# A new approach for authenticating whole grain products \*Wasim Iqbal, Abigail Smith, Dr Lenka Frankova, Dr Catherine Tetard Jones, Prof Chris Seal and Prof William Willats



Figure 1. Basic structure of a grain [1 & 3].



Whole grain foods are well known for their beneficial health effects, including a reduced risk of diabetes, cancer and cardiovascular disease [1]. Over the past few years organisations have responded by claiming products are "whole grain" or "wholemeal". However, with no clear definition of whole grain this has left room for whole grain fraud –potentially misleading consumers into thinking they are eating 100% whole grain products when it may in fact contain much less.

To tackle this, natural plant polysaccharides can be used as information-rich markers of a particular layer or anatomical feature of the grain (bran, endosperm and germ). These can be detected using various antibodies and displayed as coloured profiles with the help of microarray technology [2] (Figure 1). It is hoped that this will serve as a basis for assessing whether all components of the grain is present in a particular product.

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the formulation of support scientifically robust definitions of whole grain based on quantifiable markers.

Wheat and barley fractions (inner and outer layers) were made into a fine powder and polysaccharides were extracted using diaminocyclohexanetetraacetic acid (CDTA) and a sodium hydroxide (NaOH) solutions, before being applied onto a nitrocellulose membrane using a microarray and probed with various antibodies (figure 2).

#### A. Grain preparation and carbohydrate extraction





#### Figure 2. Polysaccharide extraction and analysis [2].

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Introduction

## Aims

To provide industry with a more robust way of assessing whole grain products.

## **Method**

Results

The inner and outer layers of wheat (figure 3) and barley samples had shown differing amounts of polysaccharides such as arabinogalactan and homogalacturonan (figure 4).

All samples were abundant in arabinoxylan and b-glucan but overall barley had a greater polysaccharide content.







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### Discussion

- The outer layers of barley grains had a greater content of arabinogalactan than its inner layers. Whereas, the outer layers of wheat grains had a greater content of homogalacturonan than its inner layers. This is consistent with previous studies [4].
- However, overall the polysaccharide content was far greater in barley than wheat which it is hoped will serve as a way of distinguishing between the two types of grains. This is also consistent with previous studies [5].
- It was later discovered that due to the high amount of bglucan and arabinoxylan these may hide other polysaccharides; These epitope masking [4]. polysaccharides may be removed by an enzyme treatment which may reveal more potential markers.

## Conclusion

The distribution of polysaccharides differed between barley and wheat layers. It is hoped that this information will serve as markers of their respective layers.

Currently, studies are underway using an improved method involving enzyme treatment.

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