



# GOOD GRAINS FOR GOOD GUT HEALTH

EXPLORING GRAINS AND HOW FIBRE CONTENT PROMOTES  
GUT HEALTH



**GRDC**

GRAINS RESEARCH  
& DEVELOPMENT  
CORPORATION

A TEACHING UNIT FOR YEAR  
9 & 10 HOME ECONOMIC  
AND NUTRITION STUDENTS

# About the GRDC

## The GRDC

The Grains Research and Development Corporation is a statutory authority established to plan and invest in research, development and extension (RD&E) for the Australian grains industry.

Its primary objective is to drive the discovery, development and delivery of world-class innovation to enhance the productivity, profitability and sustainability of Australian grain growers and benefit the industry and the wider community.

Its primary business activity is the allocation and management of investment in grains RD&E.

## GRDC Vision

A profitable and sustainable Australian grains industry, valued by the wider community.

## GRDC Mission

Create value by driving the discovery, development and delivery of world-class innovation in the Australian grains industry.

## GRDC Values

- We are committed and passionate about the Australian grains industry.
- We value creativity and innovation.
- We build strong relationships and partnerships based on mutual trust and respect.
- We act ethically and with integrity.
- We are transparent and accountable to our stakeholders.

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# 1.0 Teaching the science of grains



The Grains Research and Development Corporation has invested in the development of a suite of user-friendly grain education resources and initiatives for students, teachers and families.

These resources have been developed with teacher and researcher input and have been designed following a comprehensive survey of more than 340 teachers throughout Australia.

In each of our curriculum-linked resources we have incorporated a range of lesson plans which explore the latest science, technology, engineering, mathematics, nutrition, research and innovation in the Australian agricultural industry. You can use these resources as a unit or select components to complement your teaching plan.

By using an investigation and inquiry based approach, students will touch, try, taste and even smell the science of the Australian grains industry. It provides an ideal and relevant teaching context to engage students in food production.

Specifically, resources are available to address the food and fibre curriculum descriptors in geography, science, home economics and agriculture.

We hope you have fun teaching with these resources. Please contact us for more information.

Kind regards

**The GRDC Education Team**

# 2.0 Learning outcomes and curriculum links

## About good grains for good gut health

Grains and legumes are an important part of a healthy diet. In fact, the Australian Dietary Guidelines recommend that a variety of grains and legumes are eaten every day. Good sources of grain include breads, pasta, noodles and cereals, while good sources of pulses include baked beans, chickpeas and lentils. This ensures Australians are getting key nutrient essentials which include vitamins, minerals and fibre.

Grains and legumes or pulses are a wonderful source of insoluble fibre, soluble fibre and resistant starch. These fibres help to aid digestion, reduce the risk of diseases including diabetes and bowel cancer and reduce weight gain. Australians are not getting enough fibre. Focusing on grains, this resource explores fibre to promote gut health.

## Overview

From wholefoods to new products, this resource explores the role of grains as a source of dietary fibre. Students are tasked with evaluating health information and exploring nutritional concepts, food labels and ingredients while looking at the connection of wholefood attributes to health outcomes for the consumer. This resource engages students with new and familiar nutritional concepts (such as dietary fibre, proteins) through activities, critical reviews and ICT. Analysis and review is practised in a case study and communication skills explored through activities around community health awareness.

## Curriculum focus

Students should be able to

- Explore the function of ingredients to better understand their relevance in health and consumer preference.
- Explain the function of fibre within the body.
- Apply health information to health decisions and situations.
- Reflect, evaluate and analyse.

## Australian curriculum content descriptions

### Health and physical education

#### Personal, social and community health

#### Communicating and interacting for health and wellbeing

Evaluate and apply health information from a range of sources to health decisions and situations (ACPPS095).

#### Contributing to healthy and active communities

Plan, implement and critique strategies to enhance health, safety and wellbeing of their communities (ACPPS096).

### Design and Technologies

#### Design and technologies processes and production skills

Explain how products, services and environments evolve with consideration of preferred futures and the impact of emerging technologies on design decisions (ACTDEK041).

### Science

#### Science as a human endeavour

#### Use and influence of science

Values and needs of contemporary society can influence the focus of scientific research (ACSHE230).

# 3.0 Teaching unit content and overview

This resource contains a range of curriculum-linked lesson plans which teachers can cut, paste, and utilise as they see fit. Our team work to develop resources which are interactive, fun and fit into your busy teaching schedule. The below table summarises the wide modes of engagement strategies including activity supported insights, exploring critical and lateral thinking and inquiry – use some of these lesson plans or all. Whatever you do, we hope you have fun teaching your students about the role of grains and legumes in promoting good gut health.

<b>PAGE</b> <b>9</b>	<b>4.0 Introduction</b> Healthy Grains and Legumes	Engage students by asking them to think about grain and legume based foods which they include in their own diet. Discuss the health benefits of eating from these two food groups, leading into learning about fibre.
	<b>Watch</b>	<ul style="list-style-type: none"> <li>To introduce students to the concept of having a healthy gut, watch this TED talk. Ask students what they understand about gut flora and how what we eat is important for gut health. Resistant starch is important for healthy and happy bacteria in our stomach. This video explores the significance of good gut health.</li> <li><i>The gut flora: You and your 100 trillion friends: Jeroen Raes at TEDxBrussels (~9 Minutes)</i> <a href="https://www.youtube.com/watch?v=Af5qUx1fktl">https://www.youtube.com/watch?v=Af5qUx1fktl</a></li> </ul>
<b>PAGE</b> <b>11</b>	<b>5.0 Insight</b> Fibre facts	Ask students to list foods which they think are high in fibre. Work through the fact sheet which explains the different types of fibre. Support this with the below video and questions.
	<b>Watch</b>	View and answer the questions 'Fab Fibre' Catalyst, ABC, Maryanne Demasi, April 2010 <a href="http://www.abc.net.au/catalyst/stories/2873729.htm">http://www.abc.net.au/catalyst/stories/2873729.htm</a>
<b>PAGE</b> <b>13</b>	<b>6.0 Insight</b> Barley Buzz	<p>Barley is an example of grain being researched in Australia for its health and food processing properties. The Grains Research and Development Corporation invests about \$160 million annually into 25 different grains and pulses focusing on sustainability, profitability and extension. Included in this research is ensuring that what is grown is meeting market requirements, developing new foods and crops and ways of processing. Use this information to introduce the example of recent research into the genes of beta-glucan and the application of this information.</p> <p>More information: There are 25 grain crops that are the responsibility of the GRDC: barley, oats, wheat, sorghum, triticale, millet, cereal rye, canary seed, maize, lupin, field peas, chickpeas, faba beans, vetch, peanuts, mung beans, navy beans, pigeon pea, soybeans, cowpeas, lentils, canola, sunflower, safflower and linseed. Current areas of investment in grains include meeting market requirements, improving crop yield, protecting crops, advancing farming systems, improving farm resource bases, building skills and capacity and foundational activities.</p>
<b>PAGE</b> <b>14</b>	<b>7.0 Review</b> Barley research	Students are to read one or both of the media articles about recent barley research and answer the accompanying questions.

<p><b>PAGE</b> <b>15</b></p>	<p><b>8.0 Insight</b> Fibre and resistant starch</p>	<p>Resistant starch is beneficial for gut health in a similar way to fibre. Students are to read through the information provided as an introduction to resistant starch. Overall this activity is about fibre and wholegrains. Resistant starch is highlighted because of its recent research and discovery. The information also provides a historical synopsis of fibre and carbohydrate research.</p> <p><b>MORE READING</b> The African Diet Swap (Rhonda Witwer) <a href="http://www.resistantstarch.us/posts/diet-swap/">http://www.resistantstarch.us/posts/diet-swap/</a></p> <p>The Resistant Starch Report (Landon, S et Al) <a href="http://foodaust.com.au/Resistant_Starch_Supplement.pdf">http://foodaust.com.au/Resistant_Starch_Supplement.pdf</a></p> <p>Dr Hugh Trowell <a href="http://mccarrisonsociety.org.uk/founders-of-nutrition-othermenu-149/trowell-othermenu-145?showall=&amp;start=10">http://mccarrisonsociety.org.uk/founders-of-nutrition-othermenu-149/trowell-othermenu-145?showall=&amp;start=10</a></p>
	<p><b>Watch</b></p>	<p>'The Hungry Microbiome' - This animation released by CSIRO illustrates how starch is beneficial for gut health.</p>
<p><b>PAGE</b> <b>16</b></p>	<p><b>9.0 Activity</b> Super starch</p>	<p>To begin, ask students to read and review the article on resistant starch produced by the GRDC about CSIRO research.</p> <p>Grains Research and Development Corporation, 'Science backs the sweet smell of beans', Branagh, M, April 2015, <a href="http://grdc.com.au/Media-Centre/Ground-Cover/Ground-Cover-Issue-116-May-June-2015/Science-backs-the-sweet-smell-of-beans">http://grdc.com.au/Media-Centre/Ground-Cover/Ground-Cover-Issue-116-May-June-2015/Science-backs-the-sweet-smell-of-beans</a></p> <p>Students are then to read the case study.</p> <p>Internet access required: Visit the National Reference Values for Australia and New Zealand page <a href="https://www.nrv.gov.au/">https://www.nrv.gov.au/</a> and ask students to navigate through to fibre. Record the reference value for each patient in the case study. This could be done individually or as a class. Students are then to select one of the patients and 'Assess the example diet' as an individual task. Using the tables provided in the resource, students should assess the current fibre and resistant starch levels of the patient. Students can then evaluate how these totals compare with the NRV and create a new meal plan, recording the altered fibre and resistant starch intake.</p>

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**10. Activity**  
Fibre frenzy

Students are to select one or complete all of the following tasks about fibre. These activities could be set as classroom/homework tasks or extended to become assessment pieces.

1. Fibre content claims: Either purchase or ask students to buy a product from the supermarket which makes a claim about fibre content on the packaging/marketing. Compare the guidelines put in place by the Food Standards of Australia and New Zealand. (<http://www.foodstandards.gov.au/Pages/default.aspx>) Discuss with students what other claims they have seen on grain and legume based foods, the importance of having guidelines for health claims and any foods they found that were high in fibre they were previously unaware of.
2. Promoting the consumption of wholefoods high in fibre: Ask students to design a health campaign for their peers which encourages the consumption of high fibre foods. They can refer to the Food Standards of Australia and New Zealand for health claim guidelines. Additionally, students could utilise resources for 2016 Year of the Pulse to find information for their campaign. e.g. Grains and Legume Council - Australia <http://www.glnc.org.au/> or Pulse Australia <http://www.pulseaus.com.au/about/international-year-pulses>
3. Developing foods which have a higher fibre content: Students are to research BARLEYmax. Products containing this high fibre barley can be found in the supermarket. This could be another opportunity to explore health claims relating to fibre and consumer needs. More reading: BARLEYmax, <http://www.csiro.au/en/Research/AF/Areas/Plant-Science/Wheat-barley/BARLEYmax>
4. Increasing dietary fibre through nutritional supplements: Encourage debate between students about the use of supplements. Students are to select one fibre supplement and use the questions provided to write a synopsis about it.

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**11. Practical**  
Slice of Fibre

This practical asks students to modify a pizza dough recipe to increase its fibre content. They are to first calculate the amount of fibre in the common recipe. To do this, ask students to calculate fibre using the per serve (often 1 Cup) or per 100g dietary fibre as listed with the amount of flour used in the recipe. Secondly, students are to find a flour which has a higher fibre content. Using this alternative flour, they are to modify the common pizza dough recipe. Student may also wish to add additional ingredients, like bran, to increase its fibre. They must calculate the total fibre content for the modified recipe. Thirdly, students are to bake this dough with no toppings on it and complete a sensory analysis of their modified recipe. If a tight timeline, break off a small piece of the dough to bake for sensory analysis and let the students make a pizza with toppings with the remaining dough.

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# 4.0 INSIGHT

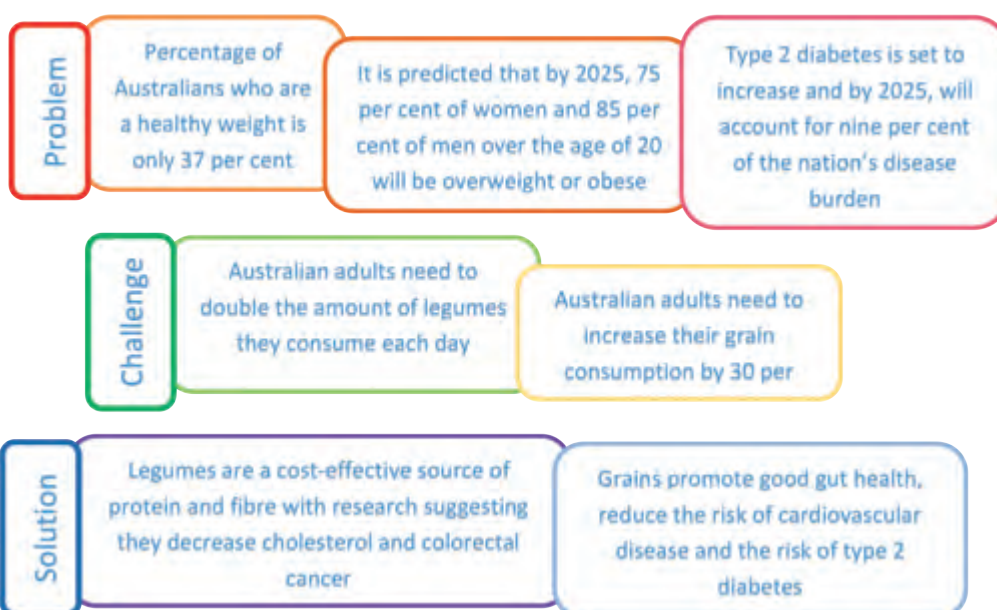
## Healthy grains and legumes

Grains and legumes or pulses are an important part of a healthy diet. Health experts in Australia recommend that we aim to eat five serves of vegetables, including legumes, and between four and six serves of grains every day. This ensures that we are getting key nutrient essentials including vitamins, minerals and fibre.

List some of the cereal grain and legume based foods which you know.

### Legumes/pulses

### Cereal Grains



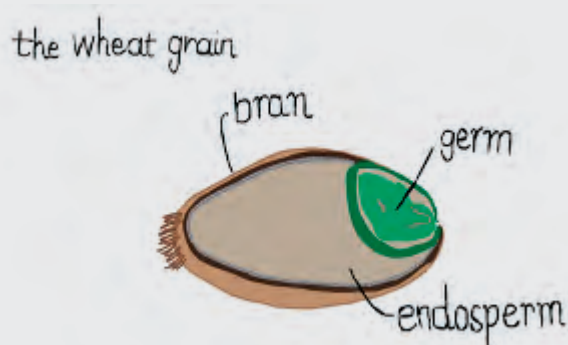
## Grains, legumes and fibre

Grains and legumes are a wonderful source of insoluble fibre, soluble fibre and resistant starch. These fibres aid digestion, reduce the risk of diseases including diabetes and bowel cancer and reduce weight gain. Australians are not getting enough fibre and the fact that we are not eating enough grains and legumes is a major contributing factor.



### Insight

Let's take a closer look at a grain of wheat to understand where this fibre comes from:



The **ENDOSPERM** helps the wheat when it is young, providing nutrients and food. It contains soluble fibre.



The **BRAN** protects the wheat grain. It contains insoluble fibre and resistant starch.



Delivering nutrients to the plant, the **GERM** is the embryo – where the grain begins! It contains insoluble fibre.

*Wholegrain Foods Fact Sheet, GLNC, 2014*

# 5.0 INSIGHT

## Fibre Facts

An important part of everyday diet, fibre is the focus of much nutritional research. Fibre comes from plant based products and is indigestible, meaning that it is not broken down or absorbed in the stomach but serves other purposes. Fibre travels to the intestines where it is beneficial for gut health. Two of the fibres that keep us healthy are *insoluble fibre* and *soluble fibre*. Each fibre assists us in different ways.

### Discussion

What grains and legumes have you heard of that contain good amounts of fibre?

<b>SOLUBLE FIBRE</b>	<b>Ferments in the colon.</b> Soluble fibre helps to keep us full and keep our blood cholesterol and glucose at a manageable level.	Soluble fibre is found in legumes (e.g. beans, peas, lentils), cereals (oats, barley), flax seed, fruits and vegetables.
<b>INSOLUBLE FIBRE</b>	<b>Ferments in our large intestine.</b> Insoluble fibre helps to fill us up as it is bulky and absorbs water. This keeps us regular and aids in prevention against diseases including bowel cancer.	Insoluble fibre is found in wholegrain foods, wheat, legumes, nuts and seeds.

An additional type of fibre is *resistant starch*. Resistant starch travels to the large intestine where it is digested or fermented by good bacteria which keeps the lining of the bowel in good condition. Resistant starch can be found in legumes and wholegrains including brown rice, breads, pasta, noodles, rice and crisp breads. Resistant starch is also found in potato which has been cooked and then cooled.

## Watch

Watch this short segment which focuses on recent research in fibre consumption.

**'Fab Fibre' Catalyst, ABC, Maryanne Demasi, April 2010**

<http://www.abc.net.au/catalyst/stories/2873729.htm>

After watching this segment, answer the following questions.

**What nutritional component is important to feed our intestinal bacteria?**

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**How has our diet changed over the past 50 years?**

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**What are the bi-products of fibre being fermented in the gut by bacteria?**

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**What does this bi-product do to the body?**

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# 6.0 INSIGHT

## Barley Buzz



### Did you know?

There are 30,000 genes in barley but only 20,000 genes in humans.

Each year in Australia, about seven million tonnes of barley is grown, making it the second largest grain crop in the nation following wheat. Barley is low in fat, high in carbohydrate and high in soluble fibre. It is very versatile and plays a role in food processing, beverage production, human health and livestock feed.

### Brainstorm: What foods contain barley?



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_____	_____
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_____	_____
_____	_____
_____	_____

### Super barley and beta-glucan

We are still researching and discovering a lot about grains and pulses. In Australia, grains are essential to health, consumer demand and our economy, therefore, a lot of money and resources are invested in research and development. Molecular biologist, Dr Rachel Burton from the University of Adelaide and her team discovered the family of genes which make a type of dietary fibre called beta-glucan. It took the team 14 years of scientific research to discover this!

Beta-glucan is found in the cell wall of barley. Cell walls hold the cell together, give the plant strength, act as a barrier to what comes in and goes out of the cell and can be very nutritious.

Beta-glucan is found in barley, oats and wheat. Beta-glucan is good for human health and research is now focused on increasing the amount of this fibre in wheat and barley. Beta-glucan helps to prevent and treat:

- colorectal cancer
- high cholesterol
- obesity
- cardiovascular disease
- non-insulin dependent diabetes

The fibre in barley dissolves in your digestive tract and slows the absorption of sugar which is important for diabetics. In the large intestine the microbes ferment the fibre. This process produces a chemical which protects against cancer.

Understanding the beta-glucan in barley is helping in refining the malting and brewing process. Furthermore, this discovery is also important for livestock as pigs and chickens cannot handle high levels of beta-glucan, so understanding these genes means this fibre can be lowered in their feed.

# 7.0 ACTIVITY

## Barley Research

Read the following articles about barley research and health, then answer the corresponding questions.

### **CSIRO cereal a real superfood by Nick Galvin, July 5 2011, Sydney Morning Herald**

<http://www.smh.com.au/lifestyle/diet-and-fitness/csiro-cereal-a-real-superfood-20110705-1gzvz.html>

**Which scientific body conducted the research?**

**What was the product of the research and how does it differ to other similar products?**

**What are the nutritional benefits of this product?**

**How is this product marketed?**

### **'Increasing our fibre intake', July 2006, Adelaidean**

<http://www.adelaide.edu.au/adelaidean/issues/12741/news12754.html>

**Which scientific body conducted the research?**

**What was discovered?**

**What are the potential nutritional benefits of this discovery?**

# 8.0 INSIGHT

## Fibre and resistant starch

There are three main types of fibre important to human health: soluble fibre, insoluble fibre and resistant starch. Resistant starch is named because it resists being digested by the enzymes in the small intestine and instead travels to the large intestine. The bacteria then digest the starch producing gas and short-chain fatty acids which are beneficial for the lining of the gut.

Resistant starch also feeds the bacteria, creating a healthy microbiome which is a community of microorganisms that live in your gut and help your digestive tract to function. Did you know we have 10 times more bacteria in our intestines than cells in our whole body? This community of bacteria is important in aiding digestion and protecting your body against toxins. However, if a person is not eating a healthy diet and consuming enough resistant starch, these good bacteria do not flourish.

It is currently recommended that we consume 20 grams of resistant starch every day, yet in Australia, on average we only consume between three and nine grams.

There are four types of resistant starch. Read about the four types below and suggest how you could include each type of resistant starch in your diet. This could be as a whole food or as part of a recipe.

	DESCRIPTION	FOOD EXAMPLES	DIET SUGGESTION
RS1	A starch which cannot be physically broken down, even by cooking.	Partly milled grains, seeds, legumes.	
RS2	Granular starch which resists being broken down by digestive enzymes. Can become digestible through cooking and processing.	Green bananas, raw potatoes.	
RS3	Starch which is cooked and then cooled. New chemical bonds are formed when cooling, making this starch resist digestion.	Bread, cornflakes, and cooked and cooled potatoes.	
RS4	Starch created by chemical modification which are not naturally occurring.	Processed starchy foods including bread and cake.	

It should be noted that resistant starch is part of ongoing scientific research in Australia and the specifics of each type R1 to R4 are still being determined.

### Historical note

British physician Dr Hugh Trowell investigated dietary fibre during the 1960s and 70s and was among the first to highlight fibre as an important nutrient. Dr Trowell worked in East Africa for more than thirty years. He noticed that diets there mainly consisted of starchy foods with high amounts of 'roughage' and stools were soft and bulky.

Through his studies, Trowell recognised that common Western diseases were very uncommon in rural parts of Africa. The physician hypothesised that this difference was a reflection of the difference in diet and in particular, unrefined carbohydrates. As unrefined carbohydrates are higher in fibre, this was the likely benefactor in lowering the risk of disease.

# 9.0 ACTIVITY

## Super starch

### Review

Read this article about gut health in Australia. Answer the questions which follow.

**‘Science backs the sweet smell of beans’ by Melissa Branagh, Grains Research and Development Corporation, April 2015**

<http://grdc.com.au/Media-Centre/Ground-Cover/Ground-Cover-Issue-116-May-June-2015/Science-backs-the-sweet-smell-of-beans>

**Insoluble fibre improves our gut health in what way?**

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**What are the little known benefits of soluble fibre?**

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**According to Dr Topping, what do gut bacteria feed on when we do not eat enough resistant starch?**

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**Australia is one of the world’s lowest consumer of what food?**

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**What foods is resistant starch found in?**

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## Case study

Three patients have all been advised by their dietician they each need to increase the amount of fibre intake in their diet. As each patient has a family history of bowel problems, it has been suggested that in particular they focus on foods that have higher levels of resistant starch.

This activity looks at how fibre consumption can be increased to ensure individuals are meeting their daily requirements. The three patients have provided a food diary that is very similar. You are provided with an example of their daily intake. Using the recommended daily intake of fibre for their gender

and age, create a food plan that includes an increase in dietary fibre. As the dietician has specified that this new diet should focus on resistant starch, ensure that you include foods which contain this.

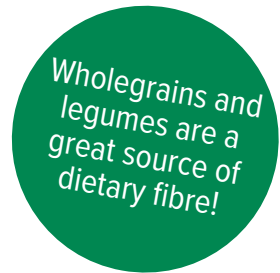
The Australian Government Department of Health and the New Zealand Ministry of Health have worked together to create a nutritional reference guide for people based on age and gender. This guide is titled the Nutritional Reference Values and is freely accessible to the wider community.

**Record the recommended daily intake of fibre for each patient using the Nutrient Reference Values found in the link below**

[www.nrv.gov.au](http://www.nrv.gov.au)

KATE, FEMALE, 13	JOHN, MALE, 21	JANE, FEMALE, 45

# Assess the example diet



Assess the fibre intake of one of these individuals (based on their individual daily need).

**Individual** \_\_\_\_\_

CURRENT MEAL PLAN	FIBRE	RS
<b>Breakfast</b>		
1 cup fruit drink		
Small tub yoghurt Or puffed rice cereal and fruit salad		
<b>Snack</b>		
1 banana, ripe 1 packet of chips		
<b>Lunch</b>		
Jam or chicken and tomato sandwich, white bread 1 chocolate milkshake		
<b>Snack</b>		
Carrot sticks		
½ cup cheddar cheese cubes		
1 apple 1 piece cake		
<b>Dinner</b>		
Bacon and cheese frittata Or chicken burger		
<b>Total</b>	_____	_____

**What aspects of this individual diet needs improving? Are there any good components of their current diet?**

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# Improve the example diet

Improve the fibre intake of one of these individuals (based on their individual daily need).

IMPROVED MEAL PLAN	FIBRE	RS
<b>Breakfast</b>  		
<b>Snack</b>  		
<b>Lunch</b>  		
<b>Snack</b>  		
<b>Dinner</b>  		
<b>Total</b>	_____	_____

How did you improve the diet of this individual? What could this mean for their health?

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FOOD	SERVING SIZE	FIBRE PER SERVE	RESISTANT STARCH PER SERVE
Banana, average green	150g		12.75g
Banana, average ripe	150g		1.84g
Fruit salad (apple, banana and mango)	1 serve	2.0g	
Kiwi fruit, peeled	1 serve	3.8g	
Apple, unpeeled	1 piece	1.7g	
Mango, peeled	1 serve	1.6g	
Orange, peeled	1 serve	2.6g	
Oats, rolled, uncooked	230g		25.3g
Canned fruit, undrained	½ cup	1.4g	
Oats, cooked	230g		0.46g
Chickpeas	80g		1.66g
Milkshake, chocolate	1 serve	0.1g	
Berry smoothie	1 serve	1.1g	
Honey Greek yoghurt	1 serve	0g	
Puffed rice cereal	1 cup	0.4g	
Fruit drink, 25% apple	Glass	0.0g	
Apple juice	Glass	0.2g	
Wholemeal crumpet	1 serve	3.9g	
White crumpet	1 serve	2.3g	
Wholemeal biscuits	X 2	4.2g	
Roasted, unsalted peanuts		8.2g	
Wholegrain bread	1 slice	2.4g	
White bread	1 slice	0.75g	
Peanut butter	1 tbsp	2.7g	
Raspberry jam	1 tbsp	1.6g	
Hardboiled egg	1 serve	1.2g	
Canned baked beans, tomato	1 serve	5.2g	
Grain based chip e.g. Grain Waves	1 serve	6.4g	
Cake	40g		0.12g
Potato chips/crisps	30g		0.06g
Pretzels	30g		0.22g
Popcorn	1 cup	1.2g	
Cheddar cheese	1 serve	0.0g	
Muesli bar	1 serve	7.7g	
Plain corn chips	1 serve	6.6g	
Roma tomato	1 serve	1.2g	
Chicken lunch meat	1 serve	0.5g	
Cheese sandwich	1 serve	3.1g	
Vegemite sandwich	1 serve	4.5g	
Ham and salad sandwich	1 serve	3.3g	
Brown rice	1 cup	2.7g	
Chicken risotto	1 serve	1.4g	

FOOD	SERVING SIZE	FIBRE PER SERVE	RESISTANT STARCH PER SERVE
Mexican wrap, bean	1 serve	3.6g	
Mexican wrap, beef	1 serve	1.3g	
Lentil burger	1 serve	3.3g	
Chicken burger	1 serve	1.1g	
Spinach and ricotta pasta	1 serve	2.4g	
Beef lasagne	1 serve	1.2g	
Tomato and vegetable pasta	1 serve	2.4g	
Bacon and cheese frittata	1 serve	0.6g	
Bacon and vegetable frittata	1 serve	1.2g	
Falafel (chickpea patty)	1 serve	11.9g	
Hash brown	60g		0.64g
Mixed frozen veg	1 cup	8.6g	
Rice noodles	180g		1.38g
Sweet potato	75g		0.06g
Potato, sliced boiled, cooled	75g		0.6g
Potato, roasted, cooled	75g		14.2g
Kidney beans	100g	6.5g	
Green lentils, cooked	1 serve	5.2g	
Grilled beef	1 serve	0.0g	
BBQ pork	1 serve	0.0g	
Chicken breast	1 serve	0.0g	
Grilled green beans	1 serve	3.5g	
Grilled capsicum	1 serve	2.0g	
Carrot	1 serve	3.3g	
Cucumber	1 serve	1.4g	
Lettuce	1 serve	1.4g	
Garden salad	1 serve	1.8g	
Cooked green peas	1 serve	6.6g	
Chicken and corn soup	1 serve	1.4g	

*Table Reference*

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# 10.0 Filling up on fibre

The Australian Institute of Health and Welfare reported that in the year 2007/08, 90 per cent of Australian adults did not eat enough vegetables and approximately 50 per cent did not eat enough fruit. Unfortunately, this does not seem to be improving with a 2014 report by the Australian Bureau of Statistics stating that only 6.8 per cent of the population met their daily recommended intake of vegetables and just 54 per cent of the population met their recommended fruit intake.

Furthermore, The Grains and Legumes Nutrition Council reported in 2015 that over the previous three years, grain consumption in Australia had dropped by 30 per cent. Consequently, this data shows that Australians are not getting enough dietary fibre.

Increasing fibre intake is a challenge for Australian health and it is hoped that consumers will become more aware of the benefits of increasing fibre intake. This increase can be achieved by promoting the consumption of wholefoods high in fibre like grains and pulses, developing foods which have a higher fibre content and looking at supplementation.

## ACTIVITY

### Fibre frenzy

#### 1. Fibre content claims

Find a commercially available product which makes a claim about fibre. Visit the Food Standards for Australia and New Zealand website. Assess whether the claims adhere to the new guidelines being rolled out.

#### 2. Promoting the consumption of wholefoods high in fibre

Design a health campaign for your school which encourages your fellow peers to eat more foods which are high in fibre. 2016 is the Year of the Pulse - research campaigns and events associated with this for inspiration for your own campaign.

#### 3. Developing foods which have a higher fibre content

Australian scientific group CSIRO has developed a type of barley which boasts a higher fibre content. *Research BARLEYmax and answer the following questions.*

What diseases are BARLEYmax researchers hoping to minimise with their discovery?

What fibre is BARLEYmax particularly high in?

What health benefits does the product provide?

Have you seen any products in the supermarket which contain BARLEYmax?

#### 4. Increasing dietary fibre through nutritional supplements

In 2011-12, the Australian Bureau of Statistics reported that 29 per cent of Australians reported taking at least one dietary supplement including those for increasing fibre intake. Select a nutritional supplement available from the supermarket or pharmacy.

*Describe what it is made from, its dietary fibre claims, how it is consumed and any health considerations consumers should be aware of when taking it.*

# 11.0 PRACTICAL

## Slice of fibre

Changing your diet to include healthier foods might seem like you will have to miss out on your favourite things, but this is not always the case! Foods can be swapped for equally delicious options or their recipes modified so they are better for you. Modifying recipes can result in less sugar, lower salt, reduced fat, more vitamins, increased fibre and more!



### Brainstorm

Do you know of any ingredients which can be swapped in a favourite recipe of yours to make it healthier?

FOOD	MODIFIED INGREDIENT	HEALTH BENEFIT

### TASK

Pizza is one of many people's favourite foods! It can be enjoyed for lunch or dinner and now, we even have dessert pizzas! Although pizza is sometimes made in a way that is not very healthy, its versatility allows us to modify every ingredient to make it better for us.

*Let's start from the beginning. You are to create a pizza dough that is higher in fibre than the common recipe. You will assess the fibre content of the common recipe and research alternative flour varieties with a higher fibre content. You are then to make your higher fibre pizza dough and assess its sensory characteristics. Lastly, top it with your favourite ingredients and enjoy!*

### 1. Common recipe

Investigate how much fibre a common pizza recipe uses.

To do this you will need to look at which ingredients contain fibre. Use the nutritional panels of these ingredients to find out how much fibre they contain. Calculate how much fibre would be in the amount used in this recipe.

EXAMPLE	CONTAINS FIBRE?	CALCULATE HOW MUCH IN THIS RECIPE
2 cups plain flour		
7 g yeast		
1 tsp sugar		
½ tsp salt		
2 tbs olive oil		
¾ cup lukewarm water		
	<b>Total</b>	

## 2. Modified recipe

Select an alternative flour variety with higher fibre than the plain white flour used in the common recipe.

**You may choose to add other ingredients to the dough to increase its fibre content.**

How much fibre does this variety of flour contain according to the nutrition panel?	
Calculate how much fibre the modified recipe will contain	

INGREDIENTS	METHOD
2 cups _____ 7 g yeast 1 tsp sugar ½ tsp salt 2 tbs olive oil ¾ cup lukewarm water Any other ingredient: _____ _____	<ol style="list-style-type: none"> <li>1. Combine all dry ingredient together in a bowl</li> <li>2. Add olive oil</li> <li>3. Add water gradually and mix into a soft dough.</li> <li>4. Knead the dough on the bench</li> <li>5. Pop the dough back in the bowl, cover with cling wrap and leave in a warm spot for 30 minutes.</li> <li>6. Remove from the bowl and kneading it again for 1 minute, popping any bubbles that may have formed.</li> <li>7. Roll the dough out and bake. <i>To this sample, we do not add any toppings.</i></li> </ol>



### 3. Sensory Analysis

Once baked, you are to conduct a sensory analysis of the pizza dough, by ticking at the appropriate box. You can replicate this sensory analysis table and ask your peers to provide feedback on your improved pizza base.

**Provide a summary of these opinions.**

	DISLIKE EXTREMELY	DISLIKE MODERATELY	DISLIKE SOMEWHAT	OKAY	LIKE	LIKE MODERATELY	LIKE A LOT
Structure							
Smell							
Doughiness							
Flavour							
Crispiness							

#### Sensory Analysis Summary

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**Having completed your sensory analysis of your modified dough, is there anything you might change next time? Would this change alter the amount of fibre in the dough?**

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### 4. Make your own pizza

**Repeat your modified recipe for high fibre dough, but this time add your favourite toppings before you pop it in the oven! Are there any toppings that you could add that are high in fibre?**

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## 12.0 Good reads

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