

**STEP-BY-STEP INSTRUCTIONS FOR CARRYING OUT SHORT TERM CONSUMER RISK
ASSESSMENT USING CRD'S TEN CONSUMER MODEL**

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Step-by-step instructions for carrying out short term consumer risk assessment using CRD's ten consumer model

1. Introduction

These guidance notes were written for CRD's acute consumer risk assessment spreadsheet version 1.0 < acute_consumer_ver1.0.xls>. For further information on the consumer risk assessment methodology that is implemented in the spreadsheets see the Manual on the Submission and Evaluation of Pesticide Residues Data, 2002 (Food and Agricultural Organization of the United Nations, FAO) (http://www.fao.org/agriculture/crops/publications/detail/en/item/46006/icode/9/?no_cache=1).

The estimates of short term exposure are calculated based on the highest residue (HR) in the treated agricultural commodity, and consumption data for the ten consumer groups as provided by the UK Food Standards Agency (FSA). The intake is then compared to the acute reference dose (ARfD) for the active substance in question.

The spreadsheet can be used for calculating individual commodity National Estimates of Short Term Intakes (NESTIs) using 97.5th percentile commodity intakes. A worst case assessment can be calculated by inserting a Maximum Residue Level (MRL) value instead of using the highest residue observed.

The spreadsheet enables the intakes of ten consumer groups from the consumption of treated agricultural commodities to be determined. The consumer groups used are: adult, infant, toddler, 46 year old child, 7-10 year old child, 11-14 year old child, 15-18 year old child, vegetarian, elderly (own home), elderly (residential)). For further information on these consumer sub-groups, please see the sections on the definitions of the consumer groups (Section 6) and on the dietary surveys (Section 7).

2. How the spreadsheet works

You need to enter several values into the spreadsheet: residue levels in the agricultural commodities (usually as HRs); any processing factors to account for concentration or reduction of residues during preparation or processing; and an ARfD value, specific to an active substance. Primarily, you need to enter residues data for the raw agricultural commodity (RAC), unless processing data is available and an alternate risk assessment is possible on this basis. ARfD values can be found at the EU pesticides database at: <http://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?event=homepage&language=EN>

You also have the option of inputting the active substance name and the source of ARfD, if you want these displayed on the output sheet. Once these inputs have been made, a NESTI calculation is carried out by the spreadsheet using consumption data provided by the UK FSA.

You can generate outputs that are suitable for use in word documents; instructions for this are given by way of the example in Section 9.

3. System requirements

The spreadsheet should run on all versions of Microsoft® Excel. Screen resolution is best set at 1024 × 768 pixels or higher.

4. How to use the spreadsheet to perform a NESTI calculation

These steps will guide you through the process of using the spreadsheet to perform a risk assessment based on the HR which returns a NESTI value based on the food consumption and residue levels.

Once the spreadsheet has been opened and saved onto the PC hard-drive it can be use the same as any other

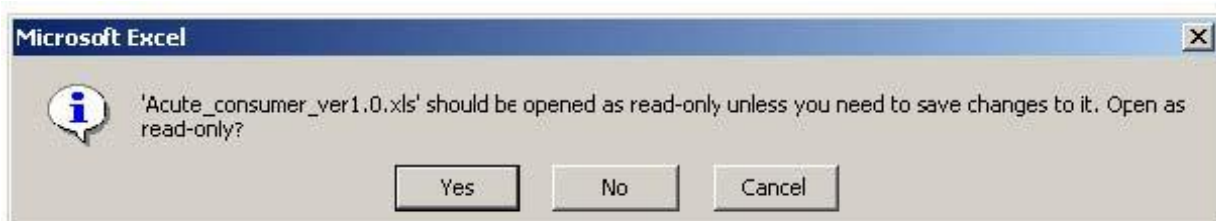
Excel spreadsheet.

Open the spreadsheet by double-clicking on the icon. This will result in the following dialogue box being displayed:



Click Enable Macros All of the macros in this spreadsheet have been virus checked and are safe to use. The spreadsheet will not work properly if the macros are disabled.

Once the macros have been enabled a prompt recommending the spreadsheet be opened as read only will be displayed.



It is advisable to open the spreadsheet as read-only and then save any changes under a different file name.

Once the spreadsheet is open, the user will see the following screen, with spreadsheet now ready to use:

The screenshot shows a Microsoft Excel window titled 'Acute_consumer_ver1.0 [Read-Only]'. The spreadsheet contains a table with the following columns: commodity, HR (mg/kg), P, HR-P (mg/kg), U (kg) wt/v factor, and a numerical value. The table is organized into categories: Citrus fruit, Tree nuts, Pomme fruit, Stone fruit, Bulb vegetables, Mushrooms, Onions, Oilseeds, and Potatoes. The control panel on the right includes a PSD logo, the title 'Acute Consumer Risk Assessment', and input fields for 'acute RiD', 'Pesticide name (optional)', and 'Source of ARfD (optional)'. It also features buttons for 'Generate Results', 'Clear Results', 'Clear Input Table', 'Goto Intake Results', 'Goto Consumption Results', and 'Goto Consumption (Worst Intakes)'. The status bar at the bottom shows 'input / adult / infant / toddler / 4-6 / 7-10 / 11-14 / 15-18 / veg / elderly-ownhome / elderly-residential / Results'.

commodity	HR (mg/kg)	P	HR-P (mg/kg)	U (kg) wt/v factor	
Grapefruit	0.00		0.00	0.160	7
Lemon	0.00		0.00	0.084	7
Limes	0.00		0.00	0.067	7
Mandarins	0.00		0.00	0.100	7
Oranges	0.00		0.00	0.160	7
Citrus fruit					
Almonds	0.00		0.00		1
Brazil nuts	0.00		0.00		1
Cashew nuts	0.00		0.00		1
Chestnuts	0.00		0.00		1
Coconuts	0.00		0.00		1
Hazelnuts	0.00		0.00		1
Pecan nuts	0.00		0.00		1
Pistachios	0.00		0.00		1
Walnuts	0.00		0.00		1
Peanuts	0.00		0.00		1
Tree nuts					
Apples	0.00		0.00	0.112	7
Pears	0.00		0.00	0.150	7
Pomme fruit					
Apricots	0.00		0.00	0.039	7
Peaches	0.00		0.00	0.110	7
Plums	0.00		0.00	0.055	7
Cherries	0.00		0.00		1
Stone fruit					
Garlic	0.00		0.00		1
Onions	0.00		0.00	0.150	7
Spring onions	0.00		0.00		1
Bulb vegetables					
Mushrooms					
Mushrooms	0.00		0.00		1
Onions	0.00		0.00		1
Oilseeds					
Canned/bottled Potatoes	0.00		0.00	0.216	7
Potato chips	0.00		0.00	0.216	7
Jacket Potatoes	0.00		0.00	0.216	7
dried (instant) Potatoes	0.00		0.00		1
boiled Potatoes	0.00		0.00	0.216	7
Crisps	0.00		0.00		1
misc. Potato products	0.00		0.00	0.216	7
Potatoes					
Potatoes	0.00		0.00	0.216	7
Wine	0.00		0.00		1
Wine grapes	0.00		0.00		1
Table grapes	0.00		0.00	0.500	5
Strawberries	0.00		0.00		1
Blackberries	0.00		0.00		1
Loganberries	0.00		0.00		1

Only cells with a green background can have data entered into them. From the figure above it can be seen that the following data can be entered; c) to e) are optional:

- a.) ARfD
- b.) HR
- c.) Processing factor (P)
- d.) Source of ARfD
- e.) Pesticide name

An example calculation demonstrating the use of the spreadsheet is outlined in Section 9 below. This is not intended to be a realistic scenario, but rather one that demonstrates the features of the spreadsheet.

5. Notes on required inputs, results and interpretation

This section focuses on the correct use of the spreadsheet and estimates of exposure outputs of the spreadsheet as a consumer risk assessment tool rather than interpretation of the results from a human health perspective taking into account the toxicology of the pesticides. An exceedance of the ARfD does not necessarily present a consumer exposure concern.

In the Intakes table that is generated and suitable for printing out/cut and pasting, dietary intakes above the ARfD are in red-type.

If the number of consumers is less than 60 people the data should be treated with caution as the results may not be statistically robust. The spreadsheet provides 95% confidence intervals on the 97.5th percentile consumption values and so gives some indication as to the distribution. Consumption data are presented in a 'consumption table', for each commodity a '97.5th percentile' is provided based on the sample of consumers (i.e. non consumers are not included).

Commodities that are based on RAC are stated in normal type in the commodity list. Those for processed foods are in italics and pale blue type. The use of the data for processed foods e.g. wine depends on the availability of residues data for the processed food itself or a processing or transfer factor which converts the RAC residue to an appropriate residue for the processed food. The data for processed food can enable a more refined calculation of intake.

Whilst the summing of intakes resulting from individual commodities is not strictly correct it can be used to identify where there are no problems with consumption patterns. Under circumstances where problems may be identified e.g. sum of commodities > 100% then further assessment such as a probabilistic one may be required.

Where bulking or blending of processed commodities occurs, the supervised trial median residue (STMR) or STMR-P to account for a processing factor if available is a better representation of the highest likely residue. Therefore for the following commodities listed in the ten consumer group acute intake spreadsheet, an STMR residue is considered suitable rather than the use of the HR: oilseeds; oils; dried (instant) potatoes; wine grapes; wine; maize; cornmeal & cornflour; sugar beet; refined sugar. For these commodities, therefore insert the STMR into the HR column.

When considering processing factors note that the Advisory Committee on Pesticides have agreed, and Departments have accepted, when considering if pesticides should be approved for use it will not be assumed that fruit and vegetables will be peeled, see link to ACP statement: <http://webarchive.nationalarchives.gov.uk/20151023155227/http://www.pesticides.gov.uk/guidance/industries/pesticides/advisory-groups/acp/acp-letters/acp-advice-to-the-fsa> . Therefore, intake estimates presented to CRD to support applications for approval should not employ processing factors to take account of edible portions.

The commodity descriptors are the same across the CRD acute exposure model (this spreadsheet) and the CRD chronic model.

6. Definitions of Consumer Groups

In the following list n=numbers in the survey, and the year given represents the date of the survey:

Adult (n=1724, 2001) – consumers aged 19 to 64 both male and female, with a mean body weight of 76.0 kg. [Please note the adults survey in previous use by CRD was the 1986/7 [n=2197] survey where the mean bodyweight of consumers was 70.1 kg].

Infant (n=488, 1986) – consumers aged 6-12 months both male and female, with a mean body weight of 8.7 kg

Toddler (n=1675, 1992/3) – consumers aged 18 months to 4 years both male and female with a mean body weight of 14.5 kg

Young people (n= 1701, 1997) split further into

4-6 year old child (n=355) – mean body weight of 20.5 kg

7-10 year old child (n=482) - mean body weight of 30.9 kg

11-14 year old child (n=475) - mean body weight of 48.0 kg
15-18 year old child (n=389) - mean body weight of 63.8 kg

Vegetarian (n= 415, 1994/5) – adult consumers aged 16 to 64 both male and female who are “self declared” vegetarians, although some still eat meat with a mean body weight of 66.7 kg

Elderly (own home) (n= 1275, 1997) – consumers aged over 65 both male and female who live in their own home with a mean body weight of 70.8 kg

Elderly (residential) (n= 412, 1997) – consumers aged over 65 both male and female who receive residential care in a nursing home or similar, with a mean body weight of 61.6 kg.

7. Dietary surveys

In recent years more data have become available enabling the risks for more consumer sub-groups to be assessed. The data are provided to CRD by the UK FSA and are derived from published dietary surveys (as referenced in Section 10). The field work for the dietary surveys has been conducted over 12 months. A weighed diary record was taken for food consumed over 7 days for all the surveys except for toddlers and elderly which were taken over 4 days. The consumption values for short term consumption are deduced for each individual in the survey by using the highest daily intake over the course of the survey for that individual/commodity combination and by using all recipes containing the food item rounding to the nearest 5%¹. The combined data for all of the individuals are then used to derive the 97.5th percentile to derive ‘high level’ single day consumption values for each of the commodities. The 97.5th percentile is often used to define this upper level of ‘normal dietary behaviour’ and is based on the upper percentile of consumers recorded as consuming a food item.

The most recent survey to become available is the National Diet and Nutrition Survey (NDNS) survey of adults conducted in 2001. In order to deduce consumption data for raw agricultural commodities from the variety of foods consumed the UK FSA apply a recipe analysis to the data assigning different food codes for raw foods and component ingredients of composite foods (such as apple pie). New updated food codes are currently being assigned to ensure that the full potential of the 2001 adults’ database is realised. As generating refined data based on the new food codes for this analysis is expected to take some time, we have compared the 2001 adults data using the existing food codes data with the previous 1986/87 adults data, and consider that using this 2001 data as an interim position is likely to represent a much more valid estimation of the UK adult diet than continuing to use the ‘old’ 1986/7 survey data. Therefore, information from the 2001 survey of adults is used in this ten consumer group spreadsheet. This will be subject to a future refinement when the further work using newly developed food codes has been conducted.

¹ Please note that for the previous adult and toddler data published by CRD (based on 1986/7 adults data and 1992/3 toddler data UK) consumption estimates relevant to short term exposure were based on the first day of dietary surveys only and also only included recipes that were 90% or more of food item.

8. Variability factors and unit sizes

For some commodities such as apples, there may be high variability of residue levels between the individual units within a composite sample. In order to account for this variation in residue levels variability factors are applied to the calculations carried out by the spreadsheet. The default variability factor applied depends on several different parameters including unit weight of the commodity and its relation to the amount consumed and whether the commodity is mixed well during processing. The approach adopted here is that in the 2002 FAO Manual. Based on the Codex sampling protocols, generally the value of the variability factor ν is: i) for large commodities (unit weights over > 250 g), $\nu = 5$ e.g. cauliflower and melons ii) for medium commodities treated using soil applied granular pesticides (unit weights usually between 25-250 g), $\nu = 10$ e.g. beetroot and carrots iii) for medium commodities treated using non-granular, foliar applied pesticides (unit weights usually between 25-250 g), $\nu = 7$ e.g. bananas and citrus fruit iv) for small commodities (unit weights < 25 g), ν does not apply since the composite residue data reflects the residue level in the food commodity as consumed e.g. cherries and oilseed rape.

The NESTI equation comprises of two main terms; the first term calculates the dietary intake for the first commodity unit and assumes it contains a very high residue i.e. a “hot” commodity unit by applying the variability factor to this term. The second term calculates the dietary intake for the other commodity units within the “portion consumption”.

$$NESTI = \frac{(U \times HR.P \times \nu) + ((F - U) \times HR.P)}{\text{mean body weight}}$$

Where: U is the weight of the first commodity unit. Where U is greater than F only a consumption value up to F can be used and so F is applied in the first part of the equation instead of U. F is the full portion consumption data. Where the full portion consumption data is less than or equal to one commodity unit or the product consumed is well mixed during processing, then the second term of the equation drops out. ν is the “variability factor” HR.P is the highest residue level detected incorporating processing. Where data are available on the residues in the edible portion or where processing data are available, they should be used rather than the HR.

The spreadsheet suggests a variability factor for each of the commodities although this can be overridden by the user if specific data is available or the effect of variability on dietary intake is to be explored. This is explained further in Section 9 below.

As seen above (by way of the component ‘U’ in the above equation), the spreadsheets need to have unit weight sizes included. Due to the diversity of food items in the spreadsheet, the unit weights are derived from a number of different published sources (see references 7, 8 and 9 in the references Section 10) or are based on advice from the UK FSA at the time of provision of the consumption data relevant to short term exposure.

9. Example Calculation

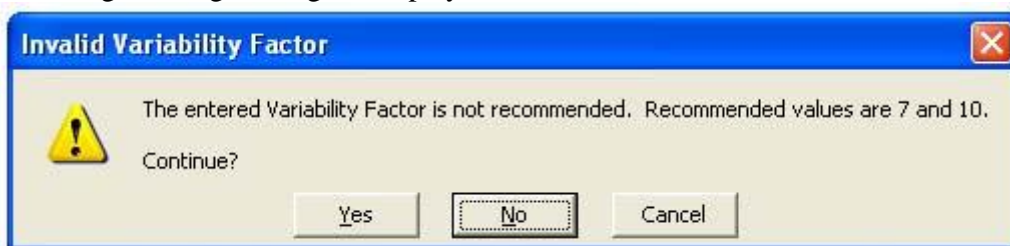
Scenario “Insecticido” is an insecticide for which approval is sought for use on pome fruit, carrots, potato, sugar beet, wheat, oats, and barley. From supervised residue trials the highest residue observed was 0.09 mg/kg. The JMPR (2004) have endorsed an ARfD of 0.0055 mg/kg bw/day.

Enter the ARfD in units of mg/kg bw/day and pesticide information as shown in the figure below:

The figure shows a data entry form with three input fields. The first field is labeled "acute RfD" and contains a green box. The second field is labeled "Pesticide name (optional)" and contains a green box. The third field is labeled "Source of ARfD (optional)" and contains a green box. A red oval highlights the "acute RfD" field, and another red oval highlights the "Pesticide name" and "Source of ARfD" fields. A red line points from the text "Input ARfD and active ingredient information" to the "acute RfD" field.

The residues from the supervised trials can now be entered in units of mg/kg in the same way. Commodity groupings (e.g. citrus fruit) are present as titles, and are not used in calculations. If, as in this example, it is required to determine the consumption of an entire commodity group such as pome fruit, then residue values for the individual commodities in that group should be entered.

The spreadsheet has recommend values of variability factor for each commodity as discussed above in Section 8. These can be over-riden by the user should the effect of variability on the outcome wish to be explored or if specific data is available (with the exception of case 1 scenarios where the variability factor is fixed at 1). The following warning message is displayed if the default values are over-riden:



Of the options given, Yes allows the calculation to proceed with the variability factor inputted by the user; No allows the user to input a further value; Cancel reverts back to the default value.

Once the residue levels have been entered, the calculations can be performed using the generate results button. Clicking this button will show a message in the status bar at the bottom of the sheet “Generating intake results form...please wait”. The sheet will appear to do nothing for a number of seconds, but will then give the results suitable for copying to word, which can be accessed using the “goto” buttons.

Goto Intake Results	Shows the NESTI values for each commodity and their relationship to the ARfD for all ten consumer groups
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Goto Worst Intakes	Shows the NESTI values for each commodity and their relationship to the ARfD for the three worst consumer groups
Goto Consumption Results	Shows the consumption results for each commodity for all ten consumer groups
Goto Consumption (Worst Intakes)	Shows the consumption results for each commodity for the three worst consumer groups

The four tables below show the results obtained from each of the function buttons described in the table above in the order they are presented.

Small amounts of formatting may be required to enable the outputs to fit on one page such as wrapping text and auto fitting to contents, but they can be displayed on an A4 page in portrait orientation, at font size 8 (with the exception of the consumption data, which requires landscape orientation).

The consumption values for each consumer group-commodity combination can be viewed by clicking on the named tabs at the bottom of the sheet, e.g. adult tab shows adult consumer data.

The clear results and clear input table buttons remove all of the results and inputs from the spreadsheet, enabling a new calculation to be performed.

commodity	HR	P	adult		infant		toddler		4-6 year old child		7-10 year old child	
			NESTI	%ARfD	NESTI	%ARfD	NESTI	%ARfD	NESTI	%ARfD	NESTI	%ARfD
Apples	0.090		0.00135	24.5	0.00882	160.3	0.00648	117.9	0.00502	91.2	0.00370	67.3
Pears	0.090		0.00145	26.3	0.00652	118.5	0.00689	125.4	0.00489	88.8	0.00325	59.0
Potatoes	0.090		0.00216	39.3	0.01384	251.6	0.00957	174.0	0.00721	131.1	0.00495	90.1
Oats	0.090		0.00008	1.5	0.00028	5.2	0.00028	5.1	0.00016	3.0	0.00019	3.4
Barley	0.090		0.00006	1.1	0.00000	0.0	0.00007	1.2	0.00016	2.9	0.00051	9.2
Wheat	0.090		0.00054	9.9	0.00116	21.1	0.00119	21.6	0.00130	23.6	0.00098	17.9
Sugar Beet	0.090		0.00233	42.5	0.00500	91.0	0.00700	127.2	0.00575	104.5	0.00471	85.6

commodity	HR	P	11-14 year old child		15-18 year old child		vegetarian		Elderly - own home		Elderly - residential	
			NESTI	%ARfD	NESTI	%ARfD	NESTI	%ARfD	NESTI	%ARfD	NESTI	%ARfD
Apples	0.09		0.00232	42.2	0.00190	34.6	0.00159	29.0	0.00120	21.8	0.00119	21.6
Pears	0.09		0.00214	38.9	0.00164	29.8	0.00162	29.5	0.00151	27.4	0.00155	28.2
Potatoes	0.09		0.00351	63.7	0.00262	47.6	0.00269	48.8	0.00214	38.9	0.00234	42.5
Oats	0.09		0.00008	1.5	0.00013	2.4	0.00011	2.0	0.00007	1.2	0.00006	1.1
Barley	0.09		0.00004	0.7	0.00005	1.0	0.00007	1.2	0.00004	0.8	0.00003	0.5
Wheat	0.09		0.00080	14.5	0.00076	13.8	0.00070	12.8	0.00041	7.5	0.00041	7.5
Sugar Beet	0.09		0.00352	63.9	0.00323	58.8	0.00188	34.1	0.00125	22.8	0.00170	30.9

Pesticide Insecticido
 ARfD 0.0055 mg/Kg bw/day
 Source JMPR 2004

commodity	HR	P	Consumer group 1			Consumer group 2			Consumer group 3		
				NESTI	%ARfD		NESTI	%ARfD		NESTI	%ARfD
Apples	0.09		infant	0.00882	160.3	toddler	0.00648	117.9	4-6 year old child	0.00502	91.2
Pears	0.09		toddler	0.00689	125.4	infant	0.00652	118.5	4-6 year old child	0.00489	88.8
Potatoes	0.09		infant	0.01384	251.6	toddler	0.00957	174.0	4-6 year old child	0.00721	131.1
Oats	0.09		infant	0.00028	5.2	toddler	0.00028	5.1	7-10 year old child	0.00019	3.4
Barley	0.09		7-10 year old child	0.00051	9.2	4-6 year old child	0.00016	2.9	vegetarian	0.00007	1.2
Wheat	0.09		4-6 year old child	0.00130	23.6	toddler	0.00119	21.6	infant	0.00116	21.1
Sugar Beet	0.09		toddler	0.00700	127.2	4-6 year old child	0.00575	104.5	infant	0.00500	91.0

Pesticide Insecticido
ARfD 0.0055 mg/Kg bw/day
Source JMPR 2004

commodity	Adult			Infant			Toddler			4-6 year old child			7-10 year old child		
	F in kg/day	F min (95% CI)	Fmax (95% CI)	F in kg/day	F min (95% CI)	Fmax (95% CI)	F in kg/day	F min (95% CI)	Fmax (95% CI)	F in kg/day	F min (95% CI)	Fmax (95% CI)	F in kg/day	F min (95% CI)	Fmax (95% CI)
Apples	0.464	0.398	0.555	0.180	0.150	0.238	0.373	0.321	0.421	0.471	0.406	0.696	0.598	0.452	0.780
Pears	0.322	0.284	0.370	0.090	0.080	0.120	0.211	0.186	0.289	0.213	0.180	0.260	0.215	0.180	0.410
Potatoes	0.531	0.513	0.550	0.191	0.170	0.216	0.246	0.234	0.262	0.346	0.327	0.456	0.405	0.394	0.497
Oats	0.070	0.102	0.174	0.028	0.024	0.030	0.045	0.030	0.054	0.038	0.029	0.063	0.064	0.044	0.089
Barley	0.052	0.052	0.069	0.000	0.000	0.000	0.011	0.008	0.014	0.036	0.013	0.079	0.173	0.037	0.194
Wheat	0.459	0.433	0.484	0.112	0.102	0.140	0.191	0.180	0.196	0.296	0.269	0.357	0.338	0.324	0.365
Sugar Beet	1.972	1.816	2.104	0.484	0.419	0.534	1.127	1.058	1.219	1.309	1.232	1.499	1.617	1.473	1.779

commodity	11-14 year old child			15-18 year old child			vegetarian			Elderly - own home			Elderly - residential		
	F in kg/day	F min (95% CI)	Fmax (95% CI)	F in kg/day	F min (95% CI)	Fmax (95% CI)	F in kg/day	F min (95% CI)	Fmax (95% CI)	F in kg/day	F min (95% CI)	Fmax (95% CI)	F in kg/day	F min (95% CI)	Fmax (95% CI)
Apples	0.566	0.452	0.646	0.677	0.520	1.050	0.509	0.397	0.722	0.271	0.250	0.307	0.143	0.111	0.299
Pears	0.241	0.202	0.333	0.263	0.185	0.267	0.302	0.247	0.334	0.288	0.214	0.340	0.160	0.150	0.240
Potatoes	0.573	0.473	0.612	0.559	0.524	0.799	0.694	0.552	0.868	0.386	0.358	0.406	0.304	0.282	0.381
Oats	0.044	0.036	0.080	0.093	0.048	0.194	0.080	0.073	0.131	0.051	0.049	0.069	0.041	0.030	0.083
Barley	0.021	0.014	0.025	0.039	0.030	0.095	0.049	0.034	0.070	0.034	0.028	0.089	0.020	0.012	0.029
Wheat	0.426	0.389	0.480	0.536	0.454	0.588	0.522	0.455	0.591	0.325	0.313	0.355	0.281	0.248	0.296
Sugar Beet	1.875	1.736	2.339	2.292	2.042	3.344	1.390	1.183	1.710	0.987	0.917	1.053	1.164	1.109	1.421

commodity	Consumer group 1			Consumer group 2			Consumer group 3					
		F in kg/day	F min (95% CI)	Fmax (95% CI)		F in kg/day	F min (95% CI)	Fmax (95% CI)		F in kg/day	F min (95% CI)	Fmax (95% CI)
Apples	infant	0.180	0.150	0.238	toddler	0.373	0.321	0.421	4-6 year old child	0.471	0.406	0.696
Pears	toddler	0.211	0.186	0.289	infant	0.090	0.080	0.120	4-6 year old child	0.213	0.180	0.260
Potatoes	infant	0.191	0.170	0.216	toddler	0.246	0.234	0.262	4-6 year old child	0.346	0.327	0.456
Oats	infant	0.028	0.024	0.030	toddler	0.045	0.030	0.054	7-10 year old child	0.064	0.044	0.089
Barley	7-10 year old child	0.173	0.037	0.194	4-6 year old child	0.036	0.013	0.079	vegetarian	0.034	0.028	0.089
Wheat	4-6 year old child	0.296	0.269	0.357	toddler	0.191	0.180	0.196	infant	0.112	0.102	0.140
Sugar Beet	toddler	1.127	1.058	1.219	4-6 year old child	1.309	1.232	1.499	infant	0.484	0.419	0.534

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