

Healthy Diet Tool by Geoff Edwards MPhil

Introduction

Some time ago 2007/2008 I became aware that I should improve my keep fit activities. I was ice skating once a week, cycling a few times a week and swimming once or twice a week. I added upper body exercises carried out every other day: press-ups, bicep lifts and flexibility movements. I noted that I did not lose weight. Some of the weight gain would be due to added muscle but I had extra fat mainly around my waist I was surprised and mentioned this to my daughter who suggested that I needed to eat less, or increase my physical activities.

Eating less I lost weight but I was concerned that I might not be eating a balanced diet. Initially, I had paper notes and downloaded information from the Internet but then I decided to use Microsoft's Excel spreadsheet program. Since then I have been developing a workbook consisting of twenty spreadsheets. It is now quite usable but I still need to lose weight!

Data

Early spreadsheet entries had data taken from Internet searches and food suppliers packaging. I found that there were issues with getting accurate data. I needed a more reliable source of the food's nutrients. I found The United States Department of Agriculture Research Service Food Composition Databases. The databases are very large containing thousands of entries. [USDA Food Lists](#)

The Weekly Healthy Diet workbook

The Healthy Diet Tool works by allowing the user to enter the food and drink they consume item by item. The user can enter data whenever it is convenient. Food is arranged in a list alphabetically with beverages underneath. Colour is used in an intuitive way, for example bakery item cells are coloured beige and vegetable items green. See illustration Fig. 1 Food List below:

Net Diary Calories Geoff Edwards amended 8th June 2018 version 24 NB only enter or alt							
requirement male moderately active Ref 1 set to M254.							
protein	kcal	Unit 100g or as stated	portion	Sun 3/6/18	portion	Mon 4/6/18	port
2.0	53	apple medium 76mm 3inch					
3.1	250	apple crumble					
3.4	241	apricots (dried)					
2.0	27	asparagus 1 spear					
28.9	210	anchovy					
1.0	15	aubergine					
2.0	160	avocado pear flesh			1.56	249.60	
33.9	468	bacon rasher			0.90	421.20	
1.1	89	banana	2.00	178	1.30	115.70	
2.4	30	bean sprouts mung etc					
1.9	35	Bean: runner (snap) & French cup					
5.0	89	beans: mixed					
25.7	260	beef /pork					
25.7	282	beef burger 100%					
1.6	43	beetroot (Beta vulgaris) raw					
1.4	43	blackberry blueberries					
10.0	263	bread+ spread					
10.0	279	bread + jam/honey					
4.0	280	Bakery cake biscuits (xmas pud 335)					
2.8	35	broccoli					
2.6	36	Brussel sprouts					
1.6	717	butter					
0.9	362	butter spreadable (oil content 43%)					
1.3	23	cabbage					
1.8	23	cauliflower					
0.8	35	carrot			1.60	56.00	
0.7	16	celery					
19.8	300	cheese Camembert					
22.9	404	cheese Cheddar					

The workbook has been developing over the years to include at present twenty spreadsheets. These spreadsheets consist of nutrient data eg. Potassium, Fibre, water. There is a main spreadsheet which is the fundamental sheet on which the other spreadsheets are used as suppliers of nutrient data. At the time of writing June 2018, there are 141 food and drink entries on the main spreadsheet: Weekly Diet. In use only the Weekly Diet spreadsheet needs to be used. However, any listed food may be checked for its nutrient content by referring to the appropriate spreadsheet or the USDA Ndb numbers. (Nutrient Database numbers) to supply further details. Each food entry includes a USDA Ndb number listed under column T. Ndb entries include 33 or 133 nutrients (full report) whereas the Healthy Diet Tool contains 18. The 18 nutrients are restricted to what can be considered as essential.

Arrangement of Data

Spreadsheet columns reference mainly days of the week. Rows contain food items Fig. 1. down to the Nutrient Section Fig. 2 which displays twenty categories. Below that is the Report Section Fig. 3. where total calories of foodstuff consumed is displayed together with variation in weight in both Stones and pounds and Kilograms. The Recommended Daily Allowance (RDA) of the various components of the diet is located on the left hand side. Amounts have been conditionally formatted to display to what extent a nutrient requirement has been achieved, underachieved or over achieved.

RDA	cod liver oil	1.00	1.00	1.00
5	Portions a Day	6.2	8.0	11.5
67	Protein total g	54.9	69.8	89.9
314.6448	Carbohydrates g	241.8	231.5	156.5
70	Fats total g	85.7	102.4	81.8
17	Saturated fat total g	37.2	32.7	45.8
25/30	Fibre g	23.8	41.1	39.3
2000/1600	Water g	2761	3651	3224
4	Alcohol total units	6.6	5.4	0.7
8	Iron total mg	5.0	10.0	6.6
90	Vitamin C total mg	53.1	131.8	184.1
900	Vitamin A RAE total µg	460.6	1481.8	2488.0
6	Salt (sodium x 2.5) g	2.2	5.8	6.7
126	Sugar g	102.9	118.4	131.9
300	Cholesterol mg	107.0	277.5	258.3
1000	Calcium mg	491.3	566.8	1711.1
400	Magnesium mg	252.6	521.6	430.6
4700	Potassium mg	2258.1	4157.5	3322.5
1000	Phosphorus mg	858.5	1377.9	1846.9
2,500	Water: total all sources	2760.7	3651.4	3224.2
11/8	Zinc mg	5.8	9.9	14.4

Fig 2. RDA section

Recommended Daily Allowance RDA

The RDA section is divided into five groups. This is meant to help the user study the data but also corresponds to the arrangement of the spreadsheets. Where appropriate items in the RDA list have a cell comment entry. If there is a male or female RDA they have been listed as M/F.

Report Section

The Report Section provides daily details. On the left is Ref 1 the calorie requirement and Ref 2 The initial weight at the beginning of the week. Ref 3 refers to the settings for Height.

65		11/8	Zinc mg		5.8		9.9		14
66		total	kcal used:			2,378		2,866	
67	Ref 1	2517	daily balance calories:			139		-349	
68			Calorie Balance b/f			139		-209	
69	Ref 2	84.29	weight Kg			84.29		84.27	84.
70			weight Pounds			185		185	
71			weight Stones			13 3/14		13 3/14	
72			Calc loss in weight lbs			0.04		no loss!	
73			Calc loss in weight Kg			0.02		no loss!	
74			kcal from alcohol			779		684	
75			percent kcal alcohol			0.33		0.24	
76									
77	Ref 3	1.84	Height metres for BMR & BMI calc.						
78									

Fig. 3. Report Section

Lists and Pie Charts

Underneath the Report Section the total food by group is displayed as two lists and also as two pie charts. The lower data is for the USDA groups and is based on calories not volume and weight.

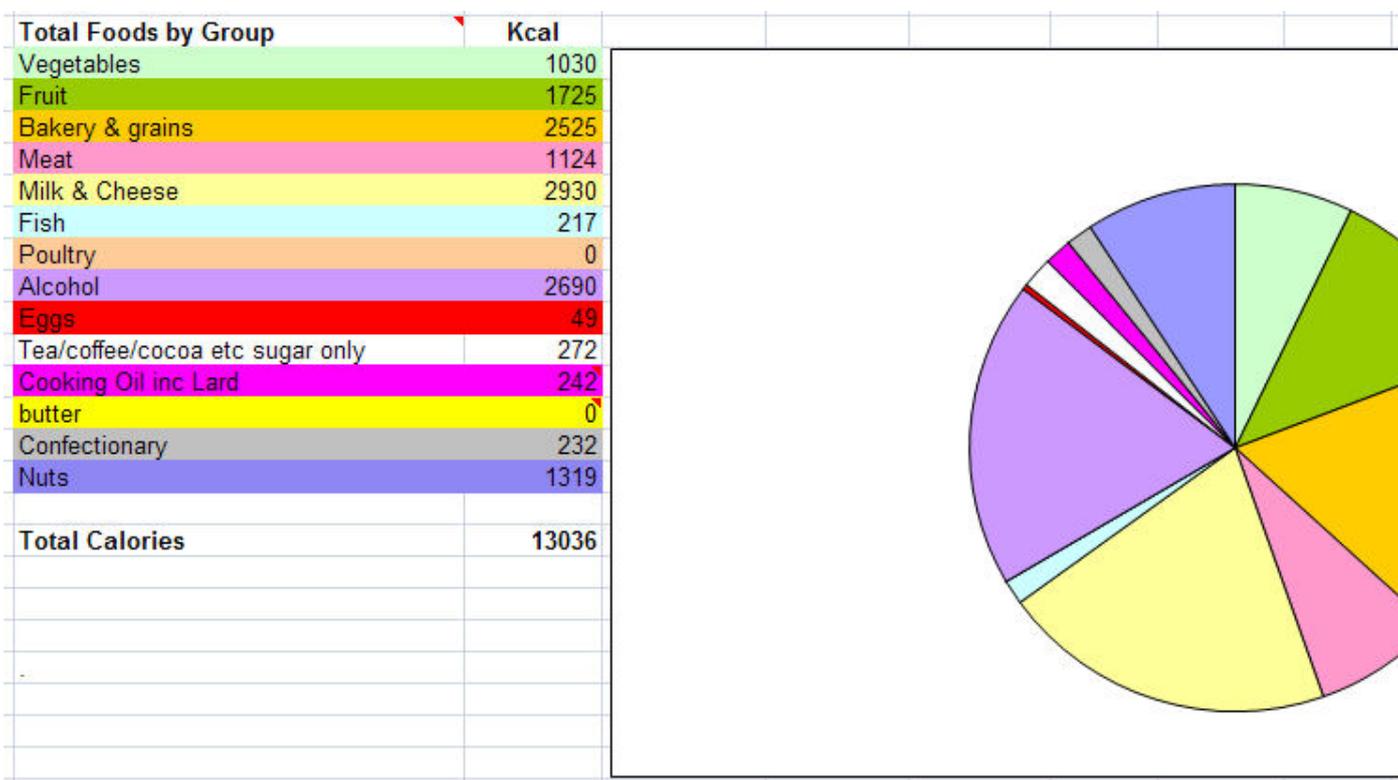


Fig. 4 Food Total by Group and Pie charts

Instructions and Information Section

The instructions for using the Healthy Diet Tool and settings include Copyright licensing information are placed in the main spreadsheet for convenience. The personal data that is required is:

- Weight in kilograms
- Height in metres
- Age
- Gender
- Activity level

Additional setting is: Protein which by default is set to 0.8g/Kg

Ref 4	76	Age		
		Men: BMR = 66 + (13.7 * wt in kg) + (5 * ht in cm) - (6.8 * age in years)		calculate
		Women: BMR = 655 + (9.6 * wt in kg) + (1.8 * ht in cm) - (4.7 * age in years)		calculate
		Activity Multiplier (Active Metabolic Rate)		
Ref 5		Sedentary = BMR X 1.2 (little or no exercise, desk job)		
Ref 6		Lightly active = BMR X 1.375 (light exercise/sports 1-3 days/wk)		
Ref 7		Mod. active = BMR X 1.55 (moderate exercise/sports 3-5 days/wk)		
Ref 8		Very active = BMR X 1.725 (hard exercise/sports 6-7 days/wk)		
Ref 9		Extr. Active = BMR X 1.9 (hard daily exercise/sports & physical job or 2X day training, i.e marathon, cont		
Ref 10	0.8	Protein factor		
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<p>Instructions</p> <p>Once downloaded it is best to use Excel to create a new workbook based on the downloaded data.</p>				

Fig. 5 User Settings

The Scientific Basis on Which the Workbook is Designed.

From the personal data supplied by the user the Basic Metabolic Rate (BMR) is calculated. For reference the BMI is also calculated and is located at the end of the week. The formula for BMR is the Harris Benedict Formula. The user selects their level of activity and uses the calculated calorific requirement to set Reference 1.

Protein requirement is calculated from the data and is set in Reference 10. to 0.8g/Kg. Bodybuilders might want to increase this factor but to no more than 1.7g/kg. Refer to: <https://bayesianbodybuilding.com/the-myth-of-1glb-optimal-protein-intake-for-bodybuilders/>

The Fat requirement is a quarter of the calories required a day divided by 9 (as one gram of fat weighs nine grams).

Carbohydrate requirement is calculated as 50 percent of the daily calorie requirement divided by 4 and conforms to current science. The minimum of 130g per day ([Carbohydrates](#)) is flagged by conditional formatting.

Data Integrity

Nearly all of the entries are referenced to the USDA Standard food list so that the user can find further details of a particular entry. I have taken information to calculate to what extent a daily diet contributes to (Five Portions a Day) from the UK NHS. For a more detailed account see 5 A Day (A Wikipedia article) While the five a day portions are described in everyday language by the UK NHS and other agencies the workbook calculates accurate data from the food entries. This means that fractions of a Five A Day portion are calculated and rounded as appropriate.

User interface

I chose to write the Healthy Diet Tool using Microsoft's Excel application as it is familiar to most people. The initial version was created using 2003 Excel. The current application is 2007 Excel.

Cell settings that control the workbook have a green background. Conditional formatting is used in the RDA Section to provide the user with information that sets flags as to whether quantities of nutrients have been met or not. Fig. 6 below shows that the Reference Totals have been met or not. Cells with yellow backgrounds may be positive, ie. for example the Five a Day portions (top row) have been more than achieved, even before the Saturday entries are yet to be met. However, units of alcohol consumed are too high at 26.

	1.00	1.00	1.00		Totals	ref Totals
	8.6	14.1	3.3	0.0	52	35
	93.7	123.2	15.0	0.0	447	472
	142.9	220.9	152.3	0.0	1146	2203
	114.2	120.8	19.2	0.0	524	489
	44.4	27.3	12.0	0.0	200	140
	40.2	37.3	16.5	0.0	198	175
	3332	3900	1784	0	18652	14000
	0.9	12.2	0.0	0.0	26	28
	7.1	9.8	2.7	0.0	41	56
	130.5	258.2	31.2	0.0	789	630
	2722.2	184.4	34.8	0.0	7372	6300
	7.6	7.3	0.3	0.0	30	42
	86.8	133.9	68.0	0.0	642	881
	434.4	143.8	0.0	0.0	1221	2100
	837.9	828.3	71.2	0.0	4507	7000
	432.5	841.3	79.4	0.0	2558	2800
	3484.2	4824.9	1128.0	0.0	19175	32,900
	1766.0	1790.8	64.7	0.0	7705	7000
	3332.1	3899.9	1784.0	0.0	18652	17500
	13.1	12.4	0.4	0.0	56	105
175	2,444	2,544	840	0	14,454	

Fig. 6 Conditional Formatting

Comments

Guidance is additionally provided for the user by means of using comments. Nearly all food entries are for 100g portions. It took some time before it was realised that to do otherwise was confusing. However, some items were difficult to enter, for example Eggs. Figure 7 below shows the Comment attached to the Eggs entry.

3.0	466 double cream/ clotted x 510/466		
7.0	520 crisps	0.50	260.00
0.7	15 cucumber cup ~50g		0.50
4.0	122 Custard cup		260.00
2.5	282 Dates fresh		
12.6	143 egg raw per 100g (refer to note for size)		
0.8	74 Figs raw		
18.7	85 fish: cod		
13.2	340 flour wholegrain		
0.4	45 tinned fruit		
2.7	33 greens		
0.6	67 grapes		
16.6	163 Ham		
4.8	180 Ice Cream		
1.9	28 kale		
24.6	217 Kippers single from pack		
1.1	61 Kiwifruit		
0.0	902 Lard		
10.5	191 Lasagne (meat sauce)		

by weight. For size:
 extra large 73g
 large 68g
 medium 58g
 small 50g
 NB mean size weights. US size categories are smaller.
 Enter 0.73 for extra large, 0.68 for large etc

Fig. 7 Comments

Conclusion and Recommendations

Over a period of several years the Excel Healthy Diet Tool has been refined and regularly updated. I refrained to weigh myself for a period of over two months as a test of the tool's accuracy. I found when I did weigh myself that I was a couple of kilograms lighter! Fortunately, I found a flaw in the workbook. (both butter and oil entries only need to be made if they are separate from cooked items I had been adding butter and oil unnecessarily) Since then the workbook does do what it is supposed to do namely, record food and drink consumption accurately and provide a report on the individual's weight that matches the individual's actual weight. It does so according to current advice as to what is a balanced diet.

The workbook provides a means to ensure that the user is following a healthy diet as it relies on the settings that are accepted by current nutritional science. It is unlikely that there are going to be any variation in the proportions of the three basic components of a healthy diet: protein, carbohydrate and fat as made by authorities. Alcohol consumption can be monitored, this includes variation in the alcohol content of beer via a custom entry.

The use of weight as a means to calculate nutrition data using 100g portions, with a few exceptions, does mean that users need to be familiar with using decimal quantities and using simple equations. Spirits can be measured by weighing the bottle and dividing by 24 to determine the number of 25ml single units that have been consumed.

The Healthy Diet Tool can be modified to include extra entries but this is rather tedious. At present the subsidiary spreadsheets are not protected, but should be, they are left as unprotected to save work when modifications to the workbook need to be made. New entries in the food list require a selection of data to be copied from the USDA Standard Food List and the modification of twenty spreadsheets. This is not difficult but as mentioned above is rather tedious.

This project has been carried out without any financial support (none applied for) and without any useful acknowledgement from the government (desirable) that were advised of it by a letter to Prime Minister David Cameron in 2014: <http://www.lettertothepm.co.uk/food-drink-and-obesity.htm> Since that date updated versions have been made and linked to via the online letter.

It would interesting to have supplied a USDA data food grouping by weight rather than calories, or both.

An extensive record of the development of the Excel Healthy diet Tool is documented in the following link where the current update may be downloaded: http://www.freshfordsomerset.co.uk/healthy_diet.php

It would be useful to be able to add a food in a simple way rather than the tedious manner that is necessary at present. Is the nutrient list adequate or should it be extended?

Geoff Edwards June 2018