Glycaemic Index (GI)

Simon Gilmour, Fonterra’s Research Scientist in Nutrition, explains the Glycaemic Index (GI), how a GI value is assigned to different foods and the health benefits that may be generated from consuming low GI foods such as NZMP milk powders.
The Glycaemic Index (GI) is a system designed to rank carbohydrate containing foods according to their effects on blood sugar levels. Low GI food and beverages are defined as having a GI value of 55 or less. NZMP milk powders are naturally low GI. NZMP Super Fortified Instant Skim Milk Powder (ISMP) and Protein+ Instant Milk Powder are certified low GI.

Introduction

The Glycaemic Index (GI) ranks foods according to their effects on blood sugar levels. Low GI foods cause a slow, steady rise in blood glucose while high GI foods cause a rapid increase or “spike”. Glucose is used as the standard against which all other foods are measured and is assigned a GI value of 100, other foods are compared to this standard and classified as either High, Mid or Low GI:

- **High**: 70+
- **Mid**: 56-69
- **Low**: 55 or less

Low GI eating patterns are good for your health and can help with the following:

- Control of blood sugar levels for individuals suffering with diabetes.
- Increased feelings of fullness in support of weight management.
- Longer lasting energy.
- Lower risk of metabolic diseases.

Executive summary
DETERMINATION OF GI VALUES

The GI value of a food is determined by feeding 10 or more healthy people a portion of the food containing 50g (or 25g depending on portion size) of digestible carbohydrates and measuring the effect on blood glucose over the next two hours. The same people then consume the equivalent amount of carbohydrate in the form of sugar (glucose) on a separate day. These responses are plotted on a graph and the area under the curve (AUC) for each feeding calculated. The GI value of the food for each person is then calculated by dividing their glucose AUC by the food AUC. The final GI value is the average of all the individual GI values (ISO, 2010).
Low GI eating patterns are good for your health

**DIABETICS CAN CONTROL BLOOD SUGAR LEVELS BY EATING LOW GI**

In individuals suffering from diabetes, the body is unable to produce, has a reduced ability to produce or has a resistance to the actions of insulin. This causes a reduced ability to control blood glucose levels effectively and can lead to prolonged periods of elevated blood sugars. Exposing the body to this can have serious health consequences so diabetics must manage their blood sugar levels carefully.

Maintaining a low GI diet can improve blood glucose control and insulin sensitivity in people with type II (non-insulin dependant) diabetes, while people with type I (insulin dependant) diabetes tended to have better blood glucose control (Zafar, 2019).

People with pre-diabetes and those at risk of developing type 2 diabetes are advised to avoid high GI diets as this could increase the chances of developing type 2 diabetes by 87% (Livsery 2019) while the consumption of dairy products, particularly low fat dairy products, has been associated with a 10% decrease in the risk of developing type 2 diabetes (Tong 2011).

**LOW GI FOODS MAY HELP WITH WEIGHT MANAGEMENT**

Maintaining a low GI eating pattern may aid weight management. High GI foods cause a rapid increase in blood glucose and stimulate high levels of insulin secretion into the bloodstream, which may direct nutrients towards storage as fat. Low GI foods help your body maintain a slow steady rise in blood glucose levels and are considered to create greater feelings of satiety (fullness) which can lead to less food consumption at the next meal.

For example, Larsen et al (2010) showed that people following a low GI eating pattern lost more weight than people who followed a high GI eating pattern. Weight loss was demonstrated to be even greater when combined with a higher protein intake (Larsen 2010). A 2007 review of the scientific literature also demonstrated that people on low GI diets lost more weight than people on other energy restricted diets (Thomas 2007). Low GI diets also lowered total cholesterol and LDL cholesterol levels, both of which are risk factors for heart disease.

When an individual has insulin resistance, the ability to control blood glucose levels and fat storage/breakdown is disturbed (Trouwborst 2018). Meaning that they often store body fat easily and struggle to lose weight. Zafar et al (2019) showed that low GI diets may help decrease body mass index (BMI), in people with pre-diabetes and diabetes, particularly if their BMI was high to start with.
LONGER LASTING ENERGY WITH LOW GI FOODS

The ability of low GI foods to help your body maintain a slow steady rise in blood glucose levels helps to maintain energy levels for longer periods of time, while high GI foods can cause a “crash” or “reactive hypoglycaemia” after the initial spike. This causes blood sugar levels to drop below optimum levels and can lead to feelings of fatigue and sluggishness.

This longer lasting energy has been demonstrated in studies comparing athletes performance after consuming low vs high GI foods, with cyclists performing significantly better during 40km time trials (Moore 2009, 2010). Researchers expect that this is due to low GI foods helping to keep blood sugar levels stable and providing a consistent flow of glucose for muscles to convert into energy.

EATING LOW GI WHILE PREGNANT CAN BENEFIT YOUR UNBORN CHILD

Maintaining a low GI diet during pregnancy has also been associated with better health outcomes for infants, contributing to healthier birth weights, lower risk of childhood obesity and metabolic diseases such as Type II diabetes later in life.

An observational study in the UK on 904 pregnant mothers showed that high GI eating patterns at 11 weeks of pregnancy was associated with increased body fat mass in their children at 4 and 6 years of age (Okubo 2014). While a study in Denmark showed that high GI intakes during pregnancy were associated with more markers of metabolic syndrome (a combination of high blood pressure, high blood glucose, excess body fat and high cholesterol) when their children were 20 years of age (Danielsen 2013), suggesting that the environment created within the womb can have effects all the way into adult life.
NZMP milk powders are naturally low GI

NZMP milk powders are naturally low GI, due to the unique macronutrient makeup of milk. Casein, which makes up 80% of milk protein, slows the emptying of the stomach leading to a slower release of the milk sugar lactose into the digestive tract. The lactose itself also contributes to the slow rise in blood sugar due to the fact that it is made up of one glucose unit and one galactose unit. When lactose is digested the glucose unit is readily absorbed and enters the bloodstream without any further conversion, whereas the galactose unit is directed to the liver, where it will only be converted into glucose if levels in the blood are low (Gibney, 2009).

NZMP SUPER FORTIFIED ISMP AND PROTEIN+ INSTANT MILK POWDER ARE CERTIFIED LOW GI

Super Fortified Instant Skim Milk Powder (ISMP) and Protein+ Instant Milk Powder have been tested and certified as low GI by Otago University using an internationally recognised test method endorsed by the Glycaemic Index Foundation. Fonterra can provide supporting documents to verify testing containing all you need to demonstrate these powders are low GI.

NZMP SUPER FORTIFIED ISMP AND PROTEIN+ INSTANT MILK POWDER CAN CARRY THE GI SYMBOL FRONT OF PACK

The low GI certification by Otago University allows you to apply for use of the GI symbol on front of pack allowing consumers to quickly and reliably identify the powder as low GI (see Appendix).

Only foods that meet strict nutrient criteria in line with International Dietary Guidelines (FAO, 2019) for energy, saturated fat and salt are eligible for testing. Applying to use the GI symbol through the GI foundation also provides benefits such as access to extensive scientific reviews to help you substantiate health claims in relation to:

Satiety
- Low GI helps you stay fuller for longer
- Low GI increases the feeling of being fuller for longer
- Low GI foods can increase satiety

Sustained Energy
- Low GI for sustained energy
- Low GI for longer lasting energy
- Low GI to help maintain energy levels

Physical Performance
- Low GI to fuel active bodies
- Low GI foods can help provide you with the energy needed to keep active for longer.
- Low GI foods provide energy to help you perform at your best

These claims have been generated under New Zealand and Australian Food Standards (FSANZ), using these claims in other markets will require consultation with relevant regulatory bodies. Application for rights to use the GI symbol incurs a fee payable to the Glycaemic Index Foundation. For more information go to: https://www.gisymbol.com.
In conclusion, eating a healthy and varied diet containing low GI foods such as Super Fortified ISMP and Protein+ Instant Milk Powder has the potential to deliver health benefits to a range of different people.

Certification through Otago University means that you and your customers can be sure these NZMP powders are low GI. This certification can be used either to provide justification for claiming low GI on pack (subject to regulations in your market), or used to apply for use of the GI Symbol from the Glycaemic Index foundation (see Appendix).

REFERENCES


Thomas D, Elliott EJ, Baur L. Low glycemic index or low glycemic load diets for overweight and obesity. Cochrane Database of Systematic Reviews. 2007(3).


Appendix

The Glycemic Index Foundation (GIF) exists as an independent authority, for both consumers and those in the food and agribusiness industry, to provide greater understanding on the evidence-based benefits of low GI eating. GIF’s key objectives are to promote awareness and understanding of GI and to work with those in the Food and Beverages industry to promote and launch low GI products.

THE GI SYMBOL PROGRAM

The GI Symbol Program is administered by GIF and exists as the only independent GI certification program to be recognised worldwide. The Symbol, which can be used on pack, provides consumers with a quick and easy way to identify products that are certified low GI. It also adds credibility to health claims for healthcare professionals and authorities.

REGISTERING PRODUCTS TO THE GI SYMBOL PROGRAM

Registration for GI Symbol contact: info@gifoundation.org.au

Requirements for registration:
https://www.gisymbol.com/gi-symbol-program/

The GI symbol is registered and can be used in the following countries:

Australia New Zealand
India Singapore
Malaysia Japan
Hong Kong India
Canada EU
USA Indonesia (Pending)
Taiwan (Pending) China (Pending)

Note: GI symbol can be used in countries where it is not registered with permission from the Glycaemic index foundation. Alternatively, a generic ‘Low GI’ claim may be used on pack.

BENEFITS OF USING THE GI SYMBOL ON PACK

Using the symbol on pack helps consumers quickly and reliably identify products as low GI when looking to make healthier food choices. Health claims that can be made in conjunction with the low GI symbol include an increase in satiety, sustained energy and physical performance. More information on making low GI general level health claims can be found here: https://www.gisymbol.com/gi-health-claims/

GIF provides added value to program licensees through marketing and communications activities which are detailed below;

• Product promotion across multiple GIF channels. Including inclusion in "Low GI Living" emails to a database of 20,000
• Access to promotional material, directed at both consumers and healthcare professionals
• Access to scientific dossiers to support claims (subject to regulations in market)

Disclaimer: The information in this document is designed to give a brief overview of the nature and characteristics of our ingredients as at the date of preparation. It does not constitute representations or warranties as to such characteristics, the functionality or potential applications of our ingredients and you must assure yourself of these matters having regard to our detailed product specifications, your specific circumstances and applicable market requirements.

Talk to the dairy ingredient experts

We’re passionate about sharing our deep dairy expertise to help you grow your business. Talk to us today about your dairy ingredient needs.

To find out more or to purchase our ingredients please visit nzmp.com