

# the children's hospital at Westmead

Data used here has been based on the work of Annabel Sweeney, Dietitian, Women's and Children's Hospital, Adelaide.

## Counting Protein for PKU

Protein in the PKU diet has been traditionally counted as **units** in Australia (1 unit = 15mg Phe). Now that commercially prepared foods are labelled clearly with their nutritional composition, a simpler method has been developed to make life easier for people with PKU.

This method counts **protein** (1 gram protein = 50mg Phe).

Families who have tested a similar method in South Australia found it much easier and control of blood phe was similar. The method is similar to counting method used in the Great Britain and New Zealand.

### How to count protein

The PKU Dietitian will advise you on how much protein to count each day. To count protein you will need to use information from food labels as well as the lists below.

### Reading food labels

In the PKU Handbook 2005, Chapter 6 pages 47 -51 explains how to use food labels to count protein and to check whether the product contains aspartame.

### Using the Protein Lists

The food lists provided here are for foods that do not come with a label e.g potato. The lists are divided into three colours:

<b>Green:</b> <b>The "go" foods.</b>	These foods contain small quantities of protein and if used in normal quantities are usually allowed without restriction. These foods are important to fill you up and variety. Many fruits and vegetables are green foods. If eaten in large quantities they may cause blood phe levels to rise and may need to be counted
<b>Orange:</b> <b>The "caution" foods.</b>	These contain more than 1 g protein per serve. These need to be counted
<b>Red:</b> <b>The "stop" foods</b>	These contain large amounts of protein per serve and are not recommended unless tolerance for phenylalanine is high. You may be able to include small quantities but discuss this with your Dietitian

## How to make your grams of protein go further

When buying packaged goods (e.g breakfast cereal, stock) choose those with the lowest protein content. This will allow you to include more foods in your protein allowance. Ask your clinic Dietitian for current information on foods with low or reduced protein.

## Fruits, vegetables and foods containing them

Many fruits and vegetables do not need to be counted.

The protein in fruits and vegetables contains less phe than protein in flour and grains. The protein values in this list have been adjusted to account for this so the protein count for fruits and vegetables are called **protein equivalents**.

If using canned or frozen fruits or vegetables with no other ingredients check if they need to be counted using the lists below and use the protein value in these lists.

If the fruit or vegetable is mixed with another ingredient e.g. custard, cereal or breadcrumbs use the value on pack

Examples:

- canned apple is free, canned apple with cereal or canned apple with custard needs to be counted using the protein value on pack.
- canned carrots are free, canned carrots with rice or couscous needs to be counted using the protein value on pack

## Rounding to the nearest ½ gram of protein

- Do not count in ¼ grams of protein. Counting in ½ grams is accurate enough.
- Round any values you have calculated to the nearest half gram  
e.g 2.3g protein is counted as 2.5g  
1.2g protein is counted as 1g
- If a food contains 0.3g protein or less per serve it does not need to be counted. It is a green food.
- Any food containing 0.4g protein or more per serve needs to be counted
- Check that the serve size given on pack is appropriate for your child – serve sizes vary.

## Tips on using household measures

Australian standard metric measures are used:

1 teaspoon = 5mls

1 tablespoon = 20mls

1 cup = 250mls

All measures are level.

## THE "GO" FOODS

These foods contain small quantities of protein and phe and if used in normal quantities are allowed without restriction. They are important to fill you up and give variety:

- Vegetables
- Fruit
- Some flours, grains and pastas
- Seasoning, stocks, sauces and condiments
- Fats and oils
- Milk substitutes
- Drinks
- Sugar, desserts and lollies

## 5 + 2 every day

### Vegetables

- Healthy eating guidelines for Australians recommend 5 serves of vegetables each day.
- Many vegetables do not need to be counted.

**Always count these vegetables: potato, peas, corn, broccoli, pumpkin, spinach and sweet potato, avocado – see orange list**

**Dried beans and lentils are too high in protein for most people with PKU and should be avoided e.g. baked beans, dried beans, lentils, chickpeas. See red list**

#### More on beans and peas:



Beans and peas eaten with the pod e.g. green beans or snowpeas do not need to be counted.



Beans or peas eaten as just the seed are much higher in protein

## **Fruit**

- Healthy eating guidelines for Australians recommend at least 2 serves of fruit a day
- Most fresh, frozen, dried or canned fruits do not need to be counted

The following fruit is free in the quantities shown. Count using the orange list if larger quantities are eaten:

- Banana – ½ small
- Mulberries – ½ cup
- Pomegranate – 1-2 teaspoons

## **Flours, grains, pasta, breads, cereals and biscuits**

Most flour, grains, pasta and foods made from them are quite high in protein and need to be counted.

The following can be used freely:

- Special low protein flour, baking mixes, breads, biscuits, pasta, rice and breakfast cereals (see P 103 PKU handbook)
- Arrowroot
- Cornflour
- Custard powder
- Tapioca, sago
- Potato flour – maximum 1 ½ cups a serve
- Baking powder, baking soda, cream of tartar
- Yeast if used to make bread with low protein flour
- Food colours, and essences eg vanilla, almond
- Egg replacer (see p92 and 106 PKU Handbook)
- Bean thread vermicelli (check food labels)

## **Seasonings, stocks, sauces and condiments**

The following are low in protein and do not usually need to be counted in normal amounts.

- Salt, pepper, vinegar, herbs and spices
- Curry powder and pastes (check food labels)
- Salad dressing e.g. French, Italian, Coleslaw Dressing, 1000 Island Dressing, mayonnaise (check food labels)
- Tomato, Barbecue and Worcestershire sauce
- Fruit chutney, mustard pickles
- Gravy powder and ready made (check food labels) – do not make with pan drippings
- Ready made pasta and casserole sauces (check food labels)
- Mustard (check food label)
- Stock cubes and stock (check food labels for lowest). Do not make stock from bones or meat

## **Fats and Oils**

The following contain very little protein and may be used freely:

- Butter\*
- Margarine\*
- Copha
- Cooking fat
- Aerosol or whipped cream with less than 0.3g protein per serve\*
- Ghee
- Oil

\*See orange section for reduced fat butter and margarine (which are higher in protein) and cream.

## Substitutes for milk

These can be used on cereal, or to make low protein drinks, custards and puddings

- Rice or oat drinks available from your health food shop (check label for lowest protein content – count if more than 0.3g protein per serve)
- A mixture of cream and water (1 tablespoon + 100ml water) – count if more than 0.3g protein per serve
- coffee creamer eg Coffeemate, mixed with water – count if more than 0.3g protein per serve
- Vance's DariFree
- Duocal (discuss with your clinic Dietitian) mixed with water or Pro Zero -free
- Loprofin low protein drink mix or PKU tetra pak – count if more than 0.3g protein per serve

## Drinks

### Water is the best drink.

Juice, soft drinks and cordials can dull a child's appetite for food and aren't good for the teeth. They are best kept to being a treat once or twice a week.

- Dilute juice for babies and limit to 100mls per day
- Cordials, soft drinks, fruit drinks, apple juice, flavoured mineral water contain no protein and do not need to be counted
- Some juices contain more protein than others - limit 100% juice to 1 cup a day for older children – it is better to drink water and eat the fruit!
- Read Chapter 13 for information on dental care
- Remember diet drinks may contain aspartame and should be avoided
- Tea (black, green, herbal) and coffee does not need to be counted for older children and adults
- Flavoured milk drinks can be made using milk substitutes and Nesquik or Sippah flavoured straws.

### Alcoholic drinks for adults

Alcoholic drinks are **NOT** suitable for children but can be used in cooking eg in casseroles.

Beer and stout need to be counted (see orange list). These drinks have little or no protein:

- Wine - red, white, champagne, wine coolers
- Port
- Sherry
- Spirits – eg rum, whiskey, gin, vodka

Check the PKU Handbook 2005 page 112 for guidelines on responsible drinking for adults and serving sizes.

Many drink bigger serves than one standard drink and this could add up to a significant amount of protein.

Pre-mixed drinks may contain artificial sweeteners aspartame (951) or acesulphame-aspartame (962) which contain phenylalanine. Check the label.

## **Sugar, desserts and lollies**

The following contain very little protein and may be used freely:

- Sugar (all types)
- Jam, honey, golden syrup, maple syrup, marmalade, treacle
- Jelly thickened with vegetable gum (not gelatine). Check the ingredient list: the numbers 406, 407, 410, 412, 413, 414, 415, 416 are vegetable gums. Ready-made jellies (in the refrigerator cabinet) are usually set with vegetable gum.
- Lollies without chocolate, milk, gelatine or nuts – check the labels of barley sugar, boiled lollies, toffee, jelly beans, pastilles, snakes, candy floss, fairy floss
- Low protein chocolate (Duobar, Vita-bite,)
- Ice blocks without ice cream or milk e.g. icy poles
- Ice cream toppings, 100's and 1000's sprinkles

Frequent eating of high sugar foods and drinks can cause tooth decay. See Chapter 13 PKU Handbook for advice on dental care

Sugar free lollies and chewing gum may contain aspartame- check the label

## THE "CAUTION" OR COUNTED FOODS.

These lists give information on foods that need to be counted but may not have food labels. Use food labels where ever possible to count protein except for fruit.

The dark shaded last column of the table gives the weight of the food that contains 1 g of protein and is useful when calculating protein content of recipes or weighing foods.

### Fruits

The following fruits are higher in protein and must be counted if the amount eaten contains more than 0.3g protein.

Fresh fruits

Food	Type	Serve	Edible weight g	Protein Equivalent per serve g	Weight (g) containing 1g protein equivalent
Banana common	Fresh	½	70 (110g with skin)	1	60
Banana sugar	Fresh	1	60	1	67
Mulberry	Fresh	1 cup	130	1.5	77
Pomegranate	Fresh	½ fruit	120 (210g with skin)	1.5	87

### Vegetables

The following vegetables are higher in protein and must be counted if the amount eaten contains more than 0.3g protein.

The protein content of legumes (dried peas, beans, chickpeas and lentils) are higher and values are provided in the red section.

Food	Type	Serve	Edible weight g	Protein equivalent per serve g	Weight (g) containing 1g protein equivalent
<b>Avocado</b>	Raw	1/2	80	1	75
<i>Weight of whole avocado with skin and seed = 240g = 2g protein</i>					
<b>Broccoli</b>	Raw, boiled	1 cluster	45	1.5	37
<b>Corn</b>					
Baby corn	Canned	10 spears	160	2	77
Creamed Corn	Canned	½ cup	130	2	63
Corn kernels	Canned, frozen, boiled	½ cup	88	2	43
Corn on the cob	Raw, frozen, boiled	Corn from 1 cob	85	2	43
Weight with cob 130g					
Weight of cob with leaves=300g=5PE					
<b>Peas</b>					
Peas, green	Raw, frozen, boiled, canned and drained	¼ cup	40	2	20

Food	Type	Serve	Edible weight g	Protein equivalent per serve g	Weight (g) containing 1g protein equivalent
Sugar snap peas	Fresh or boiled	10 pods	35	1	35
<b>Potato</b>					
Potato	Peeled, raw or boiled, or baked in jacket	1 medium or 2 small	120	2.5	50
Potato	Roasted in oil	1 medium	100	2.5	43
Potato chips	Commercial	1 cup	95	3.5	30
Potato chips	Oven fried	3/4 cup	70	2.5	27
Potato hash brown	Fried take-away	2 cakes	110	2	53
Potato salad	Commercial	1.cup	180	2.5	67
Potato scallop	Fried take-away	½ scallop	48	2	23
<b>Pumpkin</b>	Peeled, raw, boiled	½ cup	75	1	75
	Peeled and baked		80	2	40
<b>Spinach (English)</b>	Frozen or fresh boiled	¼ cup	45	1.5	30
	raw	1 cup	35	1	40
<b>Sweet potato</b>	Orange peeled, raw or boiled	½ cup	120	2	53
	White peeled, raw, boiled or baked	½ cup	120	1.5	70

## Bread, cakes, pastry and yeast

Low protein versions are better choices for most people with PKU.

Most bread, cakes and pastry have nutrition labels on the packaging. Use the label where possible. Remember if your child gets use to the taste of ordinary bread, they may not eat the low protein varieties

Food	Type	Serve	Weight of serve g	Protein g per serve	Weight containing 1g protein
Bread	Fruit loaf	1 slice	33	2.5	12
Bread	Lebanese	½ bread	55	5	11
Bread	White	1 slice	30	2.5	13
Bread	Wholemeal/Brown	1 slice	30	3.0	11
Breadcrumbs	Commercial	½ cup	50	6.0	8
Crumpet	White	1	50	2.5	20
Doughnut iced	Commercial	1	80	4.5	18
Lamington	Commercial	1	75	3.5	21
Meringue	Commercial	1 small	25	0.5	38
Muffin	English	½ toasted	40	4.0	10
Pastry filo	Raw	2 sheets	27	2.5	10
Pastry puff	Raw	½ sheet	85	4.5	18
Pastry shortcrust	Raw	½ sheet	90	5.5	17



## Flours, Grains and Pasta

Low protein versions are better choices of these unless protein tolerance is high

Food	Type	Serve	Weight of serve per g	Protein g per serve	Weight containing 1g protein
Barley pearl	Boiled	½ cup	95	2.5	41
Bulgar	boiled	½ cup	133	3.5	38
Bulgar	Dry	¼ cup	45	4.5	10
Bulgar	Soaked	½ cup	102	5.5	19
Coconut	Dessicated	½ cup	40	2.5	15
Couscous	cooked		100	5	19
Flour, white or wholemeal	Plain or self raising	½ cup	70	7.5	9
Oat bran	Raw	1 tablespoon	11	2.0	6
Noodle rice stick	Boiled		70	1.5	53
Noodle wheat Asian style	Boiled		70	4.5	16
Pasta	Raw white	½ cup or 30 strands	26	2.5	10
Pasta	Boiled	1 cup or 30 strands	70	3	24
Polenta	Raw	¼ cup	38	3.0	12
Pop corn	Popped with fat	1 cup	15	1.5	11
Pop corn	Air popped	1 cup	15	2	8
Potato flour	Raw	2 cups	300	1.0	333
Prawn crackers	Take away				27
Rice, brown	Boiled	½ cup	90	2.5	34
Rice brown	Raw	1 tablespoon	20	1.5	14
Rice brown	Raw	¼ cup	49	3.5	14
Rice cereal, baby rice		1 tablespoon			
Rice flour	Raw	½ cup	83	5.0	17
Rice white	Boiled	½ cup	95	2.0	50
Rice white	Raw	¼ cup	51	3	16
Rice white or sungold	Raw	2 tablespoons	40	2.5	16
Rolled oats	Raw	¼ cup	24	2.5	9
Rye whole flour	Raw	½ cup	55	7.0	8
Semolina	Dry	1 tablespoon	20	2.0	10
Semolina	Dry	¼ cup	40	4.5	10
Wheat bran	Raw	2 tablespoons	10	1.5	6
Wheatgerm	Dry	1 tablespoon	6	1.5	4

## Seasonings, stocks, sauces, spreads and condiments

These items need to be counted

Food	Type	Serve	Weight of serve g	Protein g per serve	Weight containing 1g protein
Low protein cheddar and mozzarella cheese	Loprofin		28	1	28
Marmite/ Bonox		1 teaspoon	6	1.0	6
Marzipan		1cm slice	15	1.0	14
Meat paste	Commercial	1 tablespoon	20	2.5	8
Mustard	Dry	1 tablespoon	8	2.5	3
Mustard	Made-up paste	1 tablespoon	22	1.5	17
Peanut butter		1 tablespoon	25	7.0	4
Soy sauce		1 tablespoon	24	1.5	19
Vegemite		1 teaspoon	6	1.5	4

## Cream

Reduced fat butter blends and cream is usually higher in protein than the full fat products.

Food	Type	Serve	Weight of serve (g)	Protein per serve (g)	Weight (g) containing 1 g protein
Butter	Dairy blend, reduced fat	1 tablespoon	18	1	25
Coconut cream	Canned	¼ cup	62	1	53
Cream	Light sour	1 tablespoon	21	1	23
Cream	Pure, UHT or thickened	2 tablespoon	40	1	42
Cream	Reduced fat	2 tablespoon	40	1	33
Cream	Rich or double thick	3 tablespoons	57	1	59
Cream	Sour	2 tablespoons	40	1	42
Cream	Whipped	4 tablespoons	40	1	43

## Drinks

These drinks need to be counted. Choose low protein alternatives

Food	Type	Serve	Serve size	Protein g per serve	Weight containing 1g protein
Cocoa	Powder	1 tablespoon	7g	1.5	5
Milk	Full cream	1 ½ tablespoon	30ml	1	30
Milo, Ovaltine, Malted milk	Powder	1 tablespoon	7g	1	8

### Alcoholic drinks

Beer and stout contain protein and need to be counted

	Serve	Serve size	Protein g per serve
Beer, extra lite beer, lite beer	1 can	375 ml	1.0
Stout	1 bottle	375	2.5

Check the PKU Handbook 2005 page 112 for guidelines on responsible drinking for adults and serving sizes.

Many of us drink bigger serves than one standard drink and this could add up to a significant amount of protein.

Pre-mixed drinks may contain artificial sweeteners aspartame (951) or acesulphame-aspartame (962) which contain phenylalanine. Check the label.



## THE "STOP" FOODS

Most people on a low protein diet will not be able to have these foods or include them in small amounts only. Ask your Dietitian.

Food	Type	Serve	Weight of serve g	Protein g per serve	Weight containing 1g protein
<b>Beans and legumes</b>					
Baked beans	Canned	½ cup	135	6	22
Broad beans	Fresh, raw or boiled (beans only)	½ cup	78	5.5	14
Canellini beans	Canned, drained	½ cup	128	8	16
Chickpeas	Canned, drained	½ cup	92	6	16
Haricot beans	Dried, boiled	½ cup	88	7	12
Lentils	Dry		20	5	4
Lentils	Dried, boiled	½ cup	100	6.5	15
Lima beans	Dried and boiled	½ cup	112	7	16
Mixed beans	Canned, drained	½ cup	100	6	16
Red kidney beans	Canned, drained	½ cup	96	6	15
Red kidney beans	Dried and boiled	½ cup	90	7	13
Soya beans	Canned and drained	½ cup	98	8	12
Soya beans	Dried and boiled	½ cup	86	13	7
<b>Egg</b>					
Egg white	raw	1 white	31	3.5	9
Egg whole	raw	1 egg	48	6.5	7.5
Egg yolk	raw	1 yolk	17	2.5	6.5
<b>Milk and dairy</b>					
Cheese	Cheddar	1 slice	21	5	4
Cheese	Ricotta/cream	2 tablespoons	50	4	12
Ice cream vanilla	Regular	2 scoops	100	4	25
Milk	Full cream	½ cup	125	4	30
Soy "milk"		½ cup	125	4.5	29
Yoghurt	plain	1 tub	200	11	18
	flavoured	1 tub	200	10	20
<b>Meat and fish</b>					
Bacon	Raw	1 rasher	39	7.5	5
Beef Mince	Raw	¼ cup	60	12	5
Beef topside	Raw	1 slice	50	11	5
Chicken breast	raw	¼ breast	56	12.5	4

<b>Food</b>	<b>Type</b>	<b>Serve</b>	<b>Weight of serve g</b>	<b>Protein g per serve</b>	<b>Weight containing 1g protein</b>
Fish white	Raw	½ fillet bream	87	17	5
Lamb leg	raw	1 slice	50	10.5	5
Pork leg	raw	1 slice	45	9	5
Salami		3 slices	15	3	5
Sausage	raw	½ thick	47	5.5	7
<b>Nuts and seeds</b>					
Chestnuts	No shell		100	2.5	50
Nuts mixed		¼ cup	40	8.5	5
Peanut butter	Paste	1 tablespoon	25	7.0	4
Pine nuts		1 tablespoon	14	2.0	8
Sesame seeds		1 tablespoon	13	3.0	5
Sunflower seeds		1 tablespoon	16	3.5	4
Tahini	Paste	1 tablespoon	21	4.5	5
<b>Snack food and confectionary</b>					
Chocolate	Dark	6 squares	29	2	16
Chocolate	Milk	6 squares	29	2.5	12
Liquorice		10cm piece	26	1	20
Marshmallow			30	1	26
Gelatine	Regular	1 tablespoon	13	11	1
Jelly made up	Gelatine based	1 cup	280	3	100