose oxidase / Amyloglucosidase

Study: Dustiness of bread improvers

- HSE funded joint study with ABIM started in 2008



Why reduce the dustiness of improvers?

Aim: To investigate whether changing the proportions of ingredients in bread improver mixtures reduces their dustiness and consequently the exposure of bakers to allergens

- Improvers contain microbial enzyme allergens
- A process of formulating/ mixing improvers is undertaken in large, medium and small bakeries
- Modifying improver mixtures could control dustiness at source (consistent with CoSHH) rather than relying first on other aspects of a control strategy.
- Controlling dustiness at source is particularly relevant to small non-mechanised bakeries where implementing engineering controls solutions is generally prohibitive because of costs.

Dustiness testing

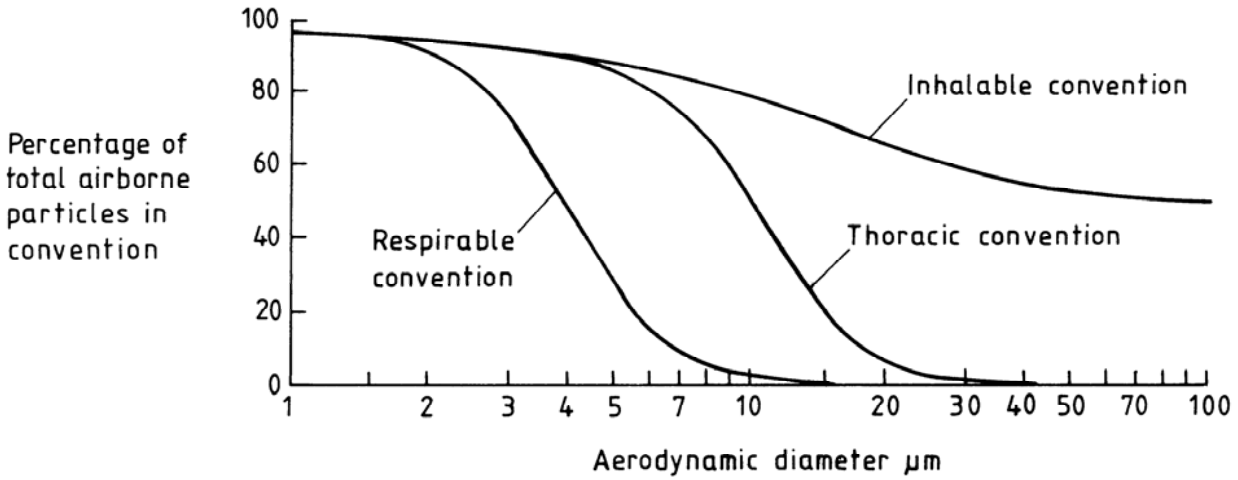
Standard dustiness testing
(rotating drum)

- European standard EN15051 (HSE MDHS 81)separates airborne dust into three health-related fractions (inhalable, thoracic and respirable) for mass measurement. Run at 4rpm and air drawn at 38L/min

User Test
Exposure measurement

- Enclosed chamber allowing manual task to be replicated and dust personal samples and size distribution (Aerosizer™)

Characterising dustiness

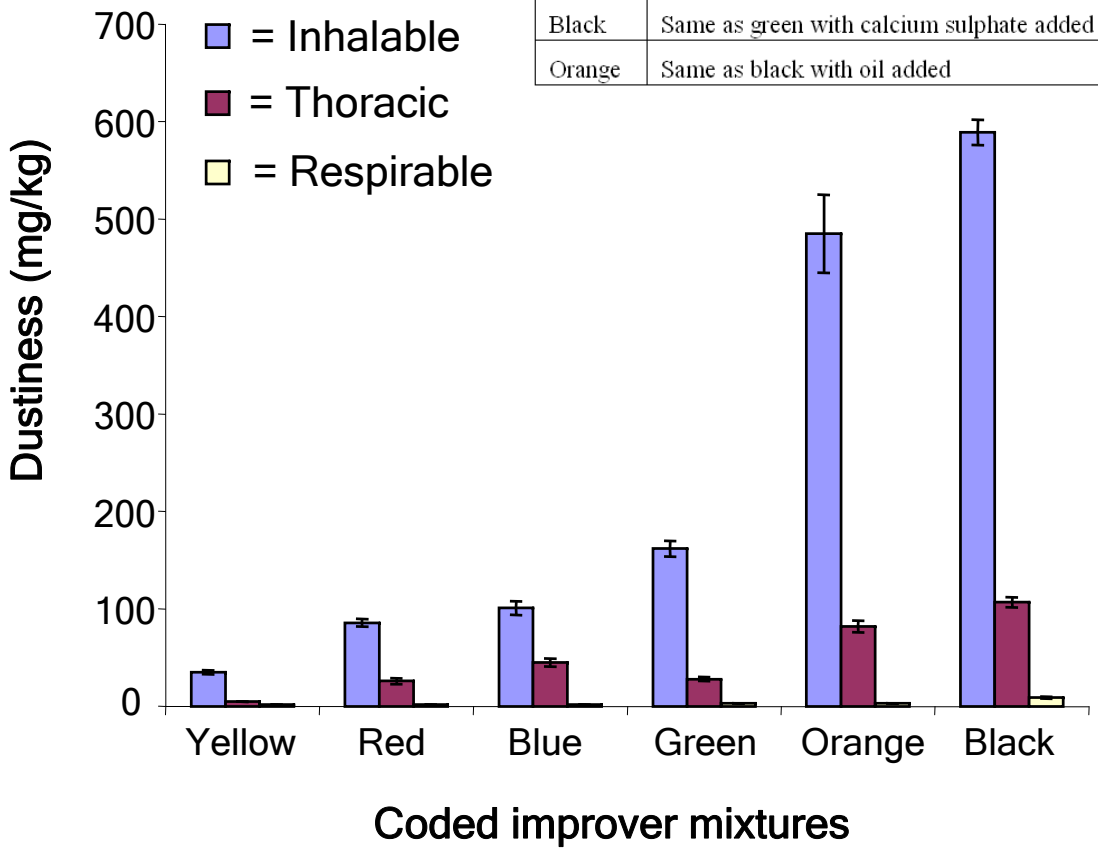


Classification of dustiness according to EN15051

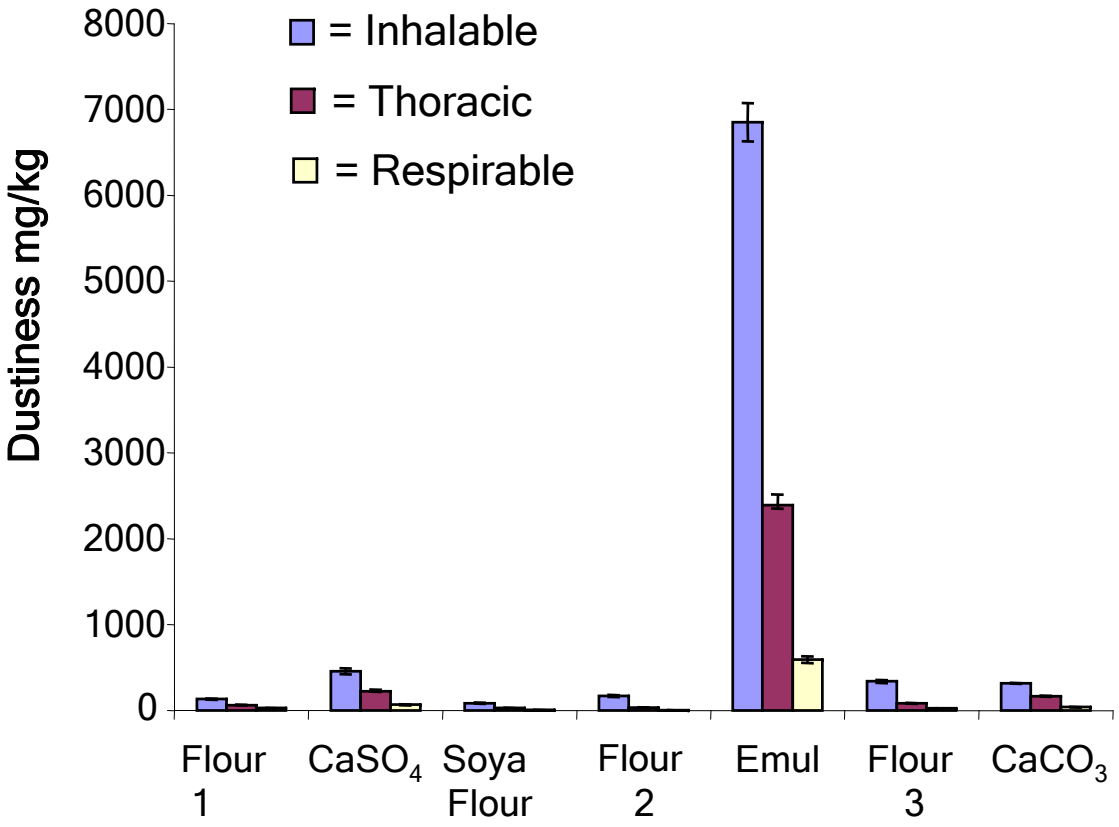
Category of dustiness	Inhalable dustiness mass fraction (mg/kg)	Thoracic dustiness mass fraction (mg/kg)	Respirable dustiness mass fraction (mg/kg)
Very low	<200	<40	<10
Low	200 - 1000	40 - 200	10 - 50
Moderate	>1000 - 5000	>200 - 1000	>50 - 250
High	>5000	>1000	>250

Dustiness: modified improvers

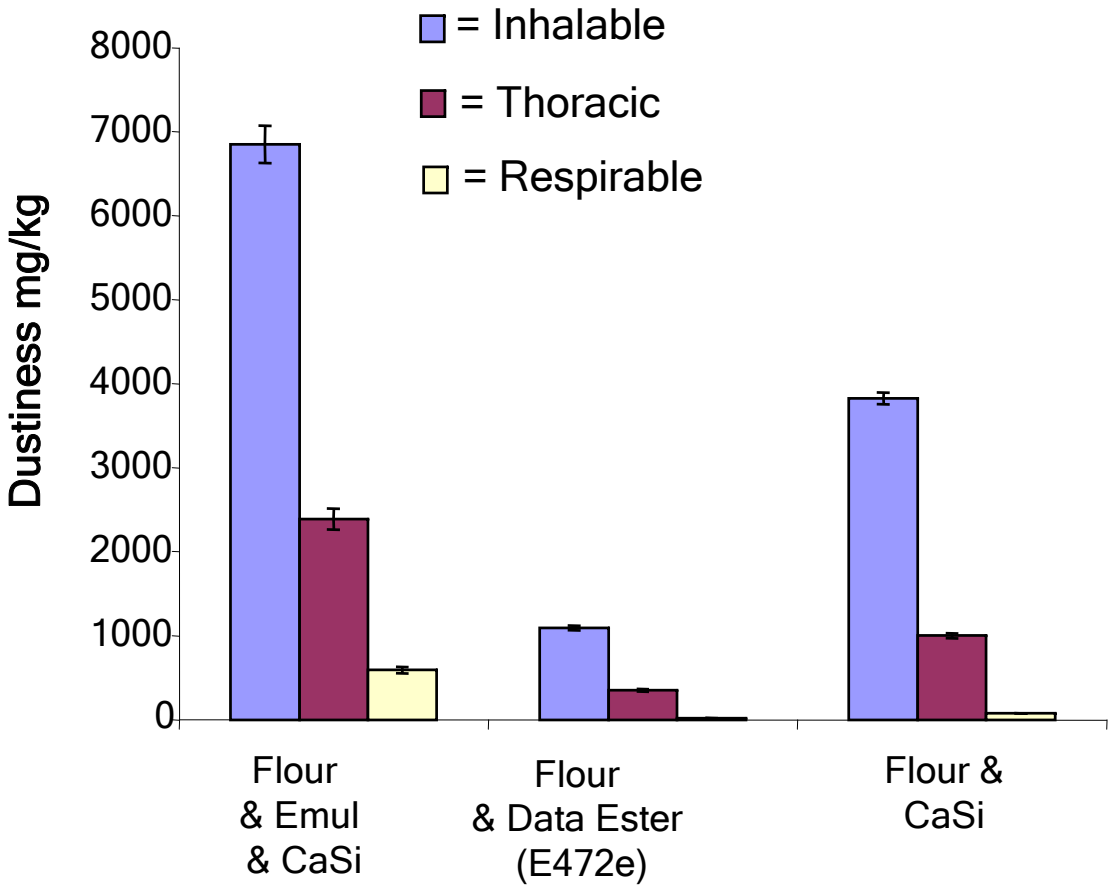
Sample	Description of sample	Soya	Emulsifier	Ca sulphate	Oil
Blue	Control: flour and ascorbic acid only	None	None	None	None
Red	Control: As blue, with fungal alpha amylase added	None	None	None	None
Yellow	Same as red with soya added	20%	None	None	None
Green	Same as yellow with emulsifier added	20%	20%	None	None
Black	Same as green with calcium sulphate added	20%	20%	25%	None
Orange	Same as black with oil added	20%	20%	25%	2%



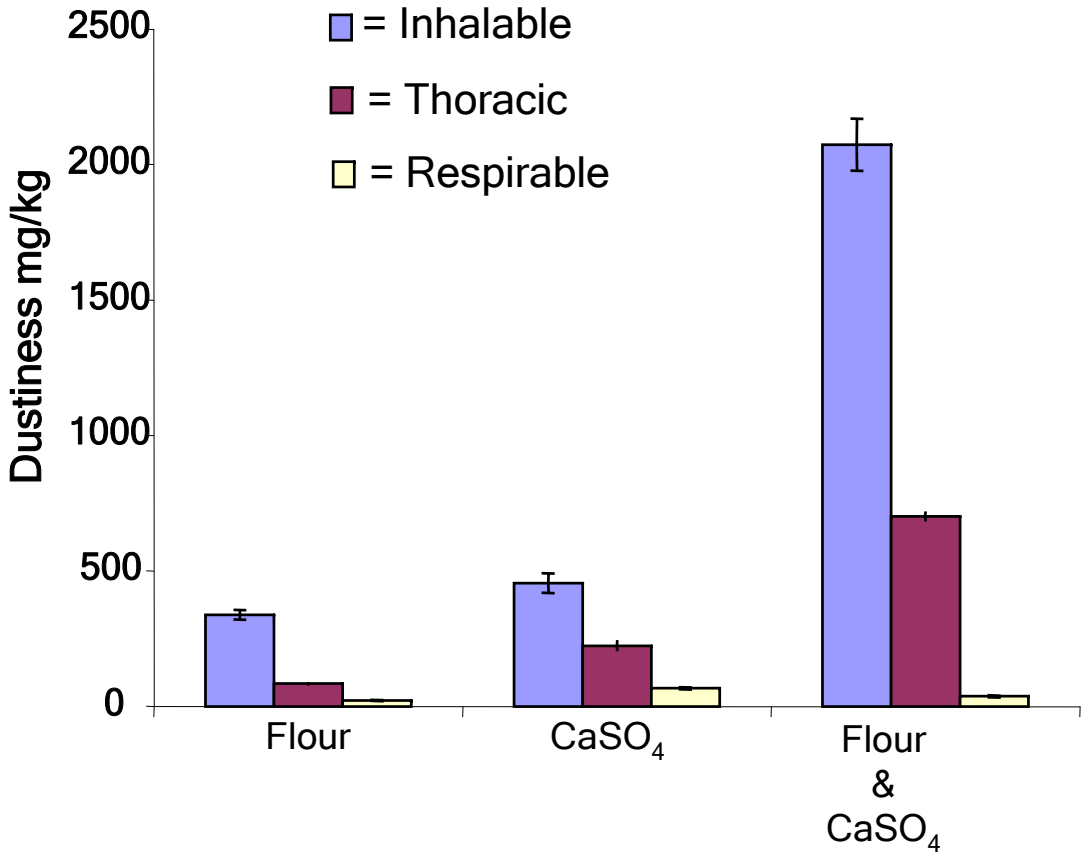
Dustiness: Improver constituents



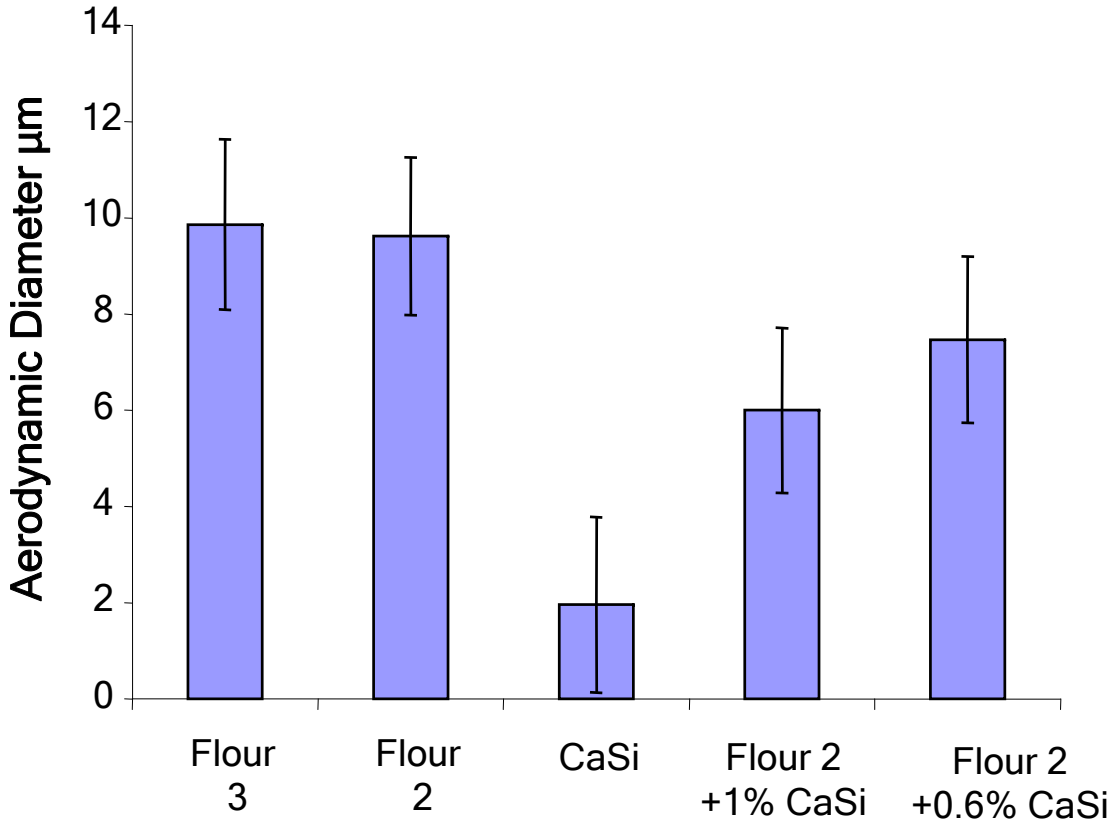
Dustiness: Emulsifier constituents



Dustiness: Calcium sulphate

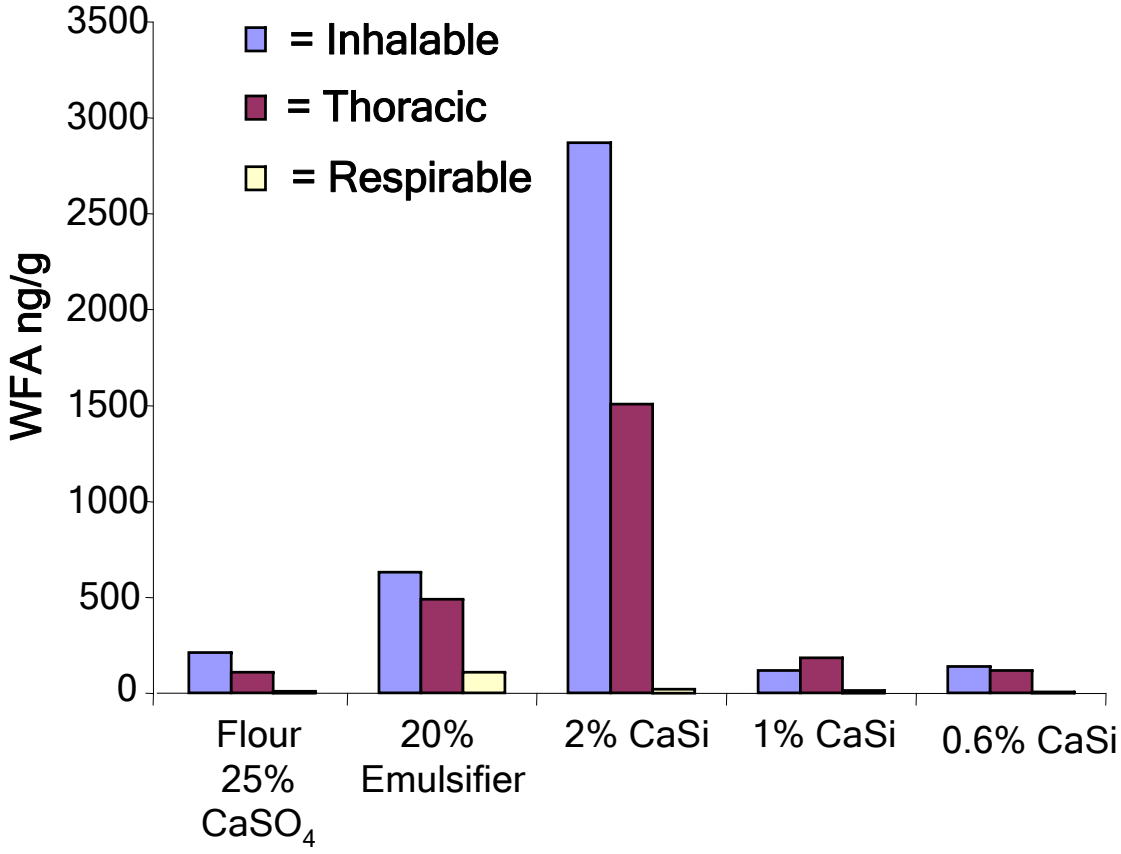


Dustiness: aerodynamic diameter

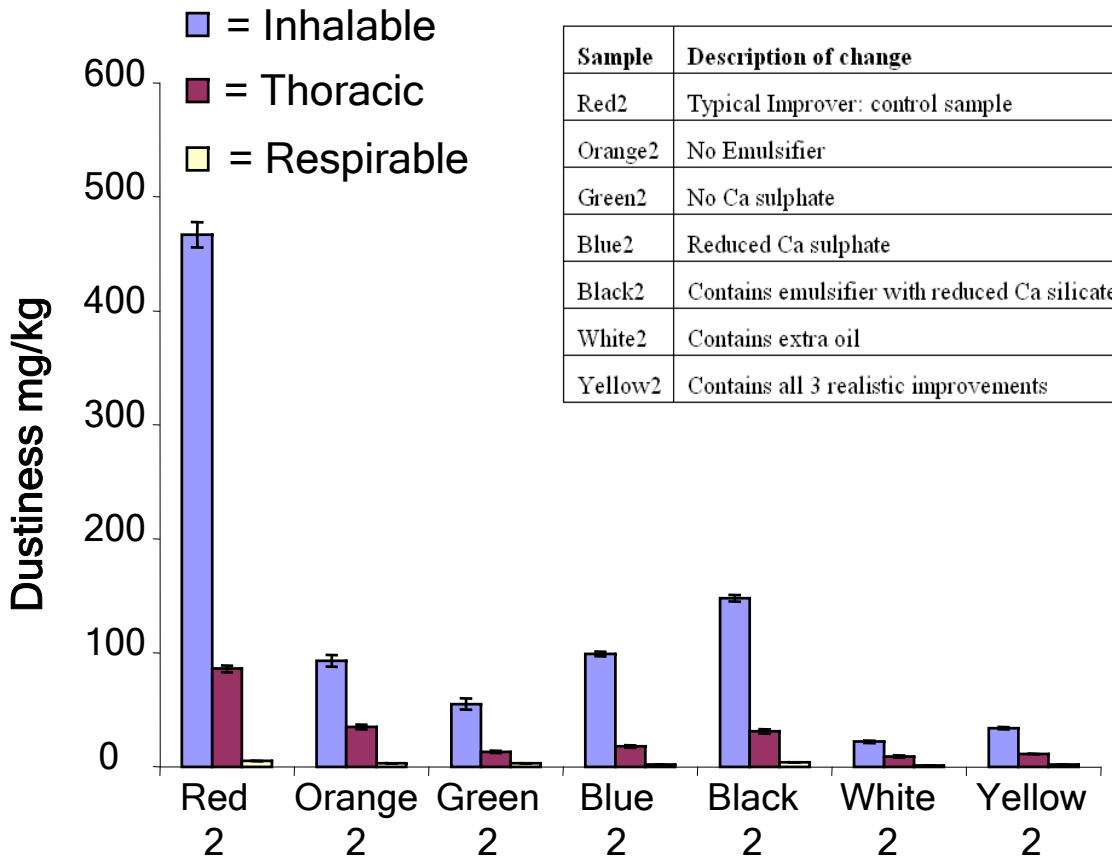


Dustiness: Free flow agent & allergens

WFA= Wheat flour antigen



Dustiness: Modified improver mixtures

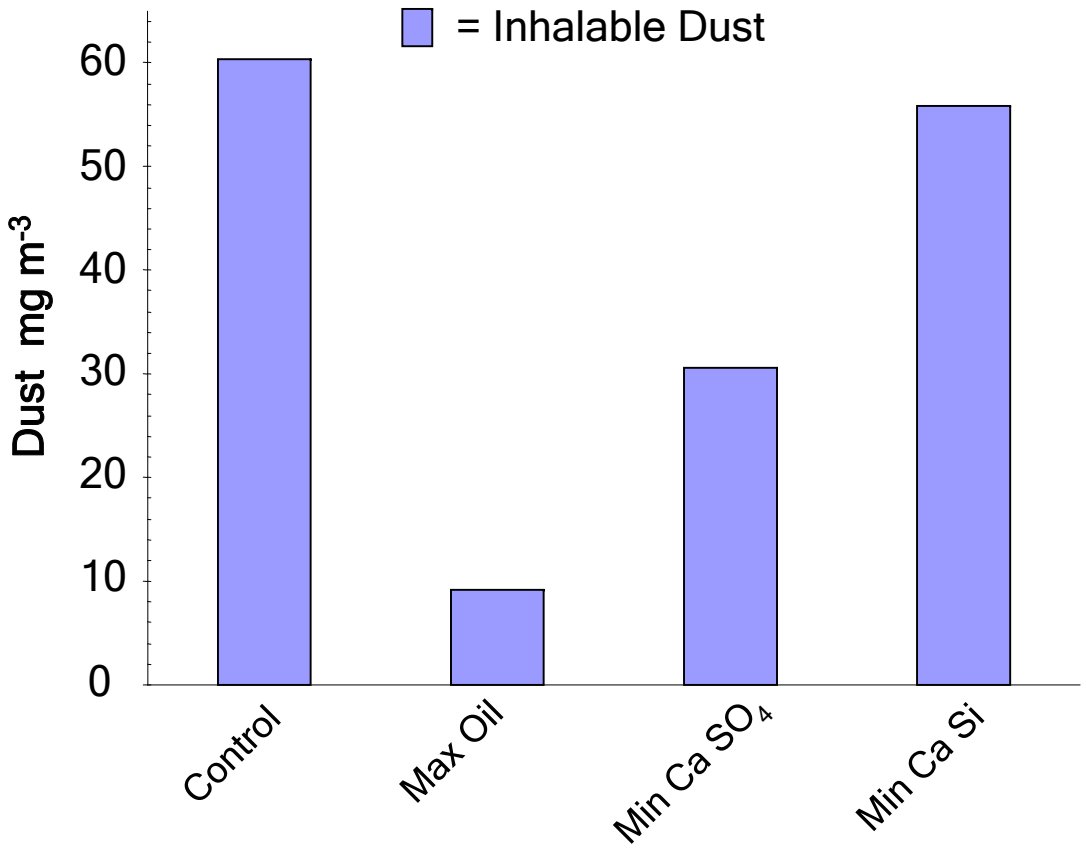


Sample descriptions and key ingredient changes

Sample	Description of change	Ca sulphate	Emulsifier	Oil
Red2	Typical Improver: control sample	25%	Contains 5% Ca silicate	2%
Orange2	No Emulsifier	25%	None	2%
Green2	No Ca sulphate	None	Contains 5% Ca silicate	2%
Blue2	Reduced Ca sulphate	5%	Contains 5% Ca silicate	2%
Black2	Contains emulsifier with reduced Ca silicate	25%	Contains 3% Ca silicate	2%
White2	Contains extra oil	25%	Contains 5% Ca silicate	4%
Yellow2	Contains all 3 realistic improvements	5%	Contains 3% Ca silicate	4%

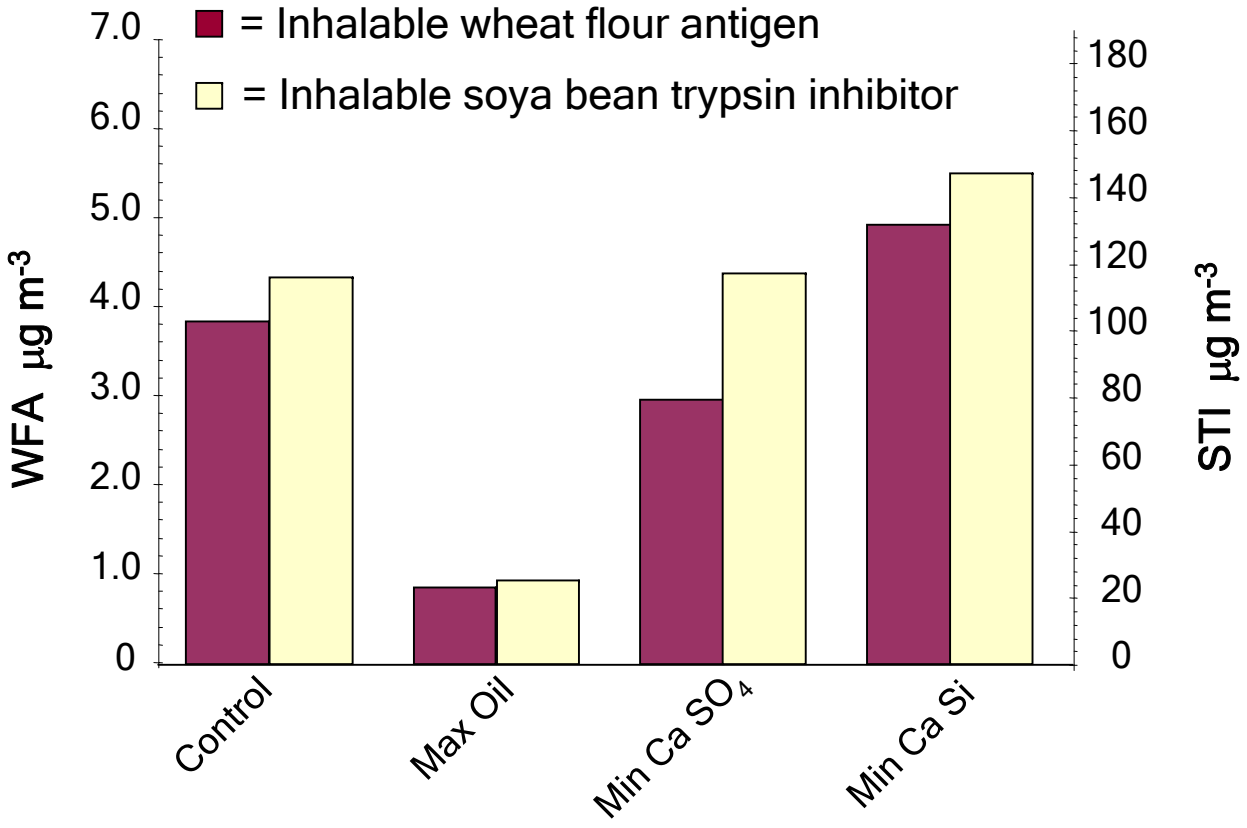
User test results: dustiness

- Does the formulation of improvers affect exposure to dust?



User test results: allergen exposure

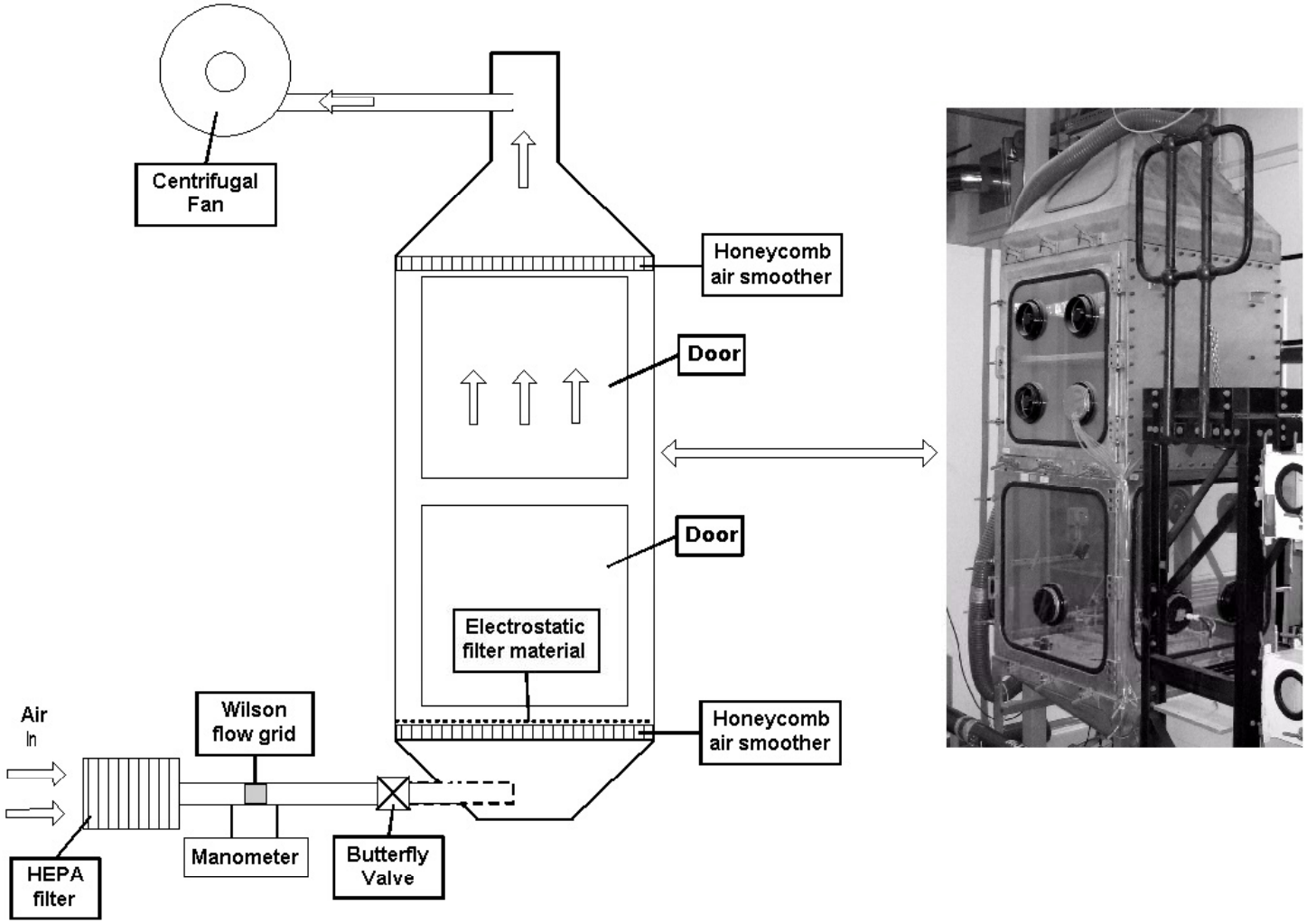
- Does the formulation of improvers affect exposure to allergens?



Acknowledgements

- Association of Bakery Ingredient Manufacturers (ABIM): Chris Morrant and Brett Makison.
- John Rowley (Allied Bakeries) and Jak Thomas (Federation of Bakers) for their help in arranging a visit to a bakery
- Health and Safety Executive (HSE): Pauline Johnson-Wright, Marie Warburton.

Annex


Centrifugal Fan
Honeycomb air smoother
Door
Door
Electrostatic filter material
Honeycomb air smoother
Air In
Wilson flow grid
HEPA filter
Manometer
Butterfly Valve