Glycemic Index Research Report #1918

For Yacon New Zealand Ltd.

June 2019

Sydney University's

Glycemic Index Research Service (SUGiRS)

School of Life and Environmental Sciences

Charles Perkins Centre, D17

The University of Sydney, NSW, 2006

AUSTRALIA

A study to measure the Glycemic Index values of two syrup products

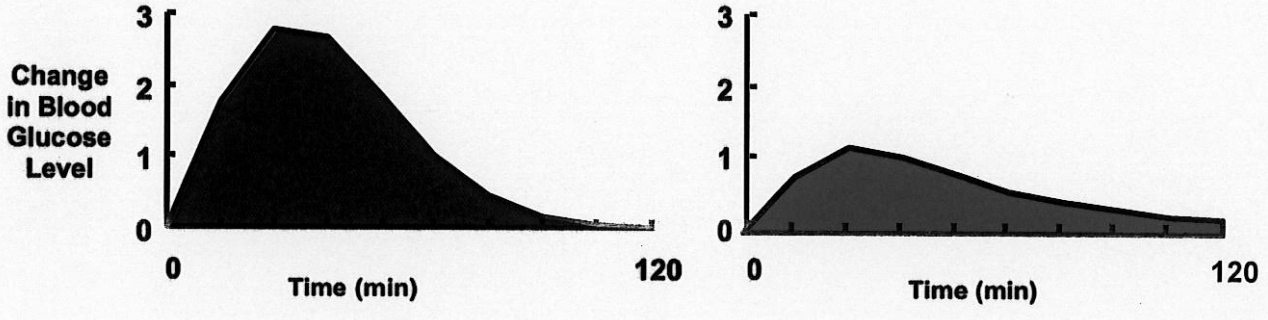
Background Information: The Glycemic Index

Nutrition research conducted in the 1970's showed that different carbohydrates did not have the same effects on blood glucose (sugar) levels after eating. These findings challenged the general assumption that all 'complex' carbohydrates (starches) produce lower blood glucose responses than 'simple' sugars, and questioned the clinical significance of carbohydrate exchange lists that have regulated the diets of people with diabetes for over three decades. These exchange lists are based on the assumption that portions of different foods containing equal amounts of carbohydrate will produce the same blood glucose response.

Consequently, the **glycemic index** (**GI**) was developed in order to rank equal carbohydrate portions of different foods according to the extent to which they increase blood glucose levels after being eaten (1). Foods with a high GI value contain rapidly digested carbohydrate, which produces a rapid and large rise and fall in the level of blood glucose. In contrast, foods with a low GI value contain slowly digested carbohydrate, which produces a gradual, relatively low rise in the level of blood glucose (Figure 1).

Figure 1. The 2-hour blood glucose response curves for a high-GI food (white bread: GI value = 70) and a low-GI food (lentils: GI value = 30).

a. High GI - White bread **b. Low GI - Lentils**



Over two decades of research has confirmed that a food's glycemic effect cannot be accurately predicted from the type and amount of carbohydrate it contains. This is because the rate at which carbohydrate is digested and released into the bloodstream is influenced by many factors, such as the food's physical form, its fat, protein and fibre content, and the chemical structure of its carbohydrate (2). For these reasons, apparently similar foods within the same food group and different flavours of the same food can have quite different effects on blood glucose levels.

GI research has important implications for the food industry and people's health. Scientists now agree that the terms 'complex carbohydrate' and 'sugars', which commonly appear on food labels, have little nutritional or physiological significance. The World Health Organisation released a consensus report stating that these terms should be removed from food labels and replaced with the food's total digestible carbohydrate content and its GI value, in order to help people select foods that will reduce the overall glycemic impact of their diet (3). Currently, many dietitians refer to the glycemic index when planning more flexible diets for people with diabetes. In addition, GI values are being used in scientific research studies to examine the relationship between the overall glycemic effect of people's habitual diets and their risk of developing certain diseases over time. Results from large-scale epidemiological studies have shown that the long-term consumption of a diet with a high glycemic impact, which induces high and recurrent surges in blood glucose and insulin levels, increases the risk of developing diabetes, heart disease and certain cancers (3, 4). In contrast, results from both epidemiological and experimental studies show that low-GI diets can reduce the risk of these diseases, improve blood glucose control and insulin sensitivity in people with diabetes, reduce high blood fat levels, and can be useful for weight control (3, 5-7). Recently, high-GI diets have been shown to enhance body fat storage to a greater extent than equal-calorie low-GI diets in healthy people, which is likely to reflect the greater insulin secretion and lower satiety associated with high-GI foods (8).

Type 2 diabetes and coronary heart disease continue to be the major causes of illness and death in industrialised countries. Therefore, food manufacturers should be encouraged to develop more low-GI foods to assist with the prevention and treatment of these diseases.

Aim of the study

The aim of this study was to measure the glycemic index (GI) values of the two syrup products listed below, using pure glucose as the reference food (GI of glucose sugar fixed at 100).

1. Comvita® Manuka Blend Honey
2. NZFOS+ Yacon Concentrate (80 Brix)

Methods

This study was conducted using internationally recognised GI methodology (3, 9, 10), which has been validated by results obtained from small experimental studies and large multi-centre research trials (11). The experimental procedures used in this study were in accordance with international standards for conducting ethical research with humans and were approved by the Human Research Ethics Committee of the University of Sydney.

Participants

A power-based (90%) sample size calculation using data from many published GI studies indicated that a group of at least 10 people would be needed for this study in order to find a significant difference among the GI values of the reference and test foods, if a significant difference truly exists (a difference of 1.0 standard deviation units in GI). A group of 10 healthy, non-smoking people, aged between 18-65 years, were recruited from the staff and student population of the University of Sydney.

People volunteering to participate in the study were excluded if they: were over- or underweight; were dieting; had impaired glucose tolerance; were suffering from any illness or food allergy; or were regularly taking prescription medication other than standard contraceptive medication. The group that participated in the study consisted of five males and five females. Their average age was 31.2 years (range: 20.7 – 47.9 years) and the group's average body mass index (BMI) was 22.1 kg/m^2 (range: 18.2 – 25.0 kg/m^2). The BMI score is a measure of a person's weight in relation to their height, values between 18 – 25 kg/m^2 are within the healthy weight range.

Test foods

The reference food and the two syrup products were served to the participants in fixed test portions containing 25-grams of digestible (available) carbohydrate. Pure glucose sugar (Glucodin® powder, Valeant Pharmaceuticals, NSW) dissolved in water was used as the reference food and was consumed by each participant on three separate occasions. The participants consumed each type of syrup on one occasion. The available carbohydrate contents of the equal-carbohydrate portions of the reference food and two test products are listed in Table 1 below, and were calculated using data supplied by the manufacturers.

Table 1. The weights and carbohydrate contents of the test portions of the reference food and the test foods, calculated using manufacturers' data.

Test food	Portion Size (g)	Energy (kJ)	Protein (g)	Fat (g)	Available Carbohydrate (g)	Sugar (g)	Fibre (g)
Reference food (glucose sugar)	25.7 g glucose 250 mL water	425	0.0	0.0	25.0	25.0	0.0
Manuka Blend Honey	31.3 g	429	0.2	0.2	25.0	24.4	-
Yacon Concentrate	73.7 g	699	2.2	0.4	25.0	25.0	27.8

- Information not supplied

Each reference food portion was prepared the day before required by dissolving 25.7 grams of glucose in 250 mL of warm water in a heatproof glass, which was covered with airtight plastic wrap, labelled and stored overnight in a refrigerator. The next morning, a reference food portion was taken from the refrigerator shortly before being served with 250 mL of plain water. The reference food was served to the participants at a cool temperature to improve its palatability. Each test portion of syrup was prepared shortly before required by weighing the appropriate amount of product into a standard bowl, which was then served to a participant with a glass of 250 mL plain water. The participants were required to consume all food (including any sticky residue in the bowl) and fluid served.

Experimental procedures

Using standard methodology to determine a food's GI value, a portion of the food containing 25 or 50 grams of available carbohydrate is fed to at least 10 healthy people the morning after they have fasted overnight. A fasting blood sample is obtained and then the test food is consumed, after which additional blood samples are obtained at regular intervals during the next 2 hours. In this way, it's possible to measure the total increase in blood sugar (glucose) produced by that food or drink over a 2-hour period. The same procedure is repeated in the same group of people on another day after they have consumed a portion of the reference food (pure glucose sugar dissolved in water) containing an equal amount of available carbohydrate. A GI value for the test food can then be calculated by expressing the 2-hour blood glucose response to the test food as a percentage of the response produced by the reference food (GI value of glucose = 100). Therefore, GI values for foods are relative measures. They indicate how high blood sugar levels rise after eating a particular food compared to the high response produced by the same amount of carbohydrate from glucose sugar. Equal-carbohydrate portions of the test and reference food are used in GI studies, because carbohydrate is the main nutrient in food that directly causes glucose levels to rise.

Typically, portions of foods containing 50 grams of available carbohydrate are used in GI studies to maximise the blood glucose responses produced by the foods, but in this study it was necessary to use a smaller portion of digestible carbohydrate (25 grams). A portion of the Yacon Concentrate containing 50 grams of available carbohydrate would have contained too high a dose of fructooligosaccharide to consume on one occasion. It is valid to use portions of test foods for GI testing that contain less than 50 grams of digestible carbohydrate, as long as the reference food and the test food portions all contain the same amount of digestible carbohydrate.

In this study, 10 healthy people consumed the reference food on three separate occasions and each syrup product on one occasion only. Therefore, each participant completed five test sessions. The reference food was consumed on the first; third and fifth test sessions and the syrups were consumed in random order in between. Each test session was completed on a separate morning with at least a day in between consecutive sessions.

The night before each session, the participants ate a regular evening meal based on a carbohydrate-rich food, other than legumes, and then fasted for at least 10 hours overnight. The participants were also required to avoid alcohol, and unusual levels of food intake and physical activity for the day before each session. The next morning, the participants reported to the research centre in a fasting condition. On arrival, the investigators checked that the participants had complied with the preceding experimental conditions. The participants then warmed a hand in hot water, after which two fasting finger-prick blood samples (-5 and 0 min) were obtained (≥ 0.5 mL blood) using a lancet (Accu-Chek® Safe-T-Pro Plus, Roche Diabetes Care GmbH, Germany). After the second fasting sample was obtained, the participants were given a fixed portion of the food, which they consumed with 250 mL of water within 12 minutes. A stopwatch was started for each participant once they began eating.

The participants remained at the research centre for the next 2 hours during which additional blood samples were collected at 15, 30, 45, 60, 90 and 120 minutes after eating had commenced. Therefore, a total of eight blood samples were collected from each participant during each 2-hour test session. The participants were required to remain seated during their test sessions and only minimal movement was allowed. Each blood sample was centrifuged for 45 seconds immediately after collection. The plasma layer of the sample was then transferred into a labelled, uncoated tube, and was then immediately placed in a freezer. All plasma samples were stored in the freezer until their glucose concentrations were analysed.

Measurement of plasma glucose concentrations and GI values

The glucose concentration of each participant's eight plasma samples collected during each 2-hour test session was analysed in duplicate using a glucose hexokinase enzymatic assay (Beckman Coulter Inc.) and an automatic centrifugal spectrophotometric clinical chemistry analyser (Beckman Coulter AU480®, Beckman Instruments Inc., USA) with internal controls. A 2-hour plasma glucose response curve was constructed for each participant's test sessions using the average glucose concentrations for each of their plasma samples. The two fasting plasma samples of each test session were averaged to provide one baseline glucose concentration.

The incremental area under each 2-hour plasma glucose response curve (iAUC) was then calculated in order to obtain a single number, which expresses the total increase in blood glucose in that participant as a result of ingesting that food or drink during the 2-hour test session. A glycemic index (GI) value for each type of syrup product was then calculated for each participant by dividing their 2-hour glucose iAUC value for the test product by their average 2-hour plasma glucose iAUC value for the reference food and multiplying by 100.

GI value for test food = Plasma glucose iAUC value for test food x 100

Average iAUC value for the equal-carbohydrate portion of the reference food

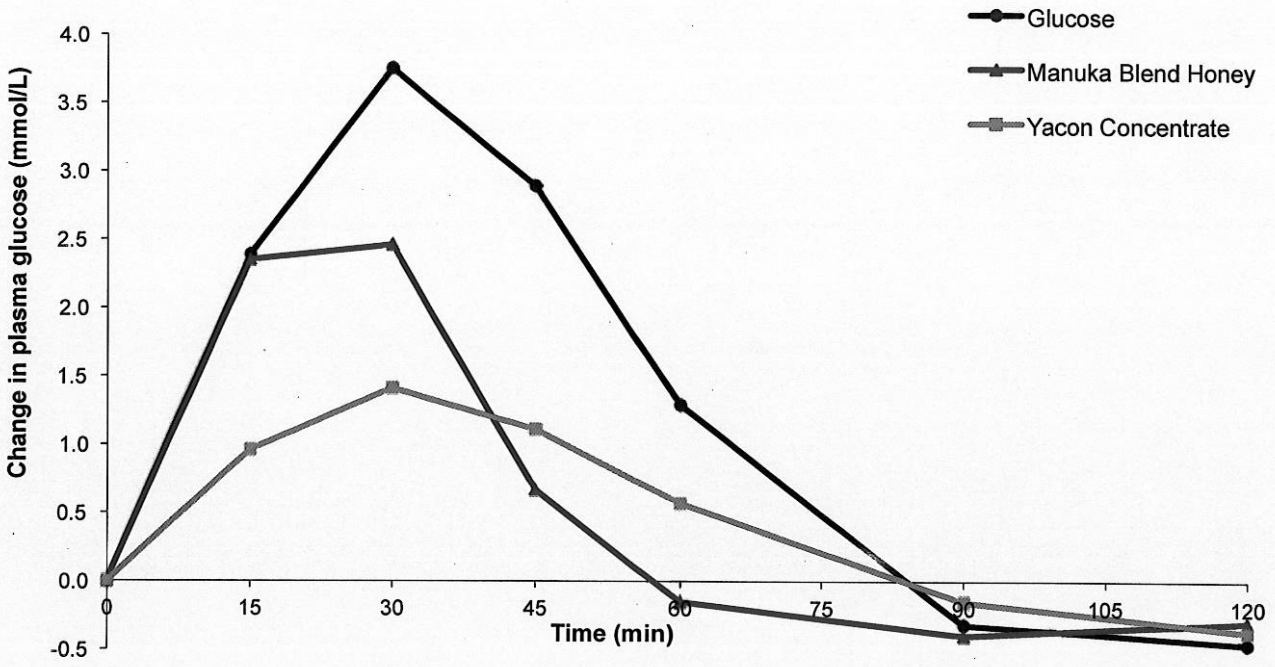
Due to differences in body weight and metabolism, blood glucose responses to the same food can vary between different people. The use of the reference food to calculate GI values reduces the variation between the participants' blood glucose results to the same food arising from these natural differences. Therefore, the GI value for the same food varies less between participants than their glucose iAUC values for this food. The participants' average plasma glucose concentrations for the reference food and the two test products are shown in Appendix A.

Results

The average glycemic response curves for the reference food and the two test syrups

The average 2-hour plasma glucose response curves for the 25-gram available carbohydrate portions of the reference food and the two syrup products are shown in Figure 2 below. The reference food (glucose solution) produced a rapid rise in plasma glucose to a high peak concentration at 30 minutes and the greatest overall glycemic response. The Manuka Blend Honey produced a rapid initial rise in glycemia to a moderate peak glucose concentration at 30 minutes followed by a steady decline in glycemia between 30 – 120 minutes. The Yacon Concentrate produced a low peak plasma glucose response at 30 minutes with a gradual decline in glycemia between 30 – 120 minutes. The Yacon Concentrate produced a smaller overall glycemic response than the Manuka Blend Honey.

Figure 2. The average plasma glucose response curves for the equal available carbohydrate portions of the reference food and the two syrup products, shown as the change in plasma glucose from the fasting baseline level.



The foods' glycemic index values

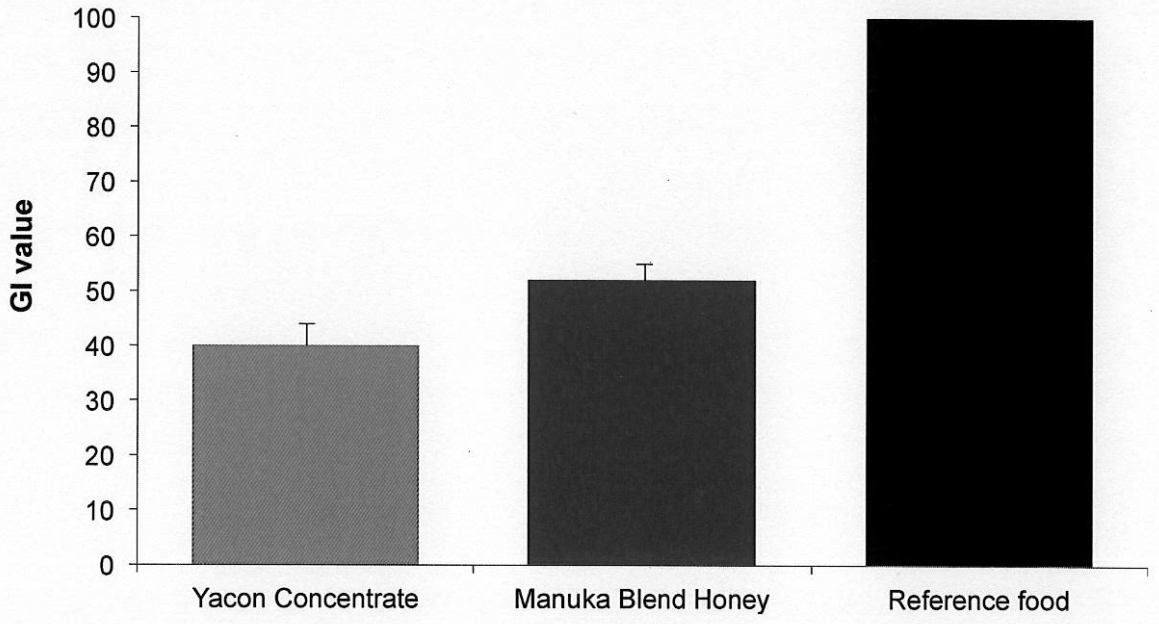
The differences in the glycemic responses produced by the reference food and the two test products are more clearly reflected by their GI values than their plasma glucose response curves. The GI methodology helps to manage both day-to-day and person-to-person variability. Variation between responses to the same food is normal and is due to a number of factors, such as different rates at which the participants ingested the food, differences in the participants' carbohydrate metabolism, and lifestyle and genetic factors.

It is standard scientific practice that if any individual participant's GI value for a particular food is either greater than the group mean (average) value plus two standard deviations or less than the group mean value minus two standard deviations then that value is classified as an outlier and is removed from the dataset. No outlier GI values were observed amongst the participants' individual responses for either of the test products. Therefore, the final GI values for the each syrup product is the average of 10 participants' GI results. The mean ± standard error of the mean (SEM) GI values for the test foods and reference food are listed in Table 2 and illustrated in Figure 3.

Table 2. The mean ± SEM GI values for the two test products and the reference food.

Test Food	GI value	GI Category
NZFOS^{+} Yacon Concentrate	40 ± 4	Low GI
Comvita® Manuka Blend Honey	52 ± 3	Low GI
Reference food (glucose sugar)	100 ± 0	High GI

Figure 3. The mean GI values for the two test products and the reference food.



Significant differences among the foods' average GI values

Standard parametric statistical tests (Analysis of Variance with Bonferroni adjustment for multiple comparisons) performed using IBM® SPSS® Statistics software (version 24) were used to determine whether there were any significant differences amongst the GI values of the two test products and the reference food. The smaller the p value, the more significant the difference, with $p<0.001$ being the most significant difference. The results of these statistical analyses are shown in Appendix B.

The reference food's GI value was significantly greater than the average GI values produced by both test syrups ($p<0.001$). The GI value produced by the Yacon Concentrate was found to be significantly lower than the average GI value produced by the Manuka Blend Honey ($p = 0.014$).

Conclusions

Using glucose as the reference food (GI = 100), foods with a GI value less than 55 are currently considered to be low-GI foods (12, 13). Foods with a GI value between 56-69 are medium- or moderate-GI foods, and foods with a GI value of 70 or more are high-GI foods. The NZFOS^{+} Yacon Concentrate and the Comvita® Manuka Blend Honey produced GI values of 40 and 52, respectively, which places both these products within the low GI category. The GI values observed for the products are only valid as long as the formulations (ingredients and processing methods) remain the same. Any changes made to these syrups can impact their GI values, and therefore any modified formulations may need to have their GI values remeasured.

GI values are measured using portions of foods and drinks that contain either 25 or 50 grams of digestible carbohydrate, but these may not be similar to the amounts of these products typically consumed by people in normal environments. It is possible to calculate a glycemic load (GL) value for any sized portion of a carbohydrate-containing food, as long as you know its GI value. The GL value for a food or drink is calculated by multiplying the amount of available carbohydrate in the portion of the food or drink by its GI value and then dividing by 100.

Similar to GI values, GL values are useful for helping people identify which types and amounts of foods will produce relatively lower blood glucose responses after consumption. Currently, the consensus is that GL values of 10 or less are low GL; GL values of 11 – 19 are medium GL values; and GL values of 20 or more are high GL values (13). The glycemic load values for a standard serve of each type of syrup tested in this study are listed below:

1. Comvita® Manuka Blend Honey (10 g serve): (8.0 x 52)/100 = 4
2. NZFOS^{+} Yacon Concentrate (12 g serve): (4.1 x 40)/100 = 2

Sydney University's Glycemic Index Research Service

SUGiRS

The GI values of foods must be tested scientifically. At this stage, only a few research groups around the world currently provide a legitimate testing service. The University of Sydney has been at the forefront of glycemic index research for over a decade and has determined GI values for more than 3500 foods. In 1999, the Human Nutrition Unit established a commercial GI testing unit called 'Sydney University's Glycemic Index Research Service' (SUGiRS) to meet the increasing demand for GI research by local and international food manufacturers and pharmaceutical companies.

Fiona Atkinson and Jennie Brand-Miller are co-authors of *The International Tables of Glycemic Index* published by the scientific journal, Diabetes Care, in 2008. Previous editions of the International Tables (published in 1995 and 2002) have proven to be an important reference for health professionals when planning therapeutic diets for people with diabetes. Jennie Brand-Miller's books, *The GI Factor* and related pocket books on diabetes, heart disease and weight reduction, are aimed at lay people and health professionals, and have sold more than 150,000 copies in Australia since 1996. A British edition of *The GI Factor* was released in 1997 and a North American edition (*The Glucose Revolution*) was released in July 1999. Each edition of the book includes tables listing the GI values of more than 350 different foods, many of which were tested at the University' of Sydney. The glycemic index been discussed in a number of best-selling books and in magazine articles in relation to a range of health topics such as diabetes, breast cancer and weight control. Publications such as these and ongoing research promoting the healthy nature of low-GI foods have generated an increasing demand for GI research.

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Appendix A

The individual participants' plasma glucose results

YACON NZ Two Syrup Products Study 2019

Reference Food: Glucodin glucose solution - 25 grams

Time (min)	Subjects 1 S1296	2 S1330	3 S1367	4 S1347	5 S1371	6 S1357	7 S1149	8 S1254	9 S1265	10 S1331	MEAN
0	5.29	4.99	5.29	5.21	5.22	5.31	4.66	5.32	5.54	5.49	**5.23**
15	7.65	8.66	6.97	8.01	7.48	6.98	7.35	7.69	5.90	7.16	**7.38**
30	10.91	9.44	8.94	9.05	7.26	9.76	8.16	9.66	7.25	9.82	**9.02**
45	8.73	7.18	8.84	8.47	6.14	9.08	7.30	9.09	8.85	9.93	**8.36**
60	5.08	5.55	6.97	6.84	5.68	7.57	6.04	7.76	8.77	7.34	**6.76**
90	4.59	4.45	4.99	4.39	4.55	5.26	4.14	4.53	6.41	5.80	**4.91**
120	5.07	4.57	4.69	4.41	4.56	4.36	4.20	4.31	5.31	4.89	**4.63**
iAUC	**170**	**163**	**167**	**177**	**85**	**198**	**158**	**203**	**177**	**205**	**170**
Mean iAUC of Reference foods	**209**	**155**	**181**	**149**	**85**	**149**	**139**	**185**	**153**	**242**	

YACON NZ Two Syrup Products Study 2019

Reference Food: Glucodin glucose solution - 25 grams

Time (min)	Subjects 1 S1296	2 S1330	3 S1367	4 S1347	5 S1371	6 S1357	7 S1149	8 S1254	9 S1265	10 S1331	MEAN
0	5.49	4.98	5.42	5.43	5.32	5.22	4.88	5.36	5.14	5.22	**5.24**
15	7.50	7.79	8.26	7.60	7.66	6.96	7.65	8.64	6.40	8.57	**7.70**
30	11.03	9.47	10.53	8.05	6.96	8.40	8.58	9.45	8.10	10.47	**9.10**
45	10.04	7.48	9.74	7.55	5.86	7.19	6.67	8.43	7.64	10.33	**8.09**
60	6.29	6.02	7.77	5.85	5.65	5.81	4.55	6.94	6.53	7.91	**6.33**
90	4.77	4.41	5.14	4.39	5.33	4.57	4.00	4.37	5.47	4.79	**4.72**
120	5.18	4.86	4.30	5.01	5.24	4.96	4.44	4.44	5.03	5.22	**4.87**
iAUC	**194**	**165**	**233**	**109**	**76**	**112**	**122**	**183**	**141**	**260**	**159**
Mean iAUC of Reference foods	**209**	**155**	**181**	**149**	**85**	**149**	**139**	**185**	**153**	**242**	

YACON NZ Two Syrup Products Study 2019

Reference Food: Glucodin glucose solution - 25 grams

Time (min)	Subjects 1 S1296	2 S1330	3 S1367	4 S1347	5 S1371	6 S1357	7 S1149	8 S1254	9 S1265	10 S1331	MEAN
0	5.29	5.02	5.27	5.32	5.43	4.93	5.14	5.22	5.47	5.35	**5.24**
15	8.57	8.31	6.96	7.99	8.39	8.26	8.48	6.84	7.71	6.64	**7.81**
30	10.26	8.96	9.55	8.66	6.67	8.79	8.01	9.04	9.02	9.52	**8.85**
45	10.41	7.22	7.61	8.30	6.02	6.58	6.80	8.19	7.87	10.21	**7.92**
60	8.21	4.30	5.96	6.66	5.92	5.24	6.31	7.32	6.23	8.86	**6.50**
90	5.04	3.85	5.38	5.01	5.92	4.59	4.38	4.87	5.58	6.53	**5.11**
120	4.85	4.85	5.14	4.95	5.20	5.03	4.42	3.87	5.24	4.68	**4.82**
iAUC	**262**	**137**	**143**	**161**	**95**	**138**	**137**	**169**	**142**	**262**	**165**

Mean iAUC of reference foods	**209**	**155**	**181**	**149**	**85**	**149**	**139**	**185**	**153**	**242**

YACON NZ Two Syrup Products Study 2019

Comvita Manuka Blend Honey

Time (min)	Subjects 1 S1296	2 S1330	3 S1367	4 S1347	5 S1371	6 S1357	7 S1149	8 S1254	9 S1265	10 S1331	MEAN
0	5.33	5.08	5.31	5.21	5.34	5.26	5.13	5.29	5.15	5.48	**5.26**
15	8.66	7.61	7.36	6.84	6.27	8.09	8.35	7.67	7.23	8.04	**7.61**
30	9.17	8.08	8.15	7.31	6.92	6.85	7.28	8.00	7.22	8.29	**7.72**
45	6.80	5.35	5.82	6.96	5.70	5.65	5.08	6.18	5.38	6.42	**5.93**
60	5.62	4.71	4.49	5.67	5.35	4.86	4.56	5.76	4.66	5.49	**5.11**
90	4.55	5.02	4.49	4.73	5.72	4.71	4.45	4.85	4.99	5.10	**4.86**
120	4.65	5.17	4.54	4.92	5.23	5.38	4.70	4.79	5.08	5.13	**4.96**
iAUC	**133**	**87**	**78**	**89**	**53**	**70**	**81**	**97**	**64**	**95**	**85**
(by subject)	**64**	**56**	**43**	**60**	**63**	**47**	**58**	**52**	**42**	**39**	**52**

FINAL GI = 52 **n = 10** **SEM = 3**

YACON NZ Two Syrup Products Study 2019

NZ FOS+ 80 Brix Yacon Concentrate

	Subjects										
Time (min)	**1** S1296	**2** S1330	**3** S1367	**4** S1347	**5** S1371	**6** S1357	**7** S1149	**8** S1254	**9** S1265	**10** S1331	**MEAN**
0	5.32	5.11	5.20	5.22	5.44	5.28	4.86	5.33	5.44	5.39	**5.26**
15	6.37	6.15	6.26	6.01	5.62	7.10	6.85	5.76	6.02	6.08	**6.22**
30	7.59	6.22	6.85	5.98	6.65	6.50	6.74	6.20	6.87	7.10	**6.67**
45	7.21	5.74	6.72	6.02	6.47	5.55	5.69	6.02	6.64	7.63	**6.37**
60	6.87	5.32	5.77	5.57	5.86	4.44	5.39	5.91	6.23	6.97	**5.83**
90	5.12	5.07	4.78	5.23	5.54	5.01	4.39	5.17	5.39	5.45	**5.11**
120	4.63	4.82	4.71	5.08	5.15	5.03	4.46	4.91	5.34	4.84	**4.89**
iAUC	**110**	**46**	**72**	**43**	**47**	**47**	**79**	**41**	**65**	**106**	**66**
(by subject)	**53**	**30**	**40**	**29**	**55**	**32**	**57**	**22**	**42**	**44**	**40**

FINAL GI = 40 **n = 10** **SEM = 4**

Yacon NZ Two Syrup Products Study 2019

Subject Characteristics

Subject	Gender	Age	BMI	Ethnicity
S1296	M	22.4	23.0	Caucasian
S1330	F	23.9	21.0	Caucasian
S1367	F	38.7	21.3	Filipino
S1347	F	20.7	25.0	Caucasian
S1371	M	25.2	18.9	Chinese
S1357	M	28.8	23.9	Caucasian
S1149	F	31.9	22.8	Caucasian
S1254	F	37.0	18.2	Chinese
S1265	M	47.9	24.9	Caucasian
S1331	M	35.3	22.4	Chinese
MEAN	**5 F**	**31.2**	**22.1**	
StDev	**5 M**	**8.6**	**2.3**	
min		20.7	18.2	
max		47.9	25.0	

Appendix B

Statistical analyses of the foods' GI values

These analyses were performed using IBM® SPSS® Statistics software (version 24). The first part of the analysis (Analysis of Variance (ANOVA)) indicated that a significant difference existed between the GI values of the reference food and the two test products. The second part of the analysis shows the results of post-hoc Bonferroni statistical test that can be used to identify the extent of the significant difference. A value of $p<0.05$ indicates a significant difference.

Oneway

Descriptives

GI

	N	Mean	Std. Deviation	Std. Error	95% Confidence ... Lower Bound
Reference Food	10	100.000	.0000	.0000	100.000
Manuka Honey	10	52.410	9.0488	2.8615	45.937
Yacon Concentrate	10	40.340	12.0923	3.8239	31.690
Total	30	64.250	27.5132	5.0232	53.976

Descriptives

GI

	95% Confidence Interval for ... Upper Bound	Minimum	Maximum
Reference Food	100.000	100.0	100.0
Manuka Honey	58.883	39.0	63.6
Yacon Concentrate	48.990	22.0	56.9
Total	74.524	22.0	100.0

ANOVA

GI

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	19899.362	2	9949.681	130.857	.000
Within Groups	2052.933	27	76.035		
Total	21952.295	29			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: GI
Bonferroni

(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig.	95% ... Lower Bound
Reference Food	Manuka Honey	47.5900*	3.8996	.000	37.636
	Yacon Concentrate	59.6600*	3.8996	.000	49.706
Manuka Honey	Reference Food	-47.5900*	3.8996	.000	-57.544
	Yacon Concentrate	12.0700*	3.8996	.014	2.116
Yacon Concentrate	Reference Food	-59.6600*	3.8996	.000	-69.614
	Manuka Honey	-12.0700*	3.8996	.014	-22.024

Multiple Comparisons

Dependent Variable: GI
Bonferroni

(I) Treatment	(J) Treatment	95% Confidence . Upper Bound
Reference Food	Manuka Honey	57.544
	Yacon Concentrate	69.614
Manuka Honey	Reference Food	-37.636
	Yacon Concentrate	22.024
Yacon Concentrate	Reference Food	-49.706
	Manuka Honey	-2.116

*. The mean difference is significant at the 0.05 level.