

GRAS Notice (GRN) No. 498

<http://www.fda.gov/Food/IngredientsPackagingLabeling/GRAS/NoticeInventory/default.htm>

ORIGINAL SUBMISSION

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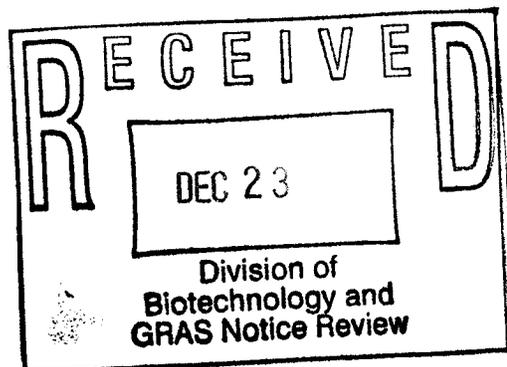
GRN 000498

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December 20, 2013

VIA FEDERAL EXPRESS

Office of Food Additive Safety (HFS-200)
Center for Food Safety and Applied Nutrition
Food and Drug Administration
5100 Paint Branch Parkway
College Park, MD 20740-3835



Re: GRAS Notification for Allulose (Psicose)

Dear Sir or Madam:

On behalf of Matustani Chemical Industry Company, Ltd. ("Matsutani"), we are submitting under cover of this letter three paper copies and one eCopy of Matustani's GRAS notification of allulose (psicose). Matustani has determined, through scientific procedures, that its allulose is generally recognized as safe ("GRAS") for use as a sugar substitute in food applications in which sugar or fructose is typically used.

Allulose, which is 70% as sweet as sucrose, can provide a similar level of sweetness as sucrose while only contributing 0.2 kcal/g to the diet. Allulose can be used in various foods such as beverages, cereals, confections and frostings, as well as many other food products, as outlined in this notification. The information presented in this notification is similar to that which was reviewed by the FDA in GRAS Notification 400, submitted for psicose.

Pursuant to the regulatory and scientific procedures established by proposed regulation 21 C.F.R. § 170.36, this use of allulose is exempt from premarket approval requirements of the Federal Food, Drug and Cosmetic Act, because the notifier has determined that such use is GRAS.

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If you have any questions regarding this notification, or require any additional information to aid in the review of Matustani's conclusion, please do not hesitate to contact me via email at gyingling@morganlewis.com or by telephone, (202)739-5610.

Sincerely,

(b) (6)



Gary L. Yingling

cc: Matsutani Chemical Industry Company, Ltd.

GRAS NOTIFICATION FOR ALLULOSE (PSICOSE)

Submitted by:
Matsutani Chemical Industry Co. Ltd.,
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1. GENERAL INTRODUCTION AND CLAIM OF EXEMPTION FROM PREMARKET APPROVAL REQUIREMENTS

1.1. Name and Address of Notifier

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1.2. Common or Usual Name of Substance

The common name of the notified substance is allulose or D-allulose or psicose or D-psicose, a highly purified form of allulose with small amounts of other related monosaccharides.

The common names “allulose” and “psicose” have been used interchangeably over the years. As such, much of the literature uses “psicose” rather than the older “allulose” when referencing the product. The compound is the same, however, despite this naming difference.

1.3. Applicable Conditions of Use

As a sugar substitute, allulose can be used in many food applications in which sugar or fructose is typically used. Allulose, which is 70% as sweet as sucrose, can provide a similar level of sweetness as sucrose while only contributing 0.2 kcal/g to the diet.

1.3.1. Substances Used In

Intended food applications include cereals, chewing gum, confections & frostings, dressings for salads, jams & jellies, sugar, sugar substitutes (carrier), and various low- calorie or dietetic foods including low-calorie, reduced-calorie, sugar-free beverages(non-alcoholic), cereals, frozen dairy desserts (ice cream, soft serve, sorbet), yogurt and frozen yogurt, gelatins, pudding & fillings, hard candies, soft candies, and sweet sauces & syrups.

1.3.2. Levels of Use

The following table presents the proposed food types and the maximum proposed level of use.

Table 1. Proposed Uses of Allulose

Food Type	Allulose Maximum Proposed Use Level (%)
Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free	3.5
Cereals, regular	2
Cereals, low calorie, reduced calorie, sugar-free	5
Chewing gum	50
Confections & Frostings	5
Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free	5
Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free	5
Dressings for salads	5
Gelatins, pudding & fillings, low calorie, reduced calorie, sugar-free	10
Hard Candies, low calorie, reduced calorie, sugar-free	50
Soft Candies, low calorie, reduced calorie, sugar-free	25

Jams & Jellies	10
Sugar	10
Sugar substitutes	100
Sweet sauces & syrups, low calorie, reduced calorie, sugar-free	10

1.4. Basis for GRAS Determination

In accordance with 21 CFR § 170.30, Matsutani has determined that its allulose is a generally recognized as safe (GRAS) substance for the intended food applications based on scientific procedures, and is therefore exempt from the requirement for premarket approval. A comprehensive search of the scientific literature was also utilized for this review.

1.5. Availability of Information for FDA Review

The data and information that are the basis for GRAS determination are available for the FDA's review and copies will be sent to FDA upon request. Requests for copies and arrangements for review of materials cited herein may be directed to:

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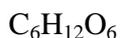
2. IDENTITY OF THE NOTIFIED SUBSTANCE

2.1. Chemical Name

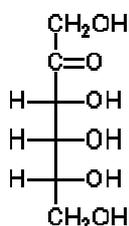
Allulose, Psicose, D-ribo-2-hexulose

CAS registry number: 23140-52-5

2.2. Formula



2.3. Composition



2.4. Specifications for food grade material

There are several types of products which we could make from our process. Product 1 is a liquid product which comes before separation chromatography, and its allulose content may vary by reaction and purification process. Product 2 is a liquid product which comes before crystallization process, and its allulose content is higher than Product 1, and because of the additional processing, is more expensive than Product 1. Product 3 is a white crystal or powder which is drying from the product 2 (liquid product) and its allulose content may vary by separation and purification process.

Product 1-Liquid Form

Specification	Acceptable Value
Appearance	Clear yellow liquid
Odor	No odor
Brix	30.0 % minimum
pH	3.0 – 7.0
Ash	<0.5%
Heavy Metal	<5.0 ppm
Lead	<1.0 ppm
Arsenic	<1.0 ppm
Total Plate Count	<10,000 CFU/g
Allulose Content	>1.0 % DSB*

*Allulose content may vary by process

Product 2- Liquid Form

Specification	Acceptable Value
Appearance	Clear yellow liquid
Odor	No odor
Brix	30.0 % minimum
pH	3.0 – 7.0
Ash	<0.5%
Heavy Metal	<5.0 ppm
Lead	<1.0 ppm
Arsenic	<1.0 ppm
Total Plate Count	<10,000 CFU/g
Allulose Content	>10.0 % DSB*

*Allulose content may vary by process

Product 3-Powder Form

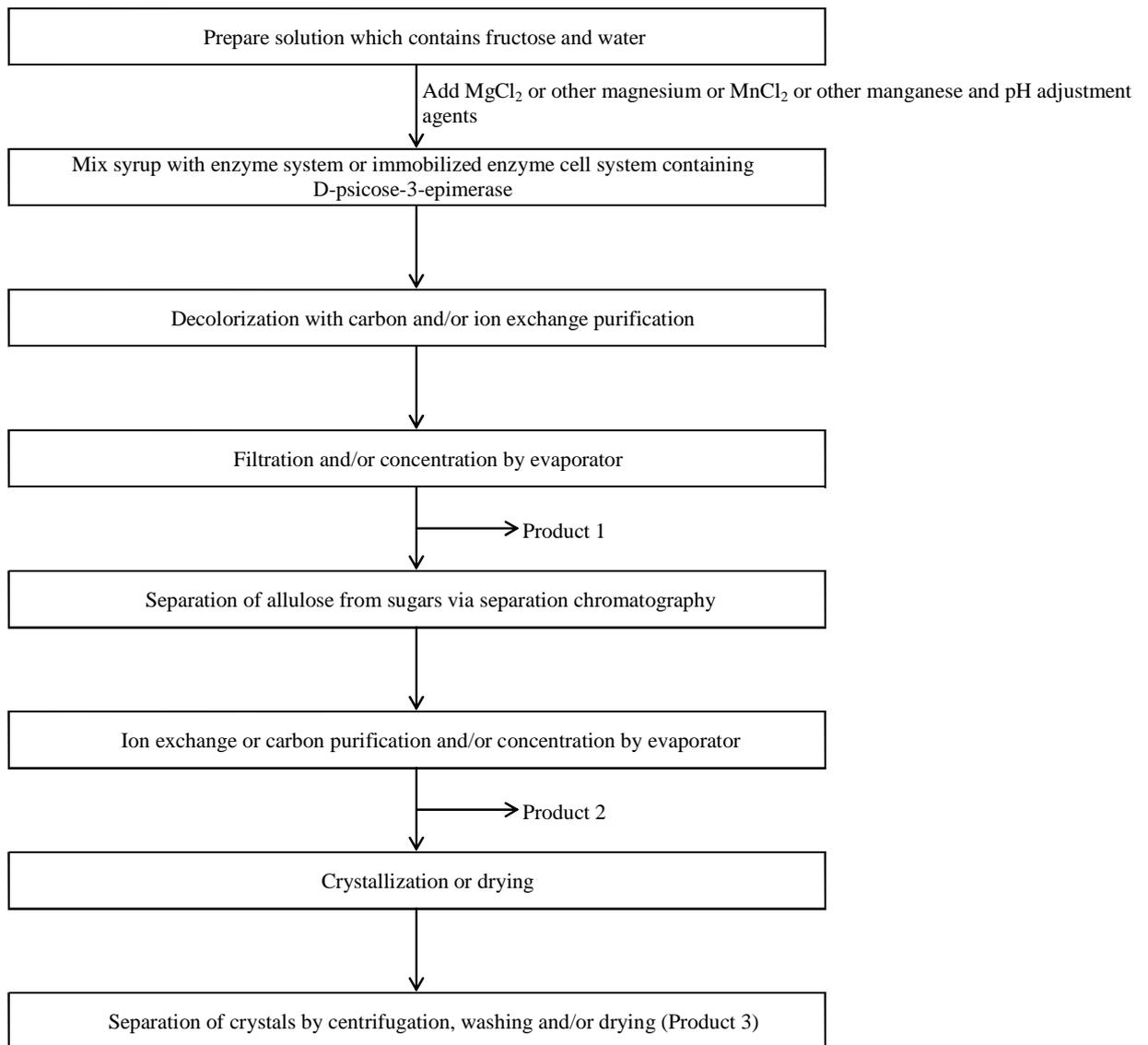
Specification	Acceptable Value
Appearance	White crystal or powder
Odor	No odor
Moisture	7.0 % maximum
pH	3.0 – 7.0
Ash	<0.5%
Heavy Metal	<5.0 ppm
Lead	<1.0 ppm
Arsenic	<1.0 ppm
Total Plate Count	<10,000 CFU/g
Allulose Content	>10.0 % DSB*

*Allulose content may vary by process

2.5. Method of Manufacture

A flow chart of the manufacturing process is presented in Figure 1.

Figure 1. **Flow Chart of Manufacturing Process**



2.6. Safety of Bacterial Strains Used in Production

D-psicose 3-epimerase (DPE), the enzyme responsible for the conversion of the fructose to allulose, was extracted from *Escherichia coli* (K12) [non-viable cell] or *Streptomyces violaceoruber* harboring DPE that originated from *Arthrobacter globiformis* or *Arthrobacter globiformis* itself.

Arthrobacter globiformis is present in some cheeses, and is considered non-toxic and non-pathogenic. (Beresford et al., 2001). International Daily Journal 11, 2001, 259-274). Several members of the *Arthrobacter* family, including *Arthrobacter globiformis*, are present in the microflora of common produce items such as broccoli.¹ Enzymes derived from this bacterial family were the subject of GRAS Notification (GRN) No. 45, in which another sweetener, trehalose, was produced through the use of enzymes from *Arthrobacter* species. FDA issued a response of “FDA has no questions” to this GRN, supporting its position as safe for use in food production. Further, this species has been used during citrus fermentations to remove limonin and reduce bitterness since 1997 (described in IFD/EFFCA Inventory of Microorganisms).

The second microorganism used in production is a recombinant strain of *Escherichia coli*, the K-12 strain. This strain of *E. coli* has been safely used in the production of chymosin enzyme, otherwise known as rennin, used in cheese production, for many years without known side effects. The production of rennin by K-12 was affirmed as GRAS by the FDA in 1990. Furthermore, this enzyme strain was specifically discussed in a paper published by the FDA in 2006,² in which it is stated “*E. coli* K-12 has been used as a laboratory organism for over 30 years without reported incidents of infection and that it does not produce toxins that cause illness by ingestion, such as Shiga-like toxin produced by certain toxigenic strains of *E. coli*....*E. coli* K-12 has a history of safe use in the production of specialty chemicals and human drugs, and was exempted from EPA review under TSCA.”

The third microorganism used in production is a recombinant strain of *Streptomyces violaceoruber*. This is a well-characterized nontoxic and nonpathogenic bacterium. This strain was included in GRAS Notice 000212 (Phospholipase A2 enzyme production strain), which was previously reviewed by the FDA in 2007. Furthermore, *Streptomyces violaceoruber* was also referenced in the literature as a safe strain for use in enzyme preparations.³

¹ Pagada, M., et al. (2000). Microbial species associated with different sections of broccoli harvested from three regions in Australia. *International Journal of Food Microbiology*. 60:15-24

² Olempska-Bier, Z.S., et al. (2006). Food-processing enzymes from recombinant microorganisms-a review. *Regulatory Toxicology and Pharmacology*. 45:144-158

³ Pariza, M.W. and Johnson, E.A. (2001). Evaluating the safety of microbial enzyme preparations used in food processing: update for a new century. *Regulatory Toxicology and Pharmacology*. 33:173-186.

2.7. Characteristics

Allulose (Psicose) is a C-3 epimer of fructose, and has the same molecular formula as fructose and glucose. Allulose is a non-digestible carbohydrate, which naturally occurs in small quantities in food products. Allulose has similar physical characteristics as a typical monosaccharide.

2.8. Potential Toxicants

No toxicant production is expected in the manufacture of allulose. The final product is highly purified through several steps during production. Further, the enzymatic conversion of fructose to allulose is an enzymatic reaction that occurs in nature, with no known toxicant production.

3. BASIS FOR GRAS DETERMINATION

3.1. History of Safe Use

Allulose (Psicose) is found in many common foods naturally. Allulose is found in dried fruits, such as dried figs and raisins, as well as in confectionary products such as fried dough and brown sugar cookies. Brown sugar contains approximately 71.1 mg/100 g allulose, and ketchup contains approximately 39.8 mg/100 g (Oshima et al., 2006). These foods are eaten frequently across population distributions, with no known adverse effects attributed to allulose.

3.2. Current Regulatory Status

Allulose (Psicose) was the subject of GRAS Notification (“GRN”) 0400, submitted by CJ Cheiljedang, Inc. in 2011. This notification proposed using allulose for similar intended uses, and differs only in the bacterial strain used in production of the product. GRN 0400 received a letter of no questions from the FDA on June 18, 2012.

Allulose is one of several monosaccharides which have been reviewed by the FDA and found to be GRAS for use in food. The FDA has had no questions with regard to the GRAS status of galactose, fructose and numerous other sweeteners, including rebaudioside from the *Stevia* plant (including GRN 418, 393, 388, 369), isomaltulose (GRN 184), and erythritol (GRN 208, 76).

3.3. Summary of Literature

In addition to the toxicity studies discussed in the following section, several experiments on the absorption, distribution, metabolism, and excretion of allulose (psicose) in rats have been published in the literature. The common names “allulose” and “psicose” have been used interchangeably over the years. As such, much of the literature uses “psicose” rather than the older “allulose” when referencing the product. The compound is the same, however, despite this naming difference.

Allulose is metabolized in a similar fashion to erythritol, another sweetener determined to be GRAS. These studies reveal that approximately 98% of intravenously administered allulose is excreted in the urine within 6 hours of treatment (Whistler et al., 1974). After oral administration of allulose, urinary excretion of unchanged allulose ranged from 11 to 25% (Matsuo et al., 2003). This indicates that allulose absorbed in the small intestine may pass into the bloodstream and be excreted in the urine, without significant metabolism.

Matsuo et al. (2003) investigated the absorption and excretion of allulose by assessing the fermentation of allulose, measured as cecal short-chain fatty acids (SCFAs). Rats were fed controlled diets containing 0, 10, 20, and 30% allulose. Urinary and fecal excretions of allulose over 24 hours following a single oral administration were 11-15% of dosage for the former and 8-13% of dosage for the latter. Allulose was not detected in urine and feces collected 24-48 hours and 48-72 hours after administration. Serum allulose concentration and allulose in the contents of stomach and small intestines decreased progressively after administration. Allulose in

stomach was 26- 37% and 0.4-0.6% of dosage after 1 and 3 hours after treatment, respectively. Allulose in the small intestine was 6- 10%, 2-3%, and 1-3% of the dosage after 1, 3, and 7 hours, respectively. Allulose in the cecum was detected after 3 and 7 h. It was 11-18% and 10-19% of the dosage after 3 and 7 hours, respectively. Continuous administration of allulose increased cecal SCFA, as allulose is fermented in the cecum by intestinal microflora.

3.4. Probable Consumption/Estimated Dietary Intake/Use levels

An intake assessment was conducted by Exponent (Washington, D.C.) to estimate the daily intake for allulose, when used as a sugar substitute in certain foods (*see* Annex 1). Exponent evaluated intake from 14 proposed food use categories (as presented in Table 1) by the U.S. population 2 years of age and older and the following five sub-populations: infants < 2 y, children 2-12 y, adolescents 13-17 y, males 19+ y and females 19+ y. The estimated daily intake (EDI) of allulose is based on foods reported consumed in the What We Eat in America (WWEIA) dietary component of the National Health and Nutrition Examination Surveys (NHANES) 2007-2010.

The results of the Exponent assessment are summarized in the two tables below. The first table presents the results of the mean of the population as well as the 90th percentile in g/day, and the second in g/kg-bw/day. These results reveal a two day average maximum exposure would occur in males greater than 19 years of age, with a 90th percentile value of 30.4 g/day or 0.32 g/kg-bw/day. The toxicity data reveals an LD₅₀ of 15.8-16.3 g/kg-bw, indicating that even at the highest exposure, allulose is not a safety risk.

Table 2. Two-day average estimated daily intake of allulose from proposed food uses by the US population 2 years and older and subpopulations (g/day); NHANES 2007-10

Population	N-user*	% User	Per Capita (g/day)		Per User (g/day)	
			Mean	90 th Percentile	Mean	90 th Percentile
US 2+ y	13,455	90	8.1	22.5	9.0	24.8
Infants < 2 y	536	51	0.8	2.6	1.7	4.1
Children 2-12 y	3,223	92	3.8	9.5	4.1	9.8
Adolescents 13-18 y	1,283	84	4.5	11.5	5.4	12.6
Males 19+ y	4,178	88	9.2	26.8	10.5	30.4
Females 19+ y	4,771	92	9.5	27.0	10.2	28.4

* Un-weighted number of consumers; % user, per capita and per user estimates derived using the statistical weights provided by the National Center for Health Statistics (NCHS)

Table 3. Two-day average estimated daily intake of allulose from proposed food uses by the US population 2 years and older and subpopulations (g/kg-bw/day); NHANES 2007-10

Population	N-user*	% User	Per Capita (g/kg-bw/day)		Per User (g/kg-bw/day)	
			Mean	90 th Percentile	Mean	90 th Percentile
US 2+ y	13,455	90	0.11	0.31	0.13	0.33
Infants < 2 y	536	51	0.08	0.24	0.15	0.42
Children 2-12 y	3,223	92	0.14	0.36	0.15	0.37
Adolescents 13-18 y	1,283	84	0.07	0.18	0.09	0.21
Males 19+ y	4,178	88	0.10	0.28	0.11	0.32
Females 19+ y	4,771	92	0.13	0.34	0.14	0.35

* Un-weighted number of consumers; % user, per capita and per user estimates derived using the statistical weights provided by the National Center for Health Statistics (NCHS)

3.5. Toxicology Studies

Numerous toxicology studies have been conducted for allulose. The major studies are summarized in the table below.

Table 4. Major Toxicity Studies

Species	Dosage	Length	Primary endpoints and NOAEL	Reference
Male rat	8, 11, 14, 17, and 20 g/kg	Single dose	Acute toxicity-LD ₅₀ , 16.3 g/kg BW	Matsuo et al., 2002
Young rat	10, 20, 30, and 40% in the diet	34 d	Feed intake, wt gain, organ wt; up to 20% in the diet (corresponding to 10,000 mg/kg BW/d)	Matsuo et al., 2002
Male rat	1,280 mg/kg BW/d	12-18 mo	Feed intake, wt gain, organ wt, serum biochemistry, hematology, histology, 1,280 mg/kg BW/d	Yagi and Matsuo 2009

The acute toxicity studies performed by Matsuo et al. (2002a) consisted of five groups of 8 male Wistar rats. These animals were treated with a single dose of allulose orally at doses of 8, 11, 14, 17, and 20 g/kg BW. Three rats receiving 14 g/kg, three rats receiving 17 g/kg and eight rats receiving 20 g/kg of allulose died within 2 days of allulose administration. The authors calculated the LD₅₀ value of 16.3 g/kg by the Behrens-Karber method and 15.8 g/kg by the Litchfield-Wilcoxon method.

Sub-acute toxicity was assessed in a 34-day feeding of allulose in 4 week-old Wistar rats (Matsuo et al., 2002a). In this study, eight groups of seven male Wistar rats were fed a diet containing 0 (control), 10, 20, 30, and 40% allulose. One rat on the 30% allulose diet and five rats on the 40% allulose diet expired during the experimental period. Higher concentrations of allulose resulted in decreased body weight gain and food efficiency. The authors concluded the

decreased in body weight gain in the 10 and 20% group was attributable to a decrease in food intake, and this was not considered to be of toxicological significance. A laxative effect was noted, but was transient and was not observed after 4 days. Rats fed the 30 and 40% diet were able to show a recovery in body weight, food intake during the first 7 days of the feeding period, suggesting the effects may have been transitory. Reduced weight gain associated with allulose intakes is not a toxicological concern.

It is well known that non-digestible carbohydrate intakes are associated with body weight reduction or reduced weight gain. The Institute of Medicine report on carbohydrates (IOM, 2002), American Dietetic Association's position paper (Marlett and McBurney, 2002), and USDA Dietary Guideline Committee report (USDA, 2010) acknowledge the efficacy of non-digestible carbohydrates in body weight reduction as a positive attribute that can significantly improve public health in the U.S. Thus, a non-digestible carbohydrate such as allulose also can contribute to improving public health without any adverse effects.

Chronic toxicity was evaluated in rats by Yagi and Matsuo (2009). A long-term toxicity of allulose in male Wistar rats was conducted by the administration of a diet containing 3% allulose (or 1,280 mg/kg bw/d) or 3% sucrose (1,220 mg/kg bw/d) for 12-18 months.

The authors found that allulose administration results in a lower body weight gain and lower intra-abdominal adipose tissue weight, and these results were significantly lower than the same parameters in rats fed the sucrose diet. Though not considered toxicologically significant, relative weights of liver and kidney were significantly higher in the allulose group than in the sucrose group. Similar findings of increased relative weight of liver have been observed previously in animals fed other type of sugars such as fructose and sucralose.

General hematology or serum chemistry tests were in the normal ranges for all animals tested. All values related to serum chemistry did not differ between the sucrose and allulose groups. Hemoglobin (Hb) and mean corpuscular volume (MCV) at 18 mo were significantly greater in the allulose group than in the sucrose group, but no differences were observed in any of the related hematology values. The histopathological data demonstrated that there were no toxicologically significant findings in rats fed 3% allulose. The authors concluded that administration of allulose at 3% in the diet did not result in any adverse effects in rats.

3.6. Other Animal Studies

Several other studies can be found in the literature discussing the effects of allulose in animal models. A summary table of key studies is presented below. These studies assessed varying concentrations of allulose in the diet, over both acute and sub-acute time periods. Despite diets containing 5% allulose, well above the proposed intended use limits of this document, no adverse effects were noted in the test animals.

Species	Dosage	Length	Primary endpoints and NOAEL	Reference
Male mice	0.2 g/kg BW/d	4 wk	Glycemic responses, insulin release, and blood lipid profiles, 0.2 g/kg BW/d	Back et al., 2010
Male rat	5% in the diet	3 wk	Body fat and lipid metabolism, 5% in the diet	Matsuo et al., 2001a
Male rat	5% in the diet	4 wk	Body fat and lipid metabolism, 5% in the diet	Matsuo et al., 2001b
Male rat	5% in the diet	8 wk	Body fat and glycemic responses, 5% in the diet	Matsuo and Izumori, 2006
Male rat	2,000 mg/kg	Single dose	Body fat and glycemic responses, 2 g/kg	Matsuo and Izumori, 2009

Baek et al. (2010), evaluated the effects of D-allulose on glycemic responses, insulin release, and lipid profiles were compared with those of D-glucose and D-fructose in a genetic diabetes mouse model, the C57BL/6J db/db mouse. D-allulose sustained weight gain by about 10% compared to other groups. The initial blood glucose level, 276 to 305 mg/dL, was maintained throughout the experimental period in the D-allulose group. A 2-fold increase was found in the other groups ($P < 0.05$) during the same period. D-allulose significantly improved glucose tolerance and the areas under the curve (AUC) for glucose ($P < 0.05$), with no effect on serum insulin concentration. D-allulose decreased hepatic concentrations of triglyceride (G) and total cholesterol (TC) by 37.9% and 62.9%, respectively, compared to the diabetic control ($P < 0.05$). No adverse effects were noted.

Matsuo et al. (2001a) studied the effects on body fat accumulation of allulose compared with cellulose or D-fructose in rats. Abdominal adipose tissue weight was lower ($P < 0.05$) in rats fed allulose than in those fed D-fructose. Fatty acid synthase and glucose 6-phosphate dehydrogenase activities in the liver were lower ($P < 0.05$) in rats fed D-allulose. No adverse effects were reported. The authors concluded that D-allulose could prove to be a good sugar substitute.

In a study conducted by Matsuo et al. (2001b) Wistar male rats were fed experimental diets that consisted of 5% D-allulose, cellulose, D-fructose, or D-glucose for 28 days. Abdominal adipose tissue weight was lower ($P < 0.05$) in rats fed the D-allulose diet than in rats fed D-fructose and D-glucose diets, even though the four dietary groups were offered the same amount throughout the experimental period. Fatty acid synthase and glucose 6-phosphate dehydrogenase activities in the liver were lower ($P < 0.05$) in rats fed the D-allulose diet than in rats fed the D-fructose and D-glucose diets. No adverse effects were reported.

Matsuo and Izumori (2006) studied the effects of supplemental D-allulose in the diet on diurnal variation in plasma glucose and insulin concentrations in rats. Forty-eight male Wistar rats were divided into four groups. Each group except for the control group was fed a diet of 5% D-fructose, D-allulose, or psico-rare sugar (3:1 mixture of D-fructose and D-allulose) for 8 weeks. Plasma glucose concentrations were lower and plasma insulin concentrations were higher at all times of the day in the allulose and psico-rare sugar groups than in the control and fructose groups. Weight gain was lower ($P < 0.05$) in the allulose group than in the control and fructose groups. Liver glycogen content, both before and after meals was higher in the allulose group than in the control and fructose groups. These results suggest that supplemental D-allulose can lower plasma glucose concentrations and reduce body fat accumulation.

Matsuo and Izumori (2009) investigated the effects of D-allulose on the activities of alpha-amylases and alpha-glucosidases *in vitro*, and evaluated the effects of D-allulose on the *in vivo* postprandial glycemic response of rats. Male Wistar rats were administered 2 g/kg of sucrose, maltose, or soluble starch together with 0.2 g/kg of D-allulose or D-fructose. The D-allulose significantly inhibited the increment of plasma glucose concentration induced by sucrose or maltose. These results suggest that D-allulose inhibited intestinal sucrase and maltase activities and suppressed the plasma glucose increase that normally occurs after sucrose and maltose ingestion. No adverse effects were reported.

3.7. *In vitro* Mutagenicity/Genotoxicity

In vitro mutagenicity and genotoxicity were addressed in GRN 400. GRN 400 referenced studies conducted by Huntington lab on behalf of the submitter, CJ Cheiljedang. An Ames test resulted in no evidence of mutagenic potential, and both a micronucleus test and chromosomal aberration test found no evidence of genetic toxicity following exposure to allulose.

Given the high degree of similarity between the product referenced in GRN 0400 and the product that is the subject of this notification, Matsutani did not repeat the studies, as genotoxicity and mutagenicity has been adequately addressed in the prior submission.

3.8. Nutritional Considerations/Other Considerations

A potential side effect of D-allulose is gastrointestinal discomfort when ingested in large quantities. It is well-known that this type of side effect is transient. As consumption levels of non-digestible carbohydrates decreased throughout the 20th century, human tolerance levels also decreased. This tolerance and loss of tolerance suggests that the gastrointestinal symptoms associated with high intakes of non-digestible carbohydrates are likely transient, and can improve over time. In fact, recent clinical studies showed that daily D-allulose intakes of up to 31-33 g were well tolerated (Matsuo et al., 2002). Furthermore, the laxative effect seen in the Matsuo study evaluating subchronic toxicity resolved after 4 days. This type of symptom is usually transient and is not considered to be of toxicological significance.

3.9. GRAS Conclusion

The information presented in this document supports the safe use of allulose as a sugar substitute for a variety of products, including baked goods, cereals, candies, and other food categories. The maximum 2 day average exposure is below the NOAEL as determined through multiple animal studies. Further, allulose is a naturally occurring substance that is encountered in the diet on a regular basis. Allulose has been reviewed by the FDA in the past, with no question to its safety. From the information presented herein, there is no reason to expect that the product in question will introduce any questions of safety, and is GRAS for the intended use as described in this document.

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5. LIST OF ANNEXES

1. Intake Assessment performed by Exponent. “*Estimated Daily Intake for the Sweetener Allulose (Psicose)*”

Annex 1

Intake Assessment

Exponent[®]

Center for Chemical Regulation and Food Safety

**ESTIMATED DAILY INTAKE FOR
THE SWEETENER ALLULOSE
(PSICOSE)**



**ESTIMATED DAILY INTAKE FOR
THE SWEETENER ALLULOSE
(PSICOSE)**

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List of Acronyms

CDC	Centers for Disease Control and Prevention
DHHS	Department of Health and Human Services
EPA	Environmental Protection Agency
FCID	Food Commodity Intake Database
FNDDS	Food and Nutrient Database for Dietary Studies
NCHS	National Center for Health Statistics
NHANES	National Health and Nutrition Examination Survey
Non-RTD	Non-Ready-to-Drink
RTD	Ready-to-Drink
USDA	U.S. Department of Agriculture
WWEIA	What We Eat in America

Introduction

At the request of Matsutani Chemical Industry Co. Ltd. (Matsutani), Exponent conducted an intake assessment to estimate the total daily intake of the sweetener, Allulose (Psicose), from 14 proposed food use categories by the U.S. population 2 years of age and older and the following five sub-populations: infants < 2 y, children 2-12 y, adolescents 13-17 y, males 19+ y and females 19+ y. The estimated daily intake (EDI) of the sweetener, Allulose (Psicose), is based on foods reported consumed in the What We Eat in America (WWEIA) dietary component of the National Health and Nutrition Examination Surveys (NHANES) 2007-2010. The sections below summarize the data, methods, and results.

Data and Methods

Proposed Use

Matsutani proposes to use the sweetener, Allulose (Psicose), at levels ranging from 2% - 100% in several food categories, as summarized in Table 1 below.

Table 1. Proposed Food Uses and Use Levels of Allulose (Psicose)

Food Types	Allulose (Psicose) Maximum Proposed Use Level (%)
1 Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free	3.5
2 Cereals, low calorie, reduced calorie, sugar-free	5
Cereals, regular	2
3 Chewing gum	50
4 Confections & Frostings	5
5 Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free	5
6 Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free	5
7 Dressings for salads	5
8 Gelatins, pudding & fillings, low calorie, reduced calorie, sugar-free	10
9 Hard Candy, low calorie, reduced calorie, sugar-free	50
10 Soft Candy, low calorie, reduced calorie, sugar-free	25
11 Jams & Jellies	10
12 Sugar	10
13 Sugar substitutes	100
14 Sweet sauces & syrups, low calorie, reduced calorie, sugar-free	10

Consumption Data

Estimated food intakes intended for Allulose (Psicose) use were based on food consumption records collected in the What We Eat in America (WWEIA) component of NHANES conducted in 2007-2008 and 2009-2010 (NHANES 2007-2010). This continuous survey uses a complex multistage probability sample designed to be representative of the civilian U.S. population (NCHS 2010, 2012). The NHANES datasets provide nationally representative nutrition and

health data and prevalence estimates for nutrition and health status measures in the United States. Statistical weights are provided by the National Center for Health Statistics (NCHS) to adjust for the differential probabilities of selection.

As part of the examination, trained dietary interviewers collected detailed information on all foods and beverages consumed by respondents in the previous 24 hour time period (midnight to midnight). A second dietary recall was administered by telephone three to ten days after the first dietary interview, but not on the same day of the week as the first interview. The dietary component of the survey is conducted as a partnership between the U.S. Department of Agriculture (USDA) and the U.S. Department of Health and Human Services (DHHS). DHHS is responsible for the sample design and data collection, and USDA is responsible for the survey's dietary data collection methodology, maintenance of the databases used to code and process the data, and data review and processing. A total of 16,244 individuals in the survey period 2007-2010 provided 2 complete days of dietary recalls.

Analysis

Using the NHANES consumption data, Exponent estimated the daily intake on a per user basis. In this analysis, a user is anyone who reported consuming any of the proposed foods on either of the survey days (USDA's user definition). We identify each participant who reported consuming any of the proposed foods on either of the survey days, and we use that individual's responses for both survey days. Zero consumption days are included in calculating that individual's average daily intake. For example, if someone reported consuming 5 grams of bread on day 1 and 10 grams of bread on day 2, his/her 2-day average bread consumption would be 7.5 grams $([5+10]/2)$. The analysis was limited to individuals who provided two complete and reliable dietary recalls as determined by NCHS. The 2-day average intakes by each individual were estimated using Exponent's Foods and Residues Evaluation Program (FARE[®] version 10.05) software. Exponent uses the statistically weighted values from the survey in its analyses. The statistical weights compensate for variable probabilities of selection, adjust for non-response, and provide intake estimates that are representative of the U.S. population.

In the analysis, the 2-day average intake of Allulose (Psicose) was estimated by multiplying the reported intake of foods from the 24-hr recall with the proposed use level (see Table 1) and the cumulative sum over the two 24-hr recalls was divided by two. Estimates were also derived on a bodyweight basis based on each participant's reported bodyweight.

Consumption data in the NHANES survey are reported on an "as consumed basis". That is, if a survey participant consumed an apple pie, the consumption amount reported in the survey for that subject would be for the amount of pie consumed, and not for the ingredients (flour, butter, apples, sugar, etc.) used to make that pie. Exponent identified foods reported consumed for each proposed food category; the list of codes and their description are provided in Appendix I. Exponent utilized USDA's Food and Nutrient Database for Dietary Studies (FNDDS) (USDA, 2012) and the Environmental Protection Agency (EPA)'s Food Commodity Intake Database (FCID) (US EPA, 2013) that translates the food as consumed into its corresponding ingredients (and gram amounts) or recipes.

Consumption of the foods with proposed use of Allulose (Psicose) was estimated using the USDA recipes when the target food was a component of the reported food (i.e., jelly component in a peanut butter and jelly sandwich, dressing component in coleslaw or other salad mixture, gelatin component in a gelatin dessert mixture, soda component in an alcoholic drink).

Sugar and Sugar Substitutes

Exponent identified six sugar codes and eight sugar substitute codes and foods with sugar or sugar substitutes that were added during preparation of foods reported as consumed (i.e., non-ready-to-drink beverages, baked goods and home recipe soups). The identification of sugar and sugar substitutes added during preparation were based on the food description containing "homemade", "home recipe", "prepared with", "made with", "made from", "with sugar", "sugar added", "sweetened", or "presweetened". In some of the foods where sugar or sugar substitutes were added in preparation, the USDA recipes were not complete. In these cases, Exponent used the Food Commodity Intake Database (FCID) developed by the US EPA and

USDA that provides data on the edible amount of agricultural food commodities (i.e., sugar) contained in each food reported eaten in the NHANES 2007-2010 database. Identification of sugar and sugar substitutes as an ingredient in non-ready-to-drink (non-RTD) beverages is described in the coffee and tea section below.

Confection & Frosting and Gelatins, Pudding & Fillings

For the proposed use of Allulose (Psicose) in the confection & frosting and gelatins, puddings & fillings categories, Exponent calculated the average proportion of confection/frosting or filling in baked good foods (i.e., cakes, cookies, and brownies with frosting; pies and pastries with filling) and applied the proportion to estimate food intake. The average proportion of frosting/icing or filling in baked good foods is 30% in cakes/cupcakes, 20% in brownies, 30% in cookies, 80% in pies, and 10% in pastries.

Ready-To-Drink (RTD) and Non-RTD Coffee and Tea Beverages

Coffee and tea beverages in the NHANES survey can be either RTD or non-RTD (e.g. made at home with added sugar). NHANES food codes were sorted into RTD and non-RTD coffee and tea beverages based on description of food codes as provided in NHANES. The following default criteria were used:

Criteria	RTD ¹	Non-RTD
Main description of NHANES food code	<ul style="list-style-type: none"> Contains “presweetened”, “pre-lightened”, or “with whitener” Is a coffee or tea substitute such as postum, chicory, and corn beverage 	Contains “tea, leaf” regardless of “presweetened” descriptors as tea leaf is assumed to be tea bags or loose leaf tea
Additional description of NHANES food code	Contains “ready-to-drink” or “from vending machine”	<ul style="list-style-type: none"> Lacks description/detail or Contains “made from ground”, “made from filter”, “coffee singles”, “Maxwell” or other non-RTD coffee brands, or “made from freeze-dried”

¹ Coffee and tea, made from powdered instant mix that follow the above criteria are classified as RTD to represent the amount consumed equivalent to a RTD coffee or tea beverage. For the two non-

reconstituted, dry powdered tea codes reported consumed; Exponent adjusted the amount consumed to the reconstituted amount to represent the amount consumed equivalent to a RTD tea.

Among the food codes that were identified as RTD coffee and tea beverages, 11 were “Low Calorie, Reduced Calorie, Sugar Free” types and these were included in the analysis under the food category #1 “beverages (non-alcoholic), low calorie, and reduced calorie, sugar-free”.

For food codes that were identified as non-RTD coffee and tea beverages, Exponent used the USDA recipes to determine if sugar or sugar substitutes were an ingredient in the non-RTD coffee and tea beverages. Generally, non-RTD beverages typically did not contain any sugar as an ingredient; however, 10 non-RTD beverages contained sugar or a sugar substitute in its recipe and the proportion of sugar (or substitute) was included in the analysis under the sugar and sugar substitute proposed use categories.

For example, Turkish coffee (food code 92101600) was identified as non-RTD because the main and additional description lacked key words suggesting it was RTD (see criteria above). Based on recipe, Turkish coffee contains approximately 9.6% sugar likely added during preparation. To estimate daily Allulose (Psicose) sweetener from this particular food, the 2-day average consumption of Turkish coffee is multiplied by the percentage of sugar in the food and the Allulose (Psicose) use level of sugar as shown below:

$$\text{Psicose} \left(\frac{g}{day} \right) = 2 \text{ day average intake of Turkish coffee} \left(\frac{g}{day} \right) \times \frac{9.6 \text{ g sugar}}{100 \text{ g coffee}} \times 0.10\% \text{ psicose}$$

It is important to note that while a beverage may not contain any sugar or sugar substitute based on the recipe, an NHANES participant may have reported consuming sugar or sugar substitutes in combination with an unsweetened beverage. In this case, the sugar or sugar substitute eaten in combination with an unsweetened beverage food code is captured separately under a sugar food code. As mentioned above, these codes were included in the

analysis under the sugar and sugar substitute proposed use categories in addition to the sugar and sugar substitutes that were ingredients in non-RTD beverages and other foods. The comprehensive list of all NHANES food codes included in the analysis can be found in Appendix I.

Results

The total estimated daily intake of Allulose (Psicose) from all proposed uses for the US population 2 years and older and five US subpopulations in units of g/day and g/kg-bw/day are provided in Tables 2 and 3, respectively. The estimated intake of Allulose (Psicose) from each proposed use food category and by population are provided in Tables 4 (g/day) and 5 (g/kg-bw/day).

Table 2. Two-day average estimated daily intake of Allulose (Psicose) from proposed food uses by the US population 2 years and older and subpopulations (g/day); NHANES 2007-10

Population	N-user ¹	% User	Per Capita (g/day)		Per User (g/day)	
			Mean	90 th Percentile	Mean	90 th Percentile
US 2+ y	13,455	90	8.1	22.5	9.0	24.8
Infants < 2 y	536	51	0.8	2.6	1.7	4.1
Children 2-12 y	3,223	92	3.8	9.5	4.1	9.8
Adolescents 13-18 y	1,283	84	4.5	11.5	5.4	12.6
Males 19+ y	4,178	88	9.2	26.8	10.5	30.4
Females 19+ y	4,771	92	9.5	27.0	10.2	28.4

¹ Un-weighted number of consumers; % user, per capita and per user estimates derived using the statistical weights provided by the National Center for Health Statistics (NCHS)

Table 3. Two-day average estimated daily intake of Allulose (Psicose) from proposed food uses by the US population 2 years and older and subpopulations (g/kg-bw/day); NHANES 2007-10

Population	N-user ¹	% User	Per Capita (g/kg-bw/day)		Per User (g/kg-bw/day)	
			Mean	90 th Percentile	Mean	90 th Percentile
US 2+ y	13,455	90	0.11	0.31	0.13	0.33
Infants < 2 y	536	51	0.08	0.24	0.15	0.42
Children 2-12 y	3,223	92	0.14	0.36	0.15	0.37
Adolescents 13-18 y	1,283	84	0.07	0.18	0.09	0.21
Males 19+ y	4,178	88	0.10	0.28	0.11	0.32
Females 19+ y	4,771	92	0.13	0.34	0.14	0.35

¹ Un-weighted number of consumers; % user, per capita and per user estimates based on statistical weights provided by the National Center for Health Statistics (NCHS)

Table 4. Two-day average estimated daily intake of Allulose (Psicose) from proposed food uses by the US population 2 years and older and subpopulations (g/day); NHANES 2007-10

Proposed Food Category	N-user ¹	% User	Per Capita (g/day)		Per User (g/day)		
			Mean	90 th Percentile	Mean	90 th Percentile	
US 2+ y							
1 Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free	4,136	32	5.5	18.6	17.3	39.4	
2 Cereals, low calorie, reduced calorie, sugar-free	15	<1.0	NA	NA	NA	NA	
Cereals, regular	7,399	46	0.6	1.8	1.3	3.2	
3 Chewing gum	662	4	0.1	0.0	1.7	3.5	
4 Confections & Frostings	1,655	13	0.1	0.2	0.6	1.3	
5 Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free	223	1	<0.05	0.0	2.6	5.5	
6 Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free	487	4	0.2	0.0	5.2	8.9	
7 Dressings for salads	4,557	36	0.4	1.2	1.0	2.0	
8 Gelatins, pudding & fillings, low calorie, reduced calorie, sugar-free	201	1	0.1	0.0	7.3	12.1	
9 Hard Candy, low calorie, reduced calorie, sugar-free	11	<1.0	NA	NA	NA	NA	
10 Soft Candy, low calorie, reduced calorie, sugar-free**	26	<1.0	<0.05	0.0	2.0	4.5	
11 Jams & Jellies	2,083	14	0.2	0.5	1.2	2.2	
12 Sugar	5,801	39	0.6	1.8	1.5	3.7	
13 Sugar substitutes	1,660	12	0.3	0.5	2.2	4.5	
14 Sweet sauces & syrups, low calorie, reduced calorie, sugar-free	238	2	<0.05	0.0	1.7	4.0	
Infants < 2 y							
1 Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free*	67	5	0.3	0.0	5.4	9.7	
2 Cereals, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA	
Cereals, regular	426	41	0.3	0.7	0.7	2.4	

Proposed Food Category	N-user ¹	% User	Per Capita (g/day)		Per User (g/day)	
			Mean	90 th Percentile	Mean	90 th Percentile
3 Chewing gum	0	0	NA	NA	NA	NA
4 Confections & Frostings**	27	2	<0.05	0.0	0.2	0.5
5 Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free	4	<1.0	NA	NA	NA	NA
6 Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free	23	2	NA	NA	NA	NA
7 Dressings for salads**	48	5	<0.05	0.0	0.4	0.8
8 Gelatins, pudding & fillings, low calorie, reduced calorie, sugar-free	11	1	NA	NA	NA	NA
9 Hard Candy, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA
10 Soft Candy, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA
11 Jams & Jellies*	70	9	<0.05	0.0	0.5	1.0
12 Sugar*	134	12	0.1	<0.05	0.5	1.4
13 Sugar substitutes	4	<1.0	NA	NA	NA	NA
14 Sweet sauces & syrups, low calorie, reduced calorie, sugar-free	10	1	NA	NA	NA	NA
Children 2-12 y						
1 Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free	913	30	2.3	7.3	7.8	14.5
2 Cereals, low calorie, reduced calorie, sugar-free	11	<1.0	NA	NA	NA	NA
Cereals, regular	2,406	65	0.5	1.2	0.8	1.8
3 Chewing gum	214	7	0.1	0.0	1.2	2.0
4 Confections & Frostings	398	14	<0.05	0.2	0.4	0.7
5 Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free**	41	1	<0.05	0.0	1.8	3.4
6 Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free*	83	2	0.1	0.0	3.6	4.6
7 Dressings for salads	651	21	0.1	0.4	0.5	1.3
8 Gelatins, pudding & fillings, low calorie, reduced	45	1	0.1	0.0	5.7	10.5

Proposed Food Category	N-user ¹	% User	Per Capita (g/day)		Per User (g/day)	
			Mean	90 th Percentile	Mean	90 th Percentile
calorie, sugar-free**						
9 Hard Candy, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA
10 Soft Candy, low calorie, reduced calorie, sugar-free	1	<1.0	NA	NA	NA	NA
11 Jams & Jellies	652	20	0.2	0.7	0.9	1.9
12 Sugar	938	30	0.3	0.8	0.9	2.6
13 Sugar substitutes**	40	1	<0.05	0.0	0.8	1.7
14 Sweet sauces & syrups, low calorie, reduced calorie, sugar-free*	92	4	<0.05	0.0	1.2	3.0
Adolescents 13-18 y						
1 Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free	327	27	2.8	9.6	10.4	19.7
2 Cereals, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA
Cereals, regular	723	45	0.5	1.2	1.0	1.9
3 Chewing gum*	109	6	0.1	0.0	1.7	3.5
4 Confections & Frostings*	132	9	0.1	0.0	0.5	1.3
5 Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free	13	<1.0	NA	NA	NA	NA
6 Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free**	24	2	0.1	0.0	5.0	13.9
7 Dressings for salads	387	26	0.3	0.8	1.1	2.3
8 Gelatins, pudding & fillings, low calorie, reduced calorie, sugar-free	7	<1.0	NA	NA	NA	NA
9 Hard Candy, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA
10 Soft Candy, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA
11 Jams & Jellies	170	11	0.2	0.3	1.7	3.8
12 Sugar	425	29	0.4	1.3	1.5	3.8
13 Sugar substitutes	21	2	NA	NA	NA	NA

Proposed Food Category	N-user ¹	% User	Per Capita (g/day)		Per User (g/day)	
			Mean	90 th Percentile	Mean	90 th Percentile
14 Sweet sauces & syrups, low calorie, reduced calorie, sugar-free**	27	2	0.1	0.0	2.8	6.0
Males 19+ y						
1 Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free	1,302	31	6.5	23.6	21.1	47.1
2 Cereals, low calorie, reduced calorie, sugar-free	1	<1.0	NA	NA	NA	NA
Cereals, regular	1,877	39	0.7	2.0	1.7	4.2
3 Chewing gum*	131	3	0.1	0.0	2.3	7.0
4 Confections & Frostings	531	12	0.1	0.2	0.7	1.7
5 Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free*	77	1	<0.05	0.0	3.2	6.8
6 Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free*	122	4	0.2	0.0	5.6	10.4
7 Dressings for salads	1,540	36	0.4	1.5	1.1	2.2
8 Gelatins, pudding & fillings, low calorie, reduced calorie, sugar-free**	51	1	0.1	0.0	8.3	16.9
9 Hard Candy, low calorie, reduced calorie, sugar-free	3	<1.0	NA	NA	NA	NA
10 Soft Candy, low calorie, reduced calorie, sugar-free	10	<1.0	NA	NA	NA	NA
11 Jams & Jellies	575	12	0.2	0.3	1.4	2.9
12 Sugar	2,136	41	0.7	2.2	1.7	4.1
13 Sugar substitutes	656	12	0.3	0.8	2.3	4.8
14 Sweet sauces & syrups, low calorie, reduced calorie, sugar-free**	55	1	<0.05	0.0	1.7	3.0
Females 19+ y						
1 Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free	1,594	35	6.6	23.1	18.6	42.7
2 Cereals, low calorie, reduced calorie, sugar-free	3	<1.0	NA	NA	NA	NA
Cereals, regular	2,393	46	0.7	2.1	1.4	3.3
3 Chewing gum	208	4	0.1	0.0	1.5	2.8

Proposed Food Category	N-user ¹	% User	Per Capita (g/day)		Per User (g/day)	
			Mean	90 th Percentile	Mean	90 th Percentile
4 Confections & Frostings	594	13	0.1	0.2	0.6	1.2
5 Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free*	92	2	<0.05	0.0	2.5	5.1
6 Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free	258	6	0.3	0.0	5.3	9.2
7 Dressings for salads	1,979	43	0.4	1.4	1.0	1.8
8 Gelatins, pudding & fillings, low calorie, reduced calorie, sugar-free*	98	2	0.1	0.0	7.2	12.0
9 Hard Candy, low calorie, reduced calorie, sugar-free	8	<1.0	NA	NA	NA	NA
10 Soft Candy, low calorie, reduced calorie, sugar-free	15	<1.0	NA	NA	NA	NA
11 Jams & Jellies	686	13	0.1	0.3	1.0	2.0
12 Sugar	2,302	42	0.6	1.9	1.4	3.4
13 Sugar substitutes	943	17	0.4	1.0	2.3	4.2
14 Sweet sauces & syrups, low calorie, reduced calorie, sugar-free*	64	2	<0.05	0.0	1.9	5.3

¹ Un-weighted number of consumers; % user, per capita and per user estimates based on statistical weights provided by the National Center for Health Statistics (NCHS)

* Intake estimate at the 90th percentile is statistically unreliable due to small user sample size

** Intake estimate at the mean and 90th percentile and higher are statistically unreliable due to small user sample size

NA Not available; sample sizes too small to provide intake estimates

Table 5. Two-day average estimated daily intake of Allulose (Psicose) by the US population 2 years and older and subpopulations (g/kg-bw/day); NHANES 2007-10

Proposed Food Category	N-user ¹	% User	Per Capita (g/kg-bw/day)		Per User (g/kg-bw/day)		
			Mean	90 th Percentile	Mean	90 th Percentile	
US 2+ y							
1 Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free	4,136	32	0.07	0.25	0.23	0.50	
2 Cereals, low calorie, reduced calorie, sugar-free	15	<1.0	NA	NA	NA	NA	
Cereals, regular	7,399	46	0.01	0.03	0.02	0.05	
3 Chewing gum	662	4	<0.005	0.00	0.03	0.07	
4 Confections & Frostings	1,655	13	<0.005	<0.005	0.01	0.02	
5 Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free	223	1	<0.005	0.00	0.04	0.08	
6 Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free	487	4	<0.005	0.00	0.08	0.15	
7 Dressings for salads	4,557	36	<0.005	0.02	0.01	0.03	
8 Gelatins, pudding & fillings, low calorie, reduced calorie, sugar-free	201	1	<0.005	0.00	0.12	0.26	
9 Hard Candy, low calorie, reduced calorie, sugar-free	11	<1.0	NA	NA	NA	NA	
10 Soft Candy, low calorie, reduced calorie, sugar-free**	26	<1.0	<0.005	0.00	0.03	0.07	
11 Jams & Jellies	2,083	14	<0.005	0.01	0.02	0.05	
12 Sugar	5,801	39	0.01	0.03	0.02	0.05	
13 Sugar substitutes	1,660	12	<0.005	0.01	0.03	0.06	
14 Sweet sauces & syrups, low calorie, reduced calorie, sugar-free	238	2	<0.005	0.00	0.03	0.06	
Infants < 2 y							
1 Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free*	67	5	0.03	0.00	0.48	0.83	
2 Cereals, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA	
Cereals, regular	426	41	0.03	0.06	0.07	0.20	

Proposed Food Category	N-user ¹	% User	Per Capita (g/kg-bw/day)		Per User (g/kg-bw/day)	
			Mean	90 th	Mean	90 th
				Percentile		Percentile
3 Chewing gum	0	0	NA	NA	NA	NA
4 Confections & Frostings**	27	2	<0.005	0.00	0.02	0.04
5 Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free	4	<1.0	NA	NA	NA	NA
6 Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free	23	2	NA	NA	NA	NA
7 Dressings for salads**	48	5	<0.005	0.00	0.03	0.09
8 Gelatins, pudding & fillings, low calorie, reduced calorie, sugar-free	11	1	NA	NA	NA	NA
9 Hard Candy, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA
10 Soft Candy, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA
11 Jams & Jellies*	70	9	<0.005	0.00	0.05	0.10
12 Sugar*	134	12	0.01	<0.005	0.05	0.12
13 Sugar substitutes	4	<1.0	NA	NA	NA	NA
14 Sweet sauces & syrups, low calorie, reduced calorie, sugar-free	10	1	NA	NA	NA	NA
Children 2-12 y						
1 Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free	913	30	0.08	0.25	0.26	0.53
2 Cereals, low calorie, reduced calorie, sugar-free	11	<1.0	NA	NA	NA	NA
Cereals, regular	2,406	65	0.02	0.05	0.03	0.08
3 Chewing gum	214	7	<0.005	0.00	0.04	0.08
4 Confections & Frostings	398	14	<0.005	0.01	0.01	0.03
5 Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free**	41	1	<0.005	0.00	0.07	0.14
6 Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free*	83	2	<0.005	0.00	0.14	0.26
7 Dressings for salads	651	21	<0.005	0.01	0.02	0.04
8 Gelatins, pudding & fillings, low calorie, reduced	45	1	<0.005	0.00	0.25	0.43

Proposed Food Category	N-user ¹	% User	Per Capita (g/kg-bw/day)		Per User (g/kg-bw/day)	
			Mean	90 th Percentile	Mean	90 th Percentile
calorie, sugar-free**						
9 Hard Candy, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA
10 Soft Candy, low calorie, reduced calorie, sugar-free	1	<1.0	NA	NA	NA	NA
11 Jams & Jellies	652	20	0.01	0.03	0.04	0.08
12 Sugar	938	30	0.01	0.03	0.04	0.10
13 Sugar substitutes**	40	1	<0.005	0.00	0.03	0.06
14 Sweet sauces & syrups, low calorie, reduced calorie, sugar-free*	92	4	<0.005	0.00	0.04	0.08
Adolescents 13-18 y						
1 Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free	327	27	0.04	0.15	0.16	0.33
2 Cereals, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA
Cereals, regular	723	45	0.01	0.02	0.02	0.03
3 Chewing gum*	109	6	<0.005	0.00	0.03	0.06
4 Confections & Frostings*	132	9	<0.005	0.00	0.01	0.02
5 Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free	13	<1.0	NA	NA	NA	NA
6 Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free**	24	2	<0.005	0.00	0.08	0.24
7 Dressings for salads	387	26	<0.005	0.01	0.02	0.04
8 Gelatins, pudding & fillings, low calorie, reduced calorie, sugar-free	7	<1.0	NA	NA	NA	NA
9 Hard Candy, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA
10 Soft Candy, low calorie, reduced calorie, sugar-free	0	0	NA	NA	NA	NA
11 Jams & Jellies	170	11	<0.005	0.01	0.03	0.07
12 Sugar	425	29	0.01	0.02	0.02	0.06
13 Sugar substitutes	21	2	NA	NA	NA	NA

Proposed Food Category	N-user ¹	% User	Per Capita (g/kg-bw/day)		Per User (g/kg-bw/day)	
			Mean	90 th Percentile	Mean	90 th Percentile
14 Sweet sauces & syrups, low calorie, reduced calorie, sugar-free**	27	2	<0.005	0.00	0.05	0.11
Males 19+ y						
1 Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free	1,302	31	0.07	0.24	0.22	0.47
2 Cereals, low calorie, reduced calorie, sugar-free	1	<1.0	NA	NA	NA	NA
Cereals, regular	1,877	39	0.01	0.02	0.02	0.05
3 Chewing gum*	131	3	<0.005	0.00	0.03	0.08
4 Confections & Frostings	531	12	<0.005	<0.005	0.01	0.02
5 Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free*	77	1	<0.005	0.00	0.03	0.07
6 Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free*	122	4	<0.005	0.00	0.07	0.13
7 Dressings for salads	1,540	36	<0.005	0.02	0.01	0.03
8 Gelatins, pudding & fillings, low calorie, reduced calorie, sugar-free**	51	1	<0.005	0.00	0.08	0.13
9 Hard Candy, low calorie, reduced calorie, sugar-free	3	<1.0	NA	NA	NA	NA
10 Soft Candy, low calorie, reduced calorie, sugar-free	10	<1.0	NA	NA	NA	NA
11 Jams & Jellies	575	12	<0.005	<0.005	0.02	0.04
12 Sugar	2,136	41	0.01	0.03	0.02	0.05
13 Sugar substitutes	656	12	<0.005	0.01	0.02	0.05
14 Sweet sauces & syrups, low calorie, reduced calorie, sugar-free**	55	1	<0.005	0.00	0.02	0.03
Females 19+ y						
1 Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free	1,594	35	0.09	0.29	0.24	0.54
2 Cereals, low calorie, reduced calorie, sugar-free	3	<1.0	NA	NA	NA	NA
Cereals, regular	2,393	46	0.01	0.03	0.02	0.05
3 Chewing gum	208	4	<0.005	0.00	0.02	0.05

Proposed Food Category	N-user ¹	% User	Per Capita (g/kg-bw/day)		Per User (g/kg-bw/day)	
			Mean	90 th Percentile	Mean	90 th Percentile
4 Confections & Frostings	594	13	<0.005	<0.005	0.01	0.02
5 Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free*	92	2	<0.005	0.00	0.03	0.07
6 Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free	258	6	<0.005	0.00	0.07	0.13
7 Dressings for salads	1,979	43	0.01	0.02	0.01	0.03
8 Gelatins, pudding & fillings, low calorie, reduced calorie, sugar-free*	98	2	<0.005	0.00	0.10	0.19
9 Hard Candy, low calorie, reduced calorie, sugar-free	8	<1.0	NA	NA	NA	NA
10 Soft Candy, low calorie, reduced calorie, sugar-free	15	<1.0	NA	NA	NA	NA
11 Jams & Jellies	686	13	<0.005	0.01	0.01	0.03
12 Sugar	2,302	42	0.01	0.03	0.02	0.05
13 Sugar substitutes	943	17	0.01	0.01	0.03	0.06
14 Sweet sauces & syrups, low calorie, reduced calorie, sugar-free*	64	2	<0.005	0.00	0.02	0.05

¹ Un-weighted number of consumers; % user, per capita and per user estimates based on statistical weights provided by the National Center for Health Statistics (NCHS)

* Intake estimate at the 90th percentile is statistically unreliable due to small user sample size

** Intake estimate at the mean and 90th percentile and higher are statistically unreliable due to small user sample size

NA Not available; sample sizes too small to provide intake estimates

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Appendix I. Food Code Included In Analysis

Food Code Description

Beverages (non-alcoholic), low calorie, reduced calorie, sugar-free

28401200	Gelatin drink, powder, flavored, with low-calorie sweetener, reconstituted
28401200	Gelatin drink, powder, flavored, with low-calorie sweetener, reconstituted
92121030	Coffee and cocoa (mocha), made from powdered instant mix, with whitener and low calorie sweetener
92121040	Coffee, made from powdered instant mix, with whitener and low calorie sweetener
92121050	Coffee and cocoa (mocha), made from powdered instant mix, with whitener and low calorie sweetener, decaffeinated
92130005	Coffee, regular, with low-calorie sweetener, pre-lightened
92130006	Coffee, decaffeinated, with low-calorie sweetener, pre-lightened
92193020	Coffee, dry instant powder, with whitener and low calorie sweetener
92301080	Tea, NS as to type, presweetened with low calorie sweetener
92301180	Tea, NS as to type, decaffeinated, presweetened with low calorie sweetener
92305090	Tea, made from powdered instant, presweetened with low calorie sweetener
92305110	Tea, made from powdered instant, decaffeinated, presweetened with low calorie sweetener
92306030	Tea, herbal, presweetened with low calorie sweetener
92400100	Soft drink, NFS, sugar-free
92410210	Carbonated water, unsweetened
92410250	Carbonated water, sugar-free
92410315	Soft drink, cola type, reduced sugar
92410320	Soft drink, cola-type, sugar-free
92410350	Soft drink, cola-type, decaffeinated, sugar-free
92410370	Soft drink, pepper-type, sugar-free
92410400	Soft drink, pepper-type, decaffeinated, sugar-free
92410420	Cream soda, sugar-free
92410520	Soft drink, fruit-flavored, sugar free, caffeine free
92410560	Soft drink, fruit flavored, caffeine containing, sugar-free
92410620	Ginger ale, sugar-free
92410720	Root beer, sugar-free
92411610	Cola with fruit or vanilla flavor, sugar-free
92550030	Fruit juice drink, low calorie, with high vitamin C
92550040	Fruit juice drink, low calorie
92550110	Cranberry juice drink, low calorie, with vitamin C added
92550350	Light orange juice beverage, 40-50% juice, lower sugar and calories, with artificial sweetener
92550400	Vegetable and fruit juice drink, low calorie, with high vitamin C
92550610	Fruit-flavored drinks, punches, ades, low calorie, with vitamin C added
92550620	Fruit flavored drink, low calorie
92552000	Fruit-flavored drink, made from powdered mix with high vitamin C added, low

calorie

- 92552010 Fruit flavored drink, made from powdered mix, low calorie
- 92552020 Fruit juice drink, reduced sugar, with thiamin (vitamin B1) and vitamin C
- 92552030 Fruit juice drink, reduced sugar, with vitamin E
- 92553000 Fruit-flavored thirst quencher beverage, low calorie
- 92565000 Fruit-flavored sports drink or thirst quencher beverage, low calorie
- 92565100 Gatorade G2 thirst quencher sports drink, low calorie
- 92565200 Powerade Zero sports drink, low calorie
- 92582120 Fruit flavored drink, reduced sugar, with high vitamin C, plus added calcium
- 92650005 Red Bull Energy Drink, sugar-free
- 92650210 Mountain Dew AMP Energy Drink, sugar-free
- 92650705 Rockstar Energy Drink, sugar-free
- 92900200 Fruit-flavored beverage, dry concentrate, low calorie, not reconstituted
- 94100200 Water, bottled, sweetened, with low or no calorie sweetener

Cereals, low calorie, reduced calorie, sugar-free

- 57125010 Cinnamon Toast Crunch Reduced Sugar
- 57349020 Reduced Sugar Frosted Flakes Cereal, Kellogg's
- 57407110 Trix, reduced sugar

Cereals, regular

- 56200300 Cereal, cooked, NFS
- 56200350 Cereal, cooked, instant, NS as to grain
- 56202960 Oatmeal, cooked, NS as to regular, quick or instant; NS as to fat added in cooking
- 56202970 Oatmeal, cooked, quick (1 or 3 minutes), NS as to fat added in cooking
- 56202980 Oatmeal, cooked, regular, NS as to fat added in cooking
- 56203000 Oatmeal, cooked, NS as to regular, quick or instant, fat not added in cooking
- 56203010 Oatmeal, cooked, regular, fat not added in cooking
- 56203020 Oatmeal, cooked, quick (1 or 3 minutes), fat not added in cooking
- 56203030 Oatmeal, cooked, instant, fat not added in cooking
- 56203040 Oatmeal, cooked, NS as to regular, quick, or instant, fat added in cooking
- 56203050 Oatmeal, cooked, regular, fat added in cooking
- 56203060 Oatmeal, cooked, quick (1 or 3 minutes), fat added in cooking
- 56203070 Oatmeal, cooked, instant, fat added in cooking
- 56203080 Oatmeal, cooked, instant, NS as to fat added in cooking
- 56203200 Oatmeal with fruit, cooked
- 56203210 Oatmeal, NS as to regular, quick, or instant, made with milk, fat not added in cooking
- 56203211 Oatmeal, cooked, regular, made with milk, fat not added in cooking
- 56203212 Oatmeal, cooked, quick (1 or 3 minutes), made with milk, fat not added in cooking
- 56203213 Oatmeal, cooked, instant, made with milk, fat not added in cooking
- 56203221 Oatmeal, cooked, regular, made with milk, fat added in cooking
- 56203222 Oatmeal, cooked, quick (1 or 3 minutes), made with milk, fat added in cooking
- 56203223 Oatmeal, cooked, instant, made with milk, fat added in cooking
- 56203230 Oatmeal, NS as to regular, quick, or instant, made with milk, NS as to fat added in

cooking

56203231 Oatmeal, cooked, regular, made with milk, NS as to fat added in cooking

56203610 Oatmeal, multigrain, cooked, fat not added in cooking

56206970 Wheat, cream of, cooked, quick, NS as to fat added in cooking

56207000 Wheat, cream of, cooked, NS as to regular, quick, or instant, fat not added in cooking

56207010 Wheat, cream of, cooked, regular, fat not added in cooking

56207020 Wheat, cream of, cooked, quick, fat not added in cooking

56207030 Wheat, cream of, cooked, instant, fat not added in cooking

56207040 Wheat, cream of, cooked, made with milk

56207060 Wheat, cream of, cooked, instant, fat added in cooking

56207080 Wheat, cream of, cooked, NS as to regular, quick, or instant, fat added in cooking

56207190 Whole wheat cereal, cooked, NS as to fat added in cooking

56207200 Whole wheat cereal, cooked, fat not added in cooking

56207220 Wheat, cream of, cooked, regular, fat added in cooking

56207230 Wheat, cream of, cooked, quick, fat added in cooking

56207300 Whole wheat cereal, wheat and barley, cooked, fat not added in cooking

56207330 Whole wheat cereal, wheat and barley, cooked, fat added in cooking

56208500 Oat bran cereal, cooked, fat not added in cooking

56208510 Oat bran cereal, cooked, fat added in cooking

56208520 Oat bran cereal, cooked, NS as to fat added in cooking

56208530 Oat bran cereal, cooked, made with milk, fat not added in cooking

56210000 Nestum cereal

57000000 Cereal, NFS

57000050 Kashi cereal, NS as to ready to eat or cooked

57000100 Oat cereal, NFS

57100100 Cereal, ready-to-eat, NFS

57100500 Character cereals, TV or movie, Kelloggs

57101000 All-Bran

57101020 All-Bran with Extra Fiber

57102000 Alpen

57103000 Alpha-Bits

57103100 Apple Cinnamon Cheerios

57104000 Apple Jacks

57106050 Banana Nut Crunch Cereal (Post)

57106100 Basic 4

57106250 Berry Berry Kix

57106260 Berry Burst Cheerios

57106530 Blueberry Morning, Post

57107000 Booberry

57110000 All-Bran Bran Buds, Kellogg's (formerly Bran Buds)

57111000 Bran Chex

57117000 Cap'n Crunch

57117500 Cap'n Crunch's Christmas Crunch
57119000 Cap'n Crunch's Crunch Berries
57120000 Cap'n Crunch's Peanut Butter Crunch
57123000 Cheerios
57124000 Chex cereal, NFS
57124200 Chocolate flavored frosted puffed corn cereal
57124300 Chocolate Lucky Charms
57125000 Cinnamon Toast Crunch
57125900 Honey Nut Clusters (formerly called Clusters)
57126000 Cocoa Krispies
57126500 Cocoa Blasts, Quaker
57127000 Cocoa Pebbles
57128000 Cocoa Puffs
57128880 Complete Oat Bran Flakes, Kellogg's (formerly Common Sense Oat Bran, plain)
57130000 Cookie-Crisp
57131000 Crunchy Corn Bran, Quaker
57132000 Corn Chex
57134000 Corn flakes, NFS
57135000 Corn flakes, Kellogg
57137000 Corn Puffs
57138000 Total Corn Flakes
57139000 Count Chocula
57143000 Cracklin' Oat Bran
57143500 Cranberry Almond Crunch, Post
57144000 Crisp Crunch
57148000 Crispix
57148500 Crispy Brown Rice Cereal
57151000 Crispy Rice
57160000 Curves Fruit and Nut Crunch Cereal
57201800 Disney cereals, Kellogg's
57201900 Dora the Explorer Cereal
57206700 Fiber One
57206800 Fiber 7 Flakes, Health Valley
57207000 Bran Flakes, NFS (formerly 40% Bran Flakes, NFS)
57208000 Complete Wheat Bran Flakes, Kellogg's (formerly 40% Bran Flakes)
57209000 Natural Bran Flakes, Post (formerly called 40% Bran Flakes, Post)
57211000 Frankenberry
57212100 French Toast Crunch, General Mills
57213000 Froot Loops
57213005 Froot Loops Cereal Straws
57213850 Frosted Cheerios
57214000 Frosted Mini-Wheats
57214100 Frosted Wheat Bites

57218000 Frosted Rice Krispies
57219000 Fruit & Fibre (fiber), NFS
57221000 Fruit & Fibre (fiber) with dates, raisins, and walnuts
57221650 Fruit Harvest cereal, Kellogg's
57221700 Fruit Rings, NFS
57221810 Fruity Cheerios
57223000 Fruity Pebbles
57224000 Golden Grahams
57227000 Granola, NFS
57228000 Granola, homemade
57229000 Granola, lowfat, Kellogg's
57229500 Granola with Raisins, lowfat, Kellogg's
57230000 Grape-Nuts
57231000 Grape-Nut Flakes
57231200 Great Grains, Raisin, Date, and Pecan Whole Grain Cereal, Post
57231250 Great Grains Double Pecan Whole Grain Cereal, Post
57237100 Honey Bunches of Oats
57237200 Honey Bunches of Oats with Vanilla Clusters, Post
57237300 Honey Bunches of Oats with Almonds, Post
57238000 Honeycomb, plain
57239100 Honey Crunch Corn Flakes, Kellogg's
57240100 Honey Nut Chex
57241000 Honey Nut Cheerios
57241200 Honey Nut Shredded Wheat, Post
57243000 Smacks, Kellogg's (formerly Honey Smacks)
57301100 Kaboom
57301500 Kashi, Puffed
57301505 Kashi Autumn Wheat
57301510 Kashi GoLean
57301511 Kashi GoLean Crunch
57301512 Kashi GOLEAN Crunch Honey Almond Flax
57301520 Kashi Good Friends
57301530 Kashi Heart to Heart
57302100 King Vitaman
57303100 Kix
57304100 Life (plain and cinnamon)
57305100 Lucky Charms
57305150 Frosted oat cereal with marshmallows
57305170 Malt-O-Meal Coco-Roos
57305180 Malt-O-Meal Corn Bursts
57305210 Malt-O-Meal Frosted Flakes
57305300 Malt-O-Meal Fruity Dyno-Bites
57305500 Malt-O-Meal Honey and Nut Toasty O's

57305600 Malt-O-Meal Marshmallow Mateys
57306100 Malt-O-Meal Puffed Rice
57306120 Malt-O-Meal Puffed Wheat
57306500 Malt-O-Meal Golden Puffs (formerly Sugar Puffs)
57306700 Malt-O-Meal Toasted Oat Cereal
57306800 Malt-O-meal Tootie Fruities
57307010 Maple Pecan Crunch Cereal, Post
57307150 Marshmallow Safari, Quaker
57307600 Mini-Swirlz Cinnamon Bun Cereal, Kellogg's
57308150 Mueslix cereal, NFS
57308190 Muesli with raisins, dates, and almonds
57308300 Multi Bran Chex
57308400 Multi Grain Cheerios
57309100 Nature Valley Granola, with fruit and nuts
57316200 Nutty Nuggets, Ralston Purina
57316300 Oat Bran Flakes, Health Valley
57316450 Oatmeal Crisp with Almonds
57316500 Oatmeal Raisin Crisp
57316710 Oh's, Honey Graham
57318000 100% Bran
57319000 100% Natural Cereal, plain, Quaker
57319500 Sun Country 100% Natural Granola, with Almonds
57320500 100 % Natural Cereal, with oats, honey and raisins, Quaker
57321700 Optimum, Nature's Path
57321800 Optimum Slim, Nature's Path
57322500 Oreo O's cereal, Post
57323050 Sweet Puffs, Quaker
57324000 Peanut Butter Toast Crunch, General Mills
57325000 Product 19
57327450 Quaker Oat Bran Cereal
57327500 Quaker Oatmeal Squares (formerly Quaker Oat Squares)
57329000 Raisin bran, NFS
57330000 Raisin Bran, Kellogg
57330010 Raisin Bran Crunch, Kellogg's
57331000 Raisin Bran, Post
57332050 Raisin Bran, Total
57332100 Raisin Nut Bran
57335550 Reese's Peanut Butter Puffs cereal
57336000 Rice Chex
57337000 Rice Flakes, NFS
57339000 Rice Krispies
57339100 Rice Krispies with Real Strawberries, Kellogg's
57339500 Rice Krispies Treats Cereal (Kellogg's)

57340000 Rice, puffed
57341000 Shredded Wheat'N Bran
57341200 Smart Start, Kellogg's
57342010 Smorz, Kellogg's
57344000 Special K
57344005 Special K Chocolatey Delight
57344010 Special K Red Berries
57344015 Special K Fruit & Yogurt
57344020 Special K Vanilla Almond
57344025 Special K Cinnamon Pecan, Kellogg's
57346500 Oatmeal Honey Nut Heaven, Quaker (formerly Toasted Oatmeal, Honey Nut)
57347000 Corn Pops
57348000 Frosted corn flakes, NFS
57349000 Frosted Flakes, Kellogg
57355000 Golden Crisp (Formerly called Super Golden Crisp)
57401100 Toasted oat cereal
57403100 Toasties, Post
57404100 Malt-O-Meal Toasty O's
57404200 Malt-O-Meal Apple and Cinnamon Toasty O's
57406100 Total
57406105 Total Cranberry Crunch
57407100 Trix
57408100 Uncle Sam's Hi Fiber Cereal
57409100 Waffle Crisp, Post
57410000 Weetabix Whole Wheat Cereal
57411000 Wheat Chex
57412000 Wheat germ, plain
57416000 Wheat, puffed, plain
57416010 Wheat, puffed, presweetened with sugar
57417000 Shredded Wheat, 100%
57418000 Wheaties
57419000 Yogurt Burst Cheerios
57601100 Wheat bran, unprocessed

Chewing gum

91800100 Chewing gum, NFS
91801000 Chewing gum, sugared
91802000 Chewing gum, sugarless

Confections & Frostings

51161280 Roll, sweet, with raisins and icing, Mexican (Pan Dulce)*
53100100 Cake, NS as to type, with or without icing*
53101200 Cake, angel food, with icing*
53102000 Cake, applesauce, NS as to icing*
53102200 Cake, applesauce, with icing*

53102700 Cake, banana, with icing*

53103600 Cake, butter, with icing*

53104000 Cake, carrot, NS as to icing*

53104260 Cake, carrot, with icing*

53104400 Cake, coconut, with icing*

53105300 Cake, German chocolate, with icing and filling*

53105500 Cake, chocolate, with icing, diet*

53105600 Cake, chocolate, devil's food, or fudge, pudding-type mix, made by "Lite" recipe (eggs and water added to dry mix, no oil added to dry mix), with icing, coating, or filling*

53106050 Cake, chocolate, devil's food, or fudge, pudding-type mix (oil, eggs, and water added to dry mix), with icing, coating, or filling*

53107000 Cake, cupcake, NS as to type or icing*

53107200 Cake, cupcake, NS as to type, with icing*

53108000 Cake, cupcake, chocolate, NS as to icing*

53108200 Cake, cupcake, chocolate, with icing or filling*

53109200 Cake, cupcake, not chocolate, with icing or filling*

53109210 Cake, cupcake, not chocolate, with icing or filling, lowfat, cholesterol free*

53109270 Cake, cupcake, chocolate, with or without icing, fruit filling or cream filling, lowfat, cholesterol free*

53114100 Cake, lemon, with icing*

53114250 Cake, lemon, lowfat, with icing*

53115200 Cake, marble, with icing*

53115320 Cake, nut, with icing*

53115410 Cake, oatmeal, with icing*

53115450 Cake, peanut butter, with icing*

53116020 Cake, pound, with icing*

53116490 Cake, pumpkin, NS as to icing*

53116510 Cake, pumpkin, with icing*

53116560 Cake, raisin-nut, with icing*

53117200 Cake, spice, with icing*

53118200 Cake, sponge, with icing*

53118310 Cake, sponge, chocolate, with icing*

53118350 Cake, sweetpotato, with icing*

53120350 Cake, white, pudding-type mix (oil, egg whites, and water added to dry mix), with icing*

53121330 Cake, yellow, pudding-type mix (oil, eggs, and water added to dry mix), with icing*

53124120 Cake, zucchini, with icing*

53204000 Cookie, brownie, NS as to icing*

53204100 Cookie, brownie, with icing*

53204600 Cookie, brownie, with peanut butter fudge icing*

53204800 Cookie, brownie, diet, NS as to icing*

53204830 Cookie, brownie, lowfat, with icing*

53244020 Cookie, butter or sugar, with icing or filling other than chocolate*

- 53520160 Doughnut, chocolate, cake type, with chocolate icing*
- 53521100 Doughnut, chocolate, raised or yeast, with chocolate icing*
- 91302010 Honey
- 91303000 Molasses
- 91305010 Icing, chocolate
- 91305020 Icing, white

Frozen dairy desserts (ice cream, soft serve, sorbet), low calorie, reduced calorie, sugar-free

- 13110320 Ice cream, no sugar added, flavors other than chocolate
- 13110330 Ice cream, no sugar added, chocolate
- 13130330 Light ice cream, no sugar added, flavors other than chocolate
- 13130340 Light ice cream, no sugar added, chocolate
- 13136000 Ice cream sandwich, made with light, no sugar added ice cream
- 13160150 Fat free ice cream, no sugar added, chocolate
- 13160160 Fat free ice cream, no sugar added, flavors other than chocolate
- 13161520 Milk dessert sandwich bar, frozen, with low-calorie sweetener, made from lowfat milk
- 13161600 Milk dessert bar, frozen, made from lowfat milk and low calorie sweetener
- 13161630 Light ice cream, bar or stick, with low-calorie sweetener, chocolate-coated (formerly ice milk)

Yogurt and frozen yogurt, low calorie, reduced calorie, sugar-free

- 11422100 Yogurt, vanilla, lemon, maple, or coffee flavor, lowfat milk, sweetened with low calorie sweetener
- 11424000 Yogurt, vanilla, lemon, maple, or coffee flavor, nonfat milk, sweetened with low calorie sweetener
- 11432500 Yogurt, fruit variety, lowfat milk, sweetened with low-calorie sweetener
- 11433500 Yogurt, fruit variety, nonfat milk, sweetened with low-calorie sweetener
- 11460400 Yogurt, frozen, chocolate, nonfat milk, with low-calorie sweetener
- 11460410 Yogurt, frozen, flavors other than chocolate, nonfat milk, with low-calorie sweetener

Dressings for salads

- 58148500 Pasta or macaroni salad with oil and vinegar-type dressing*
- 75141000 Cabbage salad or coleslaw, with dressing*
- 75141100 Cabbage salad or coleslaw with apples and/or raisins, with dressing*
- 75141200 Cabbage salad or coleslaw with pineapple, with dressing*
- 75142500 Cucumber salad with creamy dressing*
- 83100100 Salad dressing, NFS
- 83101000 Blue or roquefort cheese dressing
- 83101500 Bacon dressing (hot)
- 83102000 Caesar dressing
- 83103000 Coleslaw dressing
- 83103500 Feta Cheese Dressing
- 83104000 French dressing
- 83105000 Fruit dressing, made with fruit juice and cream
- 83105100 Fruit dressing, made with honey, oil, and water

- 83105500 Honey mustard dressing
 - 83106000 Italian dressing, made with vinegar and oil
 - 83109000 Russian dressing
 - 83110000 Mayonnaise-type salad dressing
 - 83110010 Mayonnaise-type salad dressing, cholesterol-free
 - 83112000 Green Goddess dressing
 - 83112500 Creamy dressing, made with sour cream and/or buttermilk and oil
 - 83112900 Milk, vinegar, and sugar dressing
 - 83112950 Poppy seed dressing
 - 83112960 Peppercorn Dressing
 - 83112980 Celery seed dressing
 - 83112990 Sesame dressing
 - 83113000 Sweet and sour dressing
 - 83114000 Thousand Island dressing
 - 83115000 Yogurt dressing
 - 83200100 Salad dressing, low-calorie, NFS
 - 83201000 Blue or roquefort cheese dressing, low-calorie
 - 83201050 Blue or roquefort cheese dressing, reduced calorie
 - 83201200 Blue or roquefort cheese dressing, reduced calorie, fat-free, cholesterol-free
 - 83202000 French dressing, low-calorie
 - 83202010 French dressing, reduced calorie, fat-free, cholesterol-free
 - 83202020 French dressing, reduced calorie
 - 83203000 Caesar dressing, low-calorie
 - 83204500 Honey mustard dressing, reduced calorie
 - 83205000 Italian dressing, low calorie
 - 83205450 Italian dressing, reduced calorie
 - 83205500 Italian dressing, reduced calorie, fat-free
 - 83206000 Russian dressing, low-calorie
 - 83207000 Thousand Island dressing, low-calorie
 - 83207100 Thousand Island dressing, reduced calorie, fat-free, cholesterol-free
 - 83208000 Vinegar, sugar, and water dressing
 - 83208500 Korean dressing or marinade
 - 83210000 Creamy dressing, made with sour cream and/or buttermilk and oil, diet, NS as to low or reduced calorie
 - 83210050 Creamy dressing made with sour cream and/or buttermilk and oil, low calorie
 - 83210100 Creamy dressing, made with sour cream and/or buttermilk and oil, reduced calorie
 - 83210200 Creamy dressing, made with sour cream and/or buttermilk and oil, reduced calorie, fat-free, cholesterol-free
 - 83210250 Creamy dressing, made with sour cream and/or buttermilk and oil, reduced calorie, cholesterol-free
- Gelatins, pudding & fillings, low calorie, reduced calorie, sugar-free**
- 13210250 Pudding, chocolate, ready-to-eat, low calorie, containing artificial sweetener, NS as to from dry mix or canned
 - 13210290 Pudding, flavors other than chocolate, ready-to-eat, low calorie, containing artificial

- sweetener, NS as to from dry mix or canned
- 13220210 Pudding, flavors other than chocolate, prepared from dry mix, low calorie, containing artificial sweetener, milk added
 - 13220220 Pudding, chocolate, prepared from dry mix, low calorie, containing artificial sweetener, milk added
 - 13230120 Pudding, canned, low calorie, containing artificial sweetener, flavors other than chocolate
 - 13230140 Pudding, canned, low calorie, containing artificial sweetener, chocolate
 - 13250200 Mousse, chocolate, lowfat, reduced calorie, prepared from dry mix, water added*
 - 91510100 Gelatin powder, dietetic, sweetened with low calorie sweetener, dry
 - 91511010 Gelatin dessert, dietetic, sweetened with low calorie sweetener
 - 91511020 Gelatin dessert, dietetic, with fruit, sweetened with low calorie sweetener*
 - 91511030 Gelatin dessert, dietetic, with whipped topping, sweetened with low calorie sweetener*
 - 91511090 Gelatin dessert, dietetic, with fruit and vegetable(s), sweetened with low calorie sweetener*
 - 91511100 Gelatin salad, dietetic, with vegetables, sweetened with low calorie sweetener*
 - 91511110 Gelatin dessert, dietetic, with fruit and whipped topping, sweetened with low calorie sweetener*

Hard Candy, low calorie, reduced calorie, sugar-free

- 91770020 Dietetic or low calorie hard candy

Soft Candy, low calorie, reduced calorie, sugar-free

- 91770000 Dietetic or low calorie candy, NFS
- 91770030 Dietetic or low calorie candy, chocolate covered
- 91770050 Dietetic or low calorie mints

Jams & Jellies

- 42203000 Peanut butter and jelly*
- 42302010 Peanut butter and jelly sandwich*
- 53113000 Cake, jelly roll*
- 53521140 Doughnut, jelly*
- 91401000 Jelly, all flavors
- 91402000 Jam, preserves, all flavors
- 91403000 Fruit butter, all flavors
- 91404000 Marmalade, all flavors
- 91405000 Jelly, dietetic, all flavors, sweetened with artificial sweetener
- 91405500 Jelly, reduced sugar, all flavors
- 91406000 Jams, preserves, marmalades, dietetic, all flavors, sweetened with artificial sweetener
- 91406500 Jams, preserves, marmalades, sweetened with fruit juice concentrates, all flavors
- 91406600 Jams, preserves, marmalades, low sugar (all flavors)
- 91407100 Guava paste
- 91407150 Bean paste, sweetened

Sugar

- 11541110 Milk shake, homemade or fountain-type, chocolate*
- 11541120 Milk shake, homemade or fountain-type, flavors other than chocolate*

- 11541510 Milk shake, made with skim milk, flavors other than chocolate*
- 11561010 Cafe con leche prepared with sugar*
- 13210500 Pudding, tapioca, made from home recipe, made with milk*
- 13250200 Mousse, chocolate, lowfat, reduced calorie, prepared from dry mix, water added*
- 28340590 Chicken corn soup with noodles, home recipe*
- 28340660 Chicken or turkey vegetable soup, home recipe*
- 28500070 Gravy, beef or meat, home recipe*
- 28500080 Gravy, poultry, home recipe*
- 51000180 Bread, made from home recipe or purchased at a bakery, NS as to major flour*
- 51000190 Bread, made from home recipe or purchased at a bakery, toasted, NS as to major flour*
- 51000250 Roll, made from home recipe or purchased at a bakery, NS as to major flour*
- 51101050 Bread, white, made from home recipe or purchased at a bakery*
- 51101060 Bread, white, made from home recipe or purchased at a bakery, toasted*
- 51165060 Coffee cake, yeast type, made from home recipe or purchased at a bakery*
- 51201060 Bread, whole wheat, 100%, made from home recipe or purchased at bakery*
- 51300140 Bread, whole wheat, NS as to 100%, made from home recipe or purchased at bakery*
- 51300150 Bread, whole wheat, NS as to 100%, made from home recipe or purchased at bakery, toasted*
- 51301040 Bread, wheat or cracked wheat, made from home recipe or purchased at bakery*
- 51301050 Bread, wheat or cracked wheat, made from home recipe or purchased at bakery, toasted*
- 51301540 Bread, French or Vienna, whole wheat, NS as to 100%, made from home recipe or purchased at bakery*
- 51301550 Bread, French or Vienna, whole wheat, NS as to 100%, made from home recipe or purchased at bakery, toasted*
- 51320040 Roll, wheat or cracked wheat, made from home recipe or purchased at bakery*
- 52101000 Biscuit, baking powder or buttermilk type, NS as to made from mix, refrigerated dough, or home recipe*
- 52202060 Cornbread, made from home recipe*
- 52206060 Cornbread muffin, stick, round, made from home recipe*
- 53105050 Cake, chocolate, devil's food, or fudge, made from home recipe or purchased ready-to-eat, NS as to icing*
- 53105160 Cake, chocolate, devil's food, or fudge, without icing or filling, made from home recipe or purchased ready-to-eat*
- 53105200 Cake, chocolate, devil's food, or fudge, standard-type mix (eggs and water added to dry mix), with icing, coating, or filling*
- 53105260 Cake, chocolate, devil's food, or fudge, with icing, coating, or filling, made from home recipe or purchased ready-to-eat*
- 53120060 Cake, white, made from home recipe or purchased ready-to-eat, NS as to icing*
- 53120160 Cake, white, without icing, made from home recipe or purchased ready-to-eat*
- 53120200 Cake, white, standard-type mix (egg whites and water added to mix), with icing*
- 53120260 Cake, white, with icing, made from home recipe or purchased ready-to-eat*
- 53121060 Cake, yellow, made from home recipe or purchased ready-to-eat, NS as to icing*
- 53121160 Cake, yellow, without icing, made from home recipe or purchased ready-to-eat*

53121200	Cake, yellow, standard-type mix (eggs and water added to dry mix), with icing*
53121260	Cake, yellow, with icing, made from home recipe or purchased ready-to-eat*
53206020	Cookie, chocolate chip, made from home recipe or purchased at a bakery*
62116230	Peach, dried, cooked, with sugar*
62122230	Prune, dried, cooked, with sugar*
63101330	Apple, baked, with sugar*
63135630	Peach, frozen, with sugar*
63147620	Rhubarb, frozen, with sugar*
63223030	Strawberries, raw, with sugar*
63223620	Strawberries, frozen, with sugar*
73303000	Squash, winter type, baked, NS as to fat or sugar added in cooking*
73303040	Squash, winter type, baked, no fat added in cooking, sugar added in cooking*
91101000	Sugar, NFS
91101010	Sugar, white, granulated or lump
91101020	Sugar, white, confectioner's, powdered
91102010	Sugar, brown
91104100	Sugar, cinnamon
91104200	Sugar, raw
92101600	Coffee, Turkish*
92101800	Coffee, Cuban*
92101920	Frappuccino, regular*
92101930	Frappuccino, decaffeinated*
92302200	Tea, leaf, presweetened with sugar*
92302400	Tea, leaf, presweetened, NS as to sweetener*
92302600	Tea, leaf, decaffeinated, presweetened with sugar*
92302800	Tea, leaf, decaffeinated, presweetened, NS as to sweetener*

Sugar substitutes

91107000	Sucralose-based sweetener, sugar substitute
91108000	Sugar substitute, herbal extract sweetener, powder
91108010	Sugar substitute, herbal extract sweetener, liquid
91200000	Sugar substitute, low-calorie, powdered, NFS
91200020	Sugar replacement, saccharin-based, dry powder
91200040	Sugar substitute, saccharin-based, dry powder and tablets
91200110	Sugar substitute, saccharin-based, liquid
91201010	Sugar substitute, aspartame-based, dry powder
92302300	Tea, leaf, presweetened with low calorie sweetener*
92302700	Tea, leaf, decaffeinated, presweetened with low calorie sweetener*

Sweet sauces & syrups, low calorie, reduced calorie, sugar-free

91301081	Chocolate syrup, thin type, light
91301510	Syrup, pancake, reduced calorie
91351010	Syrup, dietetic
91351020	Topping, dietetic

* Only food category component of food was applied in analysis

SUBMISSION END