

DATABASE VALIDATION PROCEDURES

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The NCC nutrient database was established in 1974 to provide nutrient analysis support for two multicentered cardiovascular studies, the Multiple Risk Factor Intervention Trial (MRFIT) and the Lipid Research Clinics (LRC) programs. The database has been expanded over the past twelve years to meet the needs of other clinical trials and medical research studies involving cancer, diabetes and other diseases in addition to heart disease and hypertension. The current NCC database includes 71 nutrient values for approximately 1600 entries.

The nutrient database must be continually updated to reflect new or better analytic data, new products on the market, new formulations of existing products, and addition of new nutrients. The following procedures and guidelines are currently used by the NCC nutrition staff to ensure the integrity of the database and the calculation software.

EVALUATION OF NEW DATA

Nutrient and non-nutrient data are collected from various sources including government publications and computer tapes, the scientific literature, other published food tables, food manufacturers, and unpublished laboratory analyses. All data are evaluated by NCC nutritionists based on factors such as the data source, sample size and preparation, analytical method and use of reference standards. New USDA data sources are generally given the highest priority in selecting values for the nutrient database.

COMPUTERIZATION OF DATABASE MAINTENANCE PROCEDURES

Considerable effort has been made by the NCC staff to computerize as much of the database maintenance procedures as possible to eliminate the potential sources for error involved in manual procedures. Software has been developed to provide nutritionists with on-line access to all data in the database. Examples of on-line screen presentations of data are shown in figures 1 and 2.

Each update to the database is made to a temporary file. A printed report of the update is reviewed by a second nutritionist prior to posting the new value to the database. Following the update, a computer generated report showing old and new data is produced for the paper file for that entry. For each new entry, a profile of all the data for the entry is produced for the paper file. An example of a complete profile for whipping cream is shown in Figure 3.

Another software enhancement that has improved the accuracy and efficiency of maintaining the NCC database is the development of a system for computerized updating of the database directly from USDA computer tapes. The NCC database reference system provides a link between NCC and USDA entries for each NCC entry that is associated with a USDA entry. Before a

computerized update is implemented, a report comparing NCC and USDA values is produced and reviewed by a nutritionist. Any large differences are investigated and verified with USDA nutritionists if necessary. While there is not always a one-to-one correspondence between NCC and USDA entries, the majority of the non-recipe NCC entries are based on USDA entries.

These software enhancements have eliminated the need for manually transcribing data onto update forms, submitting the forms to data entry operators for keying, and waiting for computer generated reports for cross-checking the new values. In addition to the considerable savings in personnel effort, the potential for error has been substantially reduced.

GUIDELINES FOR MAKING NUTRIENT MODIFICATIONS

Nutrient change limits have been established for each nutrient to guide database nutritionists in determining when the difference between a new and an existing value is sufficient to warrant a modification to the database. These guidelines are based on considerations of nutrient variability and dietary allowances. With the exception of the computerized updates from USDA data tapes mentioned above, modification procedures are generally implemented only when differences exceed the nutrient limit guidelines. This system eliminates the effort and potential for error involved in making changes to the database that are insignificant considering the nutrient variability within foods.

NUTRIENT LIMIT EDITS

Maximum nutrient limits have been established by food groups for each nutrient in the NCC database. These limits are based on review of the 20 foods highest in concentration of a particular nutrient for each food group. When new or updated nutrient values are entered into the computer, the values are compared with the established limits. Values which exceed the limits are flagged and must be verified by a nutritionist. Examples of nutrient limits for selected nutrients are listed in table 1.

DATABASE INTEGRITY CHECKS

Updates to the NCC nutrient database are made on a daily basis with an average of over 500 nutrient changes per month. A new version of the database is released every 6 to 12 months depending on the level of database activity and specific study needs. Prior to the release of an updated version, a number of computer generated integrity reports are produced for review by the database nutrition staff. These reports serve as a further check on the accuracy and internal consistency of the database.

The database integrity checks involve both calculated and non-calculated reports. Calculated integrity reports are used to compare calculations of various algorithms with known values. For example, the sum of the weight of the macronutrients plus ash and water is compared with 100 grams for each entry, or the sum of the caloric contributions of the macronutrients (including alcohol) is compared with the value for total calories. For each calculated report, the values of the individual parameters of the equation, the calculated value, the database value used for comparison, and the percent difference between the calculated and the database or expected value

are listed in separate columns as shown in figure 4. An allowable limit for percent differences between the calculated and the expected values has been established for each calculated report. Any differences exceeding the established limits are flagged by asterisks on the report. All asterisked differences are investigated by a nutritionist to verify the sources of the database values and to make corrections if necessary. A listing of the various calculated integrity reports used by the NCC is presented in table 2.

Non-calculated integrity reports are listings of database entries grouped by NCC food groups. Nutrient or non-nutrient values are listed for each food in the food group, allowing the nutritionists to scan the listed parameters for any values that appear excessively high or low within a food group. Any outlying values must be either verified or corrected. Listings of the parameters for each non-calculated integrity report are presented in table 3.

COMPARISON OF REPEATED NUTRIENT CALCULATIONS OF TEST RECORDS

A test set of dietary intake records has been selected for repeated nutrient calculation on each version of the database. The records were carefully selected to ensure that a wide range of food items are represented and that all the software calculation procedures are invoked. After all integrity reports have been verified, the set of test records is processed, and the nutrient calculations are compared with the calculations from the previous version of the database. All differences must be verified as due to modifications made to the database since the previous version was released.

LIMITING THE NUMBER OF ELEMENTAL ENTRIES AND MINIMIZING DATABASE REDUNDANCY

Timely updating of the nutrient database and incorporation of the various quality control procedures outlined above can be accomplished only by making a concerted effort to limit the number of entries in the database that require routine updating. New items are added to the NCC database as recipe entries rather than as elemental entries whenever sufficient ingredient information is available or can be imputed. This procedure reduces the effort required for routine maintenance of the database since only the elemental entries must be maintained. Nutrient values for recipe entries are automatically recalculated when the elemental ingredients are updated. Approximately one-third of the current NCC database consists of recipe entries.

NCC procedures for minimizing database redundancy while maintaining maximum specificity for describing food intakes include the use of several hundred coding rules, brand name and food characteristic coding guides which specify the coding for over 4,000 commercial products and food types, computerized food preparation rules which permit the designation of any brand name or type of fat used in food preparation, and recipe modification procedures which permit detailed specification of fat and sodium containing ingredients. A system of multiple densities helps to limit the number of elemental entries by allowing a single entry to represent different forms of the same food. These features of the NCC system facilitate the coding for many thousands of home prepared and commercial products while maintaining a compact and complete database.

Table 1. Nutrient Edit Limits by Food Group
for Selected Nutrients*

<u>Nutrient</u>	<u>Food Group</u>	<u>Limit Value (per 100 g)</u>	
Calories	Fats, oils, shortening	900 Kcal	
	Margarine, nuts, salad dressing	750 Kcal	
	Candy, cookies, desserts, sugar snacks, spices	600 Kcal	
	Fruit (except dried), vegetables, soup	150 Kcal	
	All other food groups	500 Kcal	
Protein	Meat, fish, poultry, cheese, spices	40 g	
	Nuts, cereal	30 g	
	Candy	20 g	
	Eggs and substitutes	17 g	
	Bread, crackers	15 g	
	Legumes	10 g	
	Vegetables, dairy products, soup	8 g	
	All other food groups	5 g	
Fat	Fats, oils, shortening	100 g	
	Margarine, salad dressing	81 g	
	Nuts	75 g	
	Candy, snacks	50 g	
	Meat, poultry, fish, meat substitutes, cream cheese, ice cream, eggs	40 g	
	Baked goods	30 g	
	Spices	20 g	
	All other food groups	10 g	
	Calcium	Spices	2000 mg
		Cheese	1000 mg
Other dairy products, soup, sauces, candy		300 mg	
Nuts, vegetables, bread, cereal, crackers		200 mg	
Cold cuts, fish, shellfish		120 mg	
All other food groups		100 mg	
Vitamin C	Spices	200 mg	
	Vegetables	175 mg	
	Fortified beverages	140 mg	
	Fruit, other beverages	100 mg	
	Cereal, soup, sauces	60 mg	
	Meat	30 mg	
	Chips	16 mg	
	All other food groups	3 mg	

*Edit limits were established based on review of the 20 foods highest in concentration of a particular nutrient for each food group.

Table 2. Calculated integrity reports: allowable differences between calculated sum of nutrient components and actual or expected value.

Calculation Equation	Food Table Value or Expected Value	Allowable Difference
protein + total carbohydrate + total fat + alcohol + ash + water	100 gm	5%
4(protein) + 4(total carbohydrate - dietary fiber) + 9(total fat) + 7(alcohol)	total calories	12%
starch + sugars + total dietary fiber	total carbohydrate	10%
insoluble fiber + soluble fiber	total dietary fiber	10%
sum of amino acids	total protein	20%
total saturated fatty acids + total monounsaturated fatty acids + total polyunsaturated fatty acids	total fat	10%
sum of saturated fatty acids	total saturated fatty acids	10%
sum of monounsaturated fatty acids	total monounsaturated fatty acids	10%
sum of polyunsaturated fatty acids	total polyunsaturated fatty acids	10%
3.33 (retinol) + 1.67 (B-carotene)	total vitamin A	1%
alpha tocopherol + 0.4 (beta tocopherol) + 0.1 (gamma tocopherol) + 0.01 (delta tocopherol)	total alpha tocopherol equivalents	.01%

Table 3. Parameter listings for each non-calculated integrity report.

Report No.	Parameters
1	NCC reference food unit, food specific units (if applicable); weight and description for each unit; maximum serving size for the reference unit; density
2	Thiamin, riboflavin, niacin, vitamin C
3	B ₆ , B ₁₂ , folate, pantothenic acid
4	Calcium, iron, phosphorous, magnesium, vitamin D
5	Potassium, sodium, caffeine
6	Zinc, copper, selenium, chromium, manganese
7	Total fat, cholesterol, vitamin A, total alpha tocopherol equivalents (listed in order of fat content)
8	Fat code word assignment

Food Specification Screen
Code: 25015

Name: EGG, WHOLE

Type	1	Food Groups:	Flags:	Fl. Oz.
Status	2	MRFIT	002500	CB Print
Ref Code	B01129	NCC	001504	
Prep Code	4	LRC	281000	CB Cross-references:
Fat Code		MLRC	281000	Group Name
Dates: Added	02/01/75	MSHT	000501	1:
Deact				2:

Units and Densities
Code: 25015

Name: EGG, WHOLE

Food Unit	Common?	Weight	Unit	Units:		Description
				Max Intake	--- ALIAS --- Amount Unit	
1) SH		37.00	GM			1 SMALL
2) MD		44.00	GM			1 MEDIUM
3) LG	*	50.00	GM	4.00		1 LARGE
4) XL		57.00	GM			1 EXTRA LARGE
5) JH		64.00	GM			1 JUMBO

Densities:							
	Type	Default?	Weight	Unit	Volume	Unit	Ref
1)	CHOPPED	*	136.00	GM	1.0000	CP	02
2)	SOLID		243.00	GM	1.0000	CP	81

Comments
Code: 25015

Name: EGG, WHOLE

- 1) S DENSITY BASED ON RAW, AHO1123
- 2) (243 GM/CP RAW EGG).
- 3) 44-SE: J.FD.SCI.49:446, 1984; ASSUME
- 4) LITTLE LOSS IN COOKING PER J.AG.FD.
- 5) CHEM. 20:678, 1972

Figure 1. Examples of on-line screen presentations of non-nutrient data for whole eggs.

Nutrients per 100 gm
 Code: 25015
 Name: EGG, WHOLE

Code	Ref	Value	Unit	Code	Ref	Value	Unit	Code	Ref	Value	Unit
W	02	74.80	gm	VD	17	1.25	mcg	XYLO			gm
KCAL	02	158.00	kcal	SFA	02	3.35	gm	ARAB			gm
PRO	02	12.10	gm	04:0	85	0.00	gm	RIBO			gm
FAT	02	11.15	gm	06:0	85	0.00	gm	RABI			gm
TCHO	02	1.20	gm	08:0	85	0.00	gm	RAFF			gm
CFIB	02	0.00	gm	10:0	85	0.00	gm	STAC			gm
ASH	02	0.90	gm	12:0	85	0.00	gm	DFIB	85	0.00	gm
ALC	85	0.00	gm	14:0	02	0.03	gm	ADP	85	0.00	gm
CAF	85	0.00	mg	16:0	02	2.46	gm	IFIB	85	0.00	gm
CHOL	02	548.00	mg	17:0	85	0.00	gm	CELL	85	0.00	gm
CA	02	56.00	mg	18:0	02	0.86	gm	HENI	85	0.00	gm
PE	02	2.10	mg	20:0	85	0.00	gm	LIGN	85	0.00	gm
MG	02	12.29	mg	22:0	85	0.00	gm	WSDP	85	0.00	gm
P	02	180.00	mg	HPFA	02	4.46	gm	PECT	85	0.00	gm
K	02	130.00	mg	14:1	85	0.00	gm	GUNS	85	0.00	gm
NA	02	138.00	mg	16:1	02	0.37	gm	STAR	85	0.00	gm
ZN	02	1.44	mg	18:1	02	4.08	gm	ASPT			gm
CU	18	0.06	mg	20:1	85	0.00	gm	TRYP	02	0.19	gm
CR		0.50	mg	22:1	85	0.00	gm	THRE	02	0.60	gm
SE	44	45.00	mg	PFA	02	1.45	gm	ISOL	02	0.76	gm
HN	18	0.04	mg	18:2	02	1.24	gm	LEUC	02	1.07	gm
VC	02	0.00	mg	18:3	02	0.03	gm	LYSI	02	0.82	gm
THI	02	0.07	mg	18:4	85	0.00	gm	HETH	02	0.39	gm
RIB	02	0.29	mg	20:4	02	0.09	gm	CYST	02	0.29	gm
NIA	02	0.06	mg	20:5	85	0.00	gm	PHEN	02	0.69	gm
PANT	02	1.73	mg	22:5	85	0.00	gm	TYRO	02	0.51	gm
VB6	02	0.11	mg	22:6	85	0.00	gm	VALI	02	0.87	gm
FOL	02	49.00	mcg	GLUC			gm	ARGI	02	0.78	gm
VB12	02	1.32	mcg	PRUC			gm	HIST	02	0.29	gm
BC	84	94.00	mcg	GALA			gm	ALAN	02	0.71	gm
BL	84	109.00	mcg	SUCR	85	0.00	gm	ASPA	02	1.20	gm
VA	02	520.00	IU	LACT			gm	GLUT	02	1.55	gm
ATC	41	0.70	mg	HALT			gm	GLYC	02	0.40	gm
BTC	41	0.35	mg	SORB			gm	PROL	02	0.48	gm
DTC	41	0.01	mg	HANI			gm	SERI	02	0.92	gm
TTC	84	0.74	mg	XYLI			gm				
				INOS			gm				

Figure 2. Example of on-line screen presentation of nutrient data for whole egg.

Nutrition Coordinating Center (NCC)
University of Minnesota - Minneapolis, Minnesota
Reference Food Table Status as of 06/27/86

Code: 38240 CREAM, HEAVY, WHIPPING, 37% FAT

Type: 1 Status: 2 Ref Code: B01053 Prep Code: 0 Fat Code: Pl. Oz. Plaq: Y CB Print Plaq: .

----- DENSITIES -----						----- UNITS -----					
Type	Weight	Unit /	Volume	Unit	Ref	Type	Food Unit	Weight	Unit	Max Intake	Description
SOLID	238.00	GM	1.0000	CP	02	Reference	CP	238.00	GM	1:00

-- Food Groups -- Codebook Cross-References

MRFIT	Group	Name
NCC	000508	1:
NLRC	203000	2:
HSHT	000901		

- Comment.:
- 1) 02-USDA AN8-1, #01053
 - 2) 69-CU, CR, SE, NN: FINNISH FOOD TABLE
 - 3) #6.06
 - 4) 41-TOC: JADA 75:647, 1979: SWEET CREAM
 - 5) 17-VIT. D: F&N ENCYC., #2043

--- Nutrients ---

Nutrient	Ref	Value	Nutrient	Ref	Value	Nutrient	Ref	Value	Nutrient	Ref	Value
Water	2	57.71	Vitamin B12	2	0.18	Total PFA	2	1.37	Cellulose	85	0.00
Calories	2	385.00	Beta-carotene	84	370.00	18:2	2	0.88	Hemicellulose	85	0.00
Protein	2	2.05	Retinol	84	256.00	18:3	2	0.54	Lignin	85	0.00
Total Fats	2	37.00	Total Vitamin A	2	1470.00	18:4	85	0.00	Wat-sol Diet Fiber	85	0.00
Total CHO	2	2.79	Alpha-tocopherol	84	0.63	20:4	85	0.00	Pectins	85	0.00
Crude Fiber	2	0.00	Beta-tocopherol	85	0.00	20:5	85	0.00	Gums	85	0.00
Ash	2	0.45	Gamma-tocopherol	85	0.00	22:5	85	0.00	Starch	85	0.00
Alcohol	2	0.00	Delta-tocopherol	85	0.00	22:6	85	0.00	Aspartame	85	0.00
Caffeine	85	0.00	Total Alpha-toc eq	41	0.63	Glucose	85	0.00	Tryptophan	2	0.03
Cholesterol	85	137.00	Vitamin D	17	2.50	Fructose	85	0.00	Threonine	2	0.09
Calcium	2	65.00	Total SFA	2	23.03	Galactose	85	0.00	Isoleucine	2	0.12
Iron	2	0.03	4:0	2	1.20	Sucrose	85	0.00	Leucine	2	0.20
Magnesium	2	7.00	6:0	2	0.71	Lactose	84	2.79	Lysine	2	0.16
Phosphorous	2	62.00	8:0	2	0.41	Sorbitol	85	0.00	Methionine	2	0.03
Potassium	2	75.00	10:0	2	0.93	Manitol	85	0.00	Cystine	2	0.02
Sodium	2	38.00	12:0	2	1.04	Xylitol	85	0.00	Phenylalanine	2	0.10
Zinc	2	0.23	14:0	2	3.72	Inositol	85	0.00	Tyrosine	2	0.10
Copper	85	0.01	16:0	2	2.73	Lyxose	85	0.00	Valine	2	0.14
Chromium	85	4.00	17:0	85	0.00	Arabinose	85	0.00	Arginine	2	0.07
Selenium	85	0.20	18:0	2	4.48	Ribose	85	0.00	Histidine	2	0.06
Manganese	85	0.00	20:0	85	0.00	Rabinose	85	0.00	Alanine	2	0.07
Vitamin C	2	0.58	22:0	85	0.00	Raffinose	85	0.00	Aspartic Acid	2	0.16
Thiamin	2	0.02	Total MFA	2	10.69	Stachyose	85	0.00	Glutamic Acid	2	0.43
Riboflavin	2	0.11	14:1	85	0.00	Dietary Fiber	85	0.00	Glycine	2	0.08
Niacin	2	0.04	16:1	2	0.83	Acid Detergent	85	0.00	Proline	2	0.20
Pant. Acid	2	0.26	18:1	2	9.31	Insol Diet Fiber	85	0.00	Serine	2	0.11
Vitamin B6	2	0.03	20:1	85	0.00						
Folacin	2	4.00	22:1	85	0.00						

Figure 3. Data profile for whipping cream.

Nutrition Coordinating Center (NCC)
University of Minnesota - Minneapolis, Minnesota
Food Table Integrity Queries
Version 13.0

Food Code	Name	PRO	TCHO	DFIB	PAT	ALC	Calculated Calories	Actual KCAL	Pct Diff	Exceeds Limit
54247	FIGURINES	20.80	39.60	0.00	30.19	0.00	513.31	517.00	0.71	
54361	ROLL, WHITE, PAN OR DINNER TYPE	8.20	53.00	2.80	5.60	0.00	284.00	298.00	4.70	
54403	ROLL, RICH, CRESCENT, REFRIGERATED DO	6.00	40.00	2.80	19.70	0.00	350.10	360.00	2.75	
55266	COOKIES, HIGH FAT, (HIGH SODIUM)	7.20	65.10	0.73	23.10	0.00	494.18	498.00	0.77	
55574	COOKIES, MEDIUM FAT, (HIGH SODIUM)	5.40	74.40	0.23	16.10	0.00	463.18	462.00	-0.26	
55582	COOKIES, HIGH FAT, LOW SODIUM,	7.20	65.10	0.73	23.10	0.00	494.18	498.00	0.77	
55590	COOKIES, MEDIUM FAT, LOW SODIUM,	5.40	74.40	0.23	16.10	0.00	463.18	462.00	-0.26	
55608	COOKIES, HIGH FAT, MEDIUM SODIUM,	7.20	65.10	0.73	23.10	0.00	494.18	498.00	0.77	
55616	COOKIES, MEDIUM FAT, MEDIUM SODIUM,	5.40	74.40	0.23	16.10	0.00	463.18	462.00	-0.26	
56416	HOSTESS SNOBALL,	3.30	64.00	1.00	12.00	0.00	373.20	380.00	1.79	
56440	HOSTESS KING DONG OR	3.40	57.00	0.88	27.00	0.00	481.08	490.00	1.82	
56457	HOSTESS HO HO	3.60	61.00	0.95	24.00	0.00	470.60	470.00	-0.13	
56465	HOSTESS TWINKIE,	4.00	60.00	0.40	8.95	0.00	334.95	340.00	1.49	
56473	HOSTESS CUPCAKE,	3.40	61.00	0.95	13.00	0.00	370.80	380.00	2.42	
7612	PIE TART, COMMERCIAL, FRUIT FILLED	2.70	38.00	1.94	18.00	0.00	317.04	320.00	0.92	
58024	CONE, ICE CREAM,	10.00	77.90	0.80	2.40	0.00	370.00	377.00	1.86	
58115	TASTY KAKE, COCONUT CREME PIE	6.40	39.10	1.15	27.50	0.00	424.90	467.00	9.01	
58248	PUDDING, CHOCOLATE, CANNED, COMMERCIA	2.70	22.00	1.03	5.29	0.00	142.29	150.00	5.14	
58362	TASTY KAKE, FRUIT FILLING PIE	3.40	46.10	1.94	12.57	0.00	303.37	320.00	5.20	
58396	TASTY KAKE, BUTTERSCOTCH KRIMPET	5.00	76.90	0.57	12.16	0.00	434.76	417.00	-4.26	
58404	TASTY KAKE, JELLY KRIMPET	3.80	70.80	0.40	7.42	0.00	363.58	367.00	0.93	
58412	TASTY KAKE, CHOCOLATE JUNIOR	4.90	68.40	1.06	15.62	0.00	424.54	393.00	-9.30	
58495	PUDDING, ALL FLAVORS EXCEPT CHOCOLATE	1.80	21.20	0.17	5.29	0.00	138.93	132.00	-5.25	
59014	CANDY BAR, CHOCOLATE COVERED COCONUT;	2.80	72.00	5.14	17.60	0.00	437.04	438.00	0.22	
59022	CANDY BAR, CHOCOLATE COVERED NOUGAT &	4.00	72.80	1.51	13.90	0.00	426.26	416.00	-2.47	
59030	CANDY BAR, MILK CHOCOLATE W PEANUTS;	14.10	44.60	5.48	38.10	0.00	555.78	543.00	-2.35	
59063	CANDY BAR, MILK CHOCOLATE W/C NUTS;	7.70	56.90	3.60	32.30	0.00	538.70	520.00	-2.83	
59071	CHOCOLATE, BITTER-BARKING	10.70	28.90	6.60	53.00	0.00	609.00	505.00	-20.59	*
59089	CANDY BAR, CHOCOLATE,	4.40	57.90	11.45	35.10	0.00	519.30	528.00	1.65	
59097	COCOA POWDER, UNSWT	16.80	48.30	34.00	23.70	0.00	337.70	299.00	-12.94	*
59113	MALTED MILK POWDER, DRY, PLAIN OR CHO	11.02	76.31	8.09	7.53	0.00	384.73	408.00	5.70	
59121	SAUCE, CHOCOLATE,	5.10	54.00	3.91	13.70	0.00	344.06	330.00	-4.26	
59139	SAUCE, CHOCOLATE, SYRUP TYPE,	2.30	62.70	2.72	2.00	0.00	267.12	278.00	3.91	
59154	CANDY, CHOCOLATE COVERED CHERRY,	3.80	70.30	2.14	17.10	0.00	441.74	435.00	-1.55	
59188	CANDY BAR, CHOCOLATE COVERED CARAMEL	7.70	64.10	3.22	18.10	0.00	437.22	433.00	-0.97	
59196	COCOA POWDER, PRESWT,	6.09	88.42	8.09	2.91	0.00	371.87	378.00	1.62	
59204	CANDY, CHOCOLATE COVERED ALMONDS,	12.30	39.60	9.56	43.70	0.00	562.66	569.00	1.11	
59212	CANDY BAR, MILK CHOCOLATE W ALMONDS;	9.30	51.30	4.94	35.60	0.00	543.04	532.00	-2.08	
59220	CANDY, CHOCOLATE COVERED PEANUTS;	16.40	39.10	6.66	41.30	0.00	567.06	561.00	-1.08	
59238	CANDY, CHOCOLATE COVERED RAISINS,	5.40	70.50	5.10	17.10	0.00	437.10	425.00	-2.85	
59246	CANDY, CHOCOLATE ROLL	2.20	82.70	1.63	8.20	0.00	406.88	396.00	-2.75	
59253	CANDY BAR, CHOCOLATE COVERED NOUGAT,	10.50	61.00	3.22	23.40	0.00	483.72	497.00	2.67	
59261	CANDY BAR, CHOCOLATE COVERED PEANUT	13.20	53.10	4.84	28.40	0.00	501.44	520.00	3.57	
59279	CANDY, TCFEE	4.80	74.90	0.00	10.00	0.00	408.80	397.00	-2.97	
59287	CANDY, CHOCOLATE COVERED MARSHMALLOW	3.20	69.20	1.97	17.55	0.00	439.67	424.00	-3.70	
59295	CANDY, MALTED MILK BALLS	8.10	63.70	2.77	25.00	0.00	501.12	483.00	-3.75	
59303	CANDY, CHOCOLATE COVERED CREAMS	3.80	70.30	1.80	17.10	0.00	443.10	435.00	-1.86	
59311	CANDY, CHOCOLATE COVERED PEPPERMINTS	3.80	70.30	1.80	17.10	0.00	443.10	435.00	-1.86	
59345	CANDY, HALVAH, 1.406 CU IN	10.58	45.86	9.48	35.27	0.00	505.27	529.10	4.50	
59360	CANDY BAR, CHOCOLATE COVERED RICE	8.20	53.60	3.37	29.58	0.00	499.94	513.00	2.55	
59378	CANDY BAR, CHOCOLATE COVERED, TYPE	7.70	64.10	3.22	18.10	0.00	437.22	433.00	-0.97	

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Figure 4. Example of one page of the calculated integrity report for calories. Differences exceeding the established limit are flagged in the final column.