In contrast, cereal β-glucan is readily extracted by and soluble in water and is classified as a soluble dietary fibre. Like all dietary fibres, when ingested, the soluble β-glucan is not hydrolysed by digestive systems of the human upper gastrointestinal tract, but absorbs water either to disperse into the digestive lumen, or to form a swollen, gelatinous cell wall residue, but again, like all dietary fibres, β-glucan is fermented and utilized by bacteria in the large intestine or lower GI tract.

Numerous studies have shown that β-glucan soluble fibers can play an important role in reducing the risk of cardiovascular disease by controlling 2 risk factors: the reduction in both total and low-density lipoprotein (LDL) serum cholesterol and obesity via the satiety effect. Besides, β-glucans beneficially regulates glycemic response and has a prebiotic effect which may lower the risk of intestinal diseases. Additionally, β-glucans have immune potentiating activity.

Following evaluation of clinical studies of the effect of oat products on serum cholesterol, the USAFDA and other regulatory bodies such as AFSSA (France) allowed a health claim, stating that oat products may reduce risk of heart disease, requiring a 3 g daily dose of oat β-glucan. However, not all studies have demonstrated a cholesterol-lowering effect with oat products. There is probably a number of reasons for this, but poor understanding of the amounts and bioactivity of active ingredients is certainly one of them.

However, the relation between viscosity, MW and solubility of β-glucan and cholesterol-lowering, glycemic response and appetite regulating effect has never been demonstrated.

SUMMARY ~~OF THE INVENTION~~

In one aspect, the present invention refers to a dietary fibre composition comprising at least one cereal grain component containing β-glucan, characterized in that β-glucan is selected to have a peak molecular weight in the range of 500 kDa to 3000 kDa, a solubility at 37°C of at least 50% of extracted β-glucan to the total β-glucan content in an extract of the fibre

composition, and with a viscosity of the extract at 37°C of at least 500 mPa·s measured at $30s^{-1}$; the extract being prepared by mixing a 5 g sample of the fibre composition in an Erlenmeyer flask with 75 ml of 20 mM sodium phosphate buffer, pH 6.9, containing 10 mM NaCl; stirring the mixture slowly for 15 min at 37°C; adding 250 µl of human salivary α-amylase solution (5mg/ml in 3.6 mM $CaCl_2$); stirring the mixture for further 15 min; adjusting the pH to 2.0 with 6M and 1M HCL; adding 625 µl of porcine solution (0.5 mg/ml in 0.9 % NaCl); incubating the mixture for 30 min at 37°C; adjusting the pH to 6.9 with 3M NaOH; adding 1.25 ml of pancreatin solution (0.5 mg/ml in 20 mM sodium phosphate buffer containing 10 mM NaCl); continuing incubation for 90 min; and centrifuging an aliquot for 10 min at 7,000xg.

The present disclosure describes~~invention relates to~~ a dietary fibre composition comprising at least one cereal grain component containing β-glucan, the β-glucan being selected to have a peak molecular weight in the range of 40 kDa to 3000 kDa, a solubility at 37°C of at least 20% of extracted β-glucan to the total β-

glucan content in an extract of the fibre composition prepared according to the method disclosed herein, and with a viscosity of the extract at 37°C of at least 30 mPa·s when measured at 30 s^{-1}.

More preferably, β-glucan is selected to have a molecular weight in the range of 500 kDa to 2000 kDa.

The importance of using β-glucans within a relatively high MW-range and having relatively high solubility has not previously been recognised. It cannot directly be assumed that all β-glucans having the same MW would also have the same solubility. There are high MW β-glucans with low solubility and those with higher solubility. Solubility and MW depends on the type of food-stuff in which the β-glucans are present, and on the production methods used when preparing β-glucans containing foodstuffs and compositions. Accordingly, the present invention resides in the selection of those particular β-glucans having a combination of peak MW and solubility that will produce a sufficiently high viscosity to provide a beneficial effect at a comparatively low content of β-glucans in the fibre composition.

In particular, one example~~the invention~~ relates to extruded oat cereal containing 3 g of high molecular weight oat β-glucan or 4 g of medium molecular weight oat β-glucan, or 3 g of medium molecular weight oat β-glucan, or 4 g of low molecular weight oat β-glucan that reduces serum LDL cholesterol and regulates glycemic response compared to a control wheat bran cereal. The amounts of β-glucan refer to the amount in a recommended serving of the oat cereal. The LDL cholesterol-lowering and glycemic response regulating effect of β-glucan is directly related to its ability to increase the viscosity of the intestinal contents, which in turn, is related to the molecular weight (MW), concentration and viscosity of β-glucan solubilised in the small intestine.

The disclosure also describes~~invention relates also to~~ extruded oat cereal containing 2.2 g of high molecular weight oat β-glucan or 3.8 g of medium molecular weight oat β-glucan, or 5.5 g of low molecular weight oat β-glucan that increase levels of

plasma PYY compared to a control wheat bran cereal per recommended serving of the oat cereal.

The solubility "C" of β-glucan is measured as disclosed herein and is defined herein as the amount of β-glucan in an extract of a β-glucan containing foodstuff or composition and is expressed as the percentage of the total β-glucan content in the foodstuff or composition that is found in the extract. The solubility will differ between different foodstuff as seen in Table 1. The solubility of the β-glucan is dependent on the molecular weight of the β-glucan and is also highly dependent of the treatment of the cereal grain component in the composition of foodstuff. Accordingly, depolymerisation and manipulating of β-glucan during bread making, the presence of other ingredients, processing methods, and storage condition can affect solubility and consequently viscosity and resultant physiological activity. In the dietary composition according to the present invention β-glucan is selected to have a solubility of at least 50%, preferably at least 75%, measured by the *in vitro* method described below.

The dietary fibre composition according to the present invention can have a protein content of about 2-20% by weight, a fat content of about 3% by weight and a fibre content of about 10-50% by weight.

The dietary fibre composition according the present invention can have a β-glucan content less than 50% by weight, preferably less than 40% by weight, more preferably less than 30% by weight.

For the purpose of the present disclosure~~invention~~, solubility, C has been defined as set out herein and is the percentage of the β-glucan in a composition/foodstuff that is dissolved in an extract of the composition/foodstuff.

However, other definitions of solubility or the amount of available β-glucan may be found in the art such as the g β-glucan/g food, g β-glucan/serving, g soluble β-glucan/serving, g β-glucan/ mL in vitro extract.

In another aspect, the present invention refers to foodstuff containing the dietary fibre composition as disclosed herein.

In yet another aspect, the present invention refers to nutritional supplement containing the dietary fibre composition as disclosed herein.

In a further aspect, the present invention refers to use of a dietary fibre composition as disclosed herein for manufacturing foodstuffs for treatment and/or prophylaxis of hypercholesterolemia, regulating glycemic response and appetite control in a mammal.

In yet another aspect, the present invention refers to use of dietary fibre composition as disclosed herein for manufacturing nutritional supplement for treatment and/or prophylaxis of hypercholesterolemia, regulating glycemic response and appetite control in a mammal.

In a further aspect, the present invention refers to medicament containing the dietary fibre composition as disclosed herein.