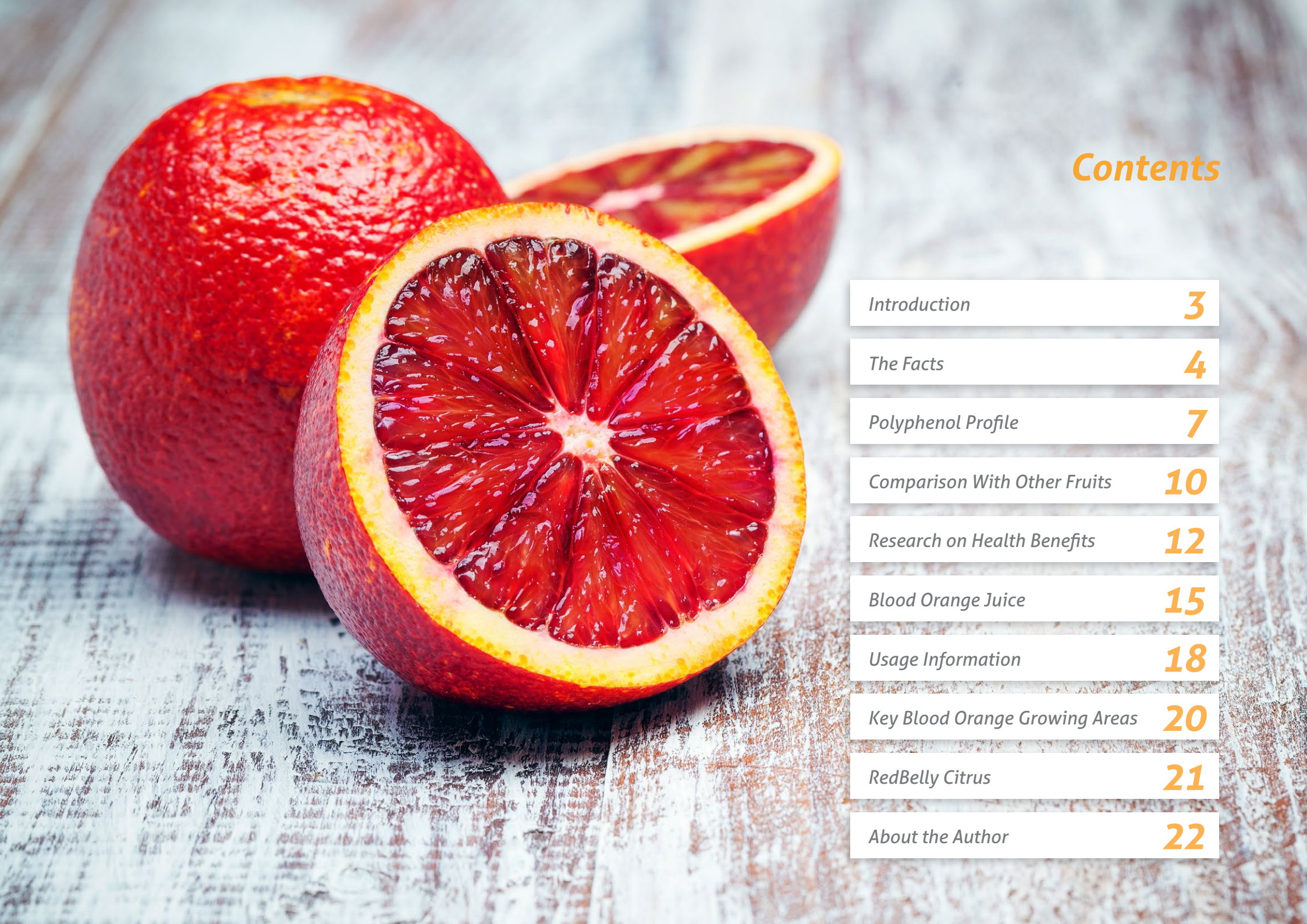
EATREDLIVE

Health & Nutrition Overview 2017

BloodOranges



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Introduction

Kathleen Alleaume | Nutritionist and Exercise Physiologist (MSc)

Slicing into a blood orange is almost as exciting as eating one. With one quick peel of the flesh, you will see instantly why the name speaks for itself. Upon tasting the blood orange you are presented with sweet citrus flavours and aromas - a combination that is difficult to beat.

Beyond the alluring aesthetics, blood oranges offer health-promoting nutrients and traits that have wide-ranging protective powers. Known for their distinctive crimson-red hue, blood oranges are the only commercially available citrus fruit to contain anthocyanins (which are more commonly found in blueberries, cherries and red wine).

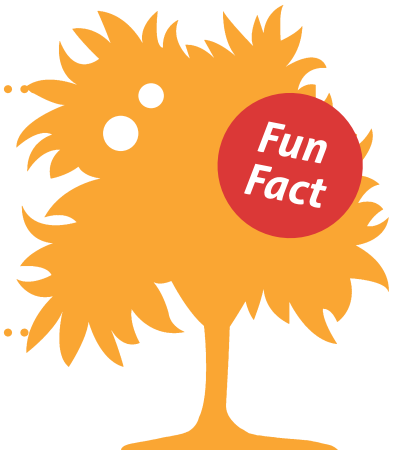
In addition to anthocyanins, blood oranges contain many other beneficial phytonutrients, known as phenolics (or commonly referred to as polyphenols), which have been associated with improved cardiovascular health, protection from UV cell damage and improvements in metabolic disease including type 2 diabetes, fatty liver and obesity.

As a bonus, they also represent an economical way to get these phytonutrients into your diet. Nutrition wise, this cocktail of phenolic compounds makes blood oranges unique amongst citrus varieties.

Besides their high levels of phenolic compounds, blood oranges are an excellent source of vitamin C, a good source of fibre, as well as a source of carotonoids (vitamin A) and potassium.

With the Australian blood orange season running from late July to November, the fruit ripens just in time to fight off those pesky cold weather cravings that often see us reaching for heavier foods and clinging onto calories to keep warm. The blood orange with its fat-fighting properties, is the nutritious ingredient you've been waiting for.

This report provides a deep dive into the health benefits of blood oranges and complementary scientific research conducted over the past two decades. I'm excited to share the latest nutrition information, along with some usage tips, so all Australians can enjoy blood oranges in their diet.



*The **fruit of the orange tree**, like all citrus fruits, is considered a berry because it **contains seeds enclosed in soft, fleshy fruit that come from a single ovary**. Strawberries are technically not a berry!*

The Facts

An underappreciated fruit with powerful nutritional capabilities

History of the Blood Orange

The origins of blood orange varieties are generally attributed to random mutations that occurred in common orange varieties in Italy and China centuries ago. The Moro variety that is most commonly available to consumers in Australia arose by way of a natural random mutation on the slopes of Mount Etna in the late 1800's and has been carefully cultivated by the Sicilians ever since. They are, therefore, entirely natural and not genetically modified.

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Blood oranges deliver the usual bundle of nutrients derived from citrus, including ascorbic acid (vitamin C), carotenoids (vitamin A) and certain flavonoids that are contained within common orange varieties, however where the blood orange is unique is in their ability to provide an additional mix of polyphenols comprising a mix of ***anthocyanins*** and ***hydroxycinnamic acids*** which act synergistically to produce the health benefits that far exceed the sum of the individual parts. This unique group of bioactive compounds have been identified and quantified through scientific studies and even produced as a standardised extract marketed as "Red Orange Complex" or "Morosil®".

Nutrients, Serves and Portions

The Australian Dietary Guidelines define a serve of fruit as around 150 grams (roughly 1 cup), and recommend Australian adults eat two serves of fruit a day and children between 1-2 serves a day. Additional amounts can be included depending on energy needs (age, activity levels and body size) **(1)**.

The average size of an Australian blood orange is 200g with an edible portion of approximately 150g, which means it is the perfect portion to eat straight out of your hand. For a detailed nutrient breakdown refer to **Table 1**.

Table 1

*Nutrient profile of the edible portion of fresh blood oranges**

	Per 100g	Per 150g
Energy	119kJ (28 cals)	178.5kJ (42.5 cals)
Protein	0.7g	1.05g
Total fat	0.2g	3g
Total sugars	7g	10.5g
Dietary fibre	2g	2.5g
Potassium	200mg	300mg
Phosphorus	22mg	33mg
Zinc	0.20mg	0.3mg
Vitamin C	50mg	75mg
Total folate	31µg	46.5µg
Beta-Carotene (Vitamin A)	371µg (61 RE)	556.5µg (92 RE)
Anthocyanins	16.8mg	25.2mg
Hydroxycinnamic acids	9.8mg	14.7mg
Total Polyphenols	74mg	111mg

**Sources (13), (3), (4), (5)*

Nutrient Composition of Blood Oranges

Energy. Blood oranges contain just 119kJ (28 cals) per 100g serve of the edible portion. For your average blood orange (200g/150g edible) there is 178.5kJ (42.5 cals) per orange. This represents 2% of the of the average Australian adult's recommended daily energy intake (RDI) of 8700kJ.

Sugar. The sugars in blood oranges are a mix of glucose, fructose and sucrose **(5)**. They are low GI which makes them an excellent food choice for diets designed to manage weight without compromising on good nutrition **(6)**.

Glycemic Load (GL) is a measure of both the quality (the GI value) and quantity (grams per serve) of a carbohydrate in a meal. Blood oranges have a GL value of 4, which is low compared to other commonly eaten fruit, such as bananas, blueberries, grapes, and apples. This means there should be little fear in adding them to your diet even if you adhere to a diet that is low in carbohydrates **(7)**.

Vitamin C is key for healing and repairing damaged tissue throughout the body and is needed for a healthy immune system. It also acts as an antioxidant and assists in absorption of key minerals, including iron and zinc. Just one blood orange offers 75 mg of vitamin C which is well over 100% of the recommended daily intake (RDI 35 and 45 mg for children and adults respectively).

Beta-carotene. The body converts beta-carotene into vitamin A, an essential vitamin which helps maintain normal reproduction, vision and immune function. An average sized blood orange (150g) has 556µg of beta-carotene which is 92 RE, providing around 10%-13% of the daily recommended intake of vitamin A (RDI 700-900) for adults. Interestingly, this is approximately double the RE available in Navel oranges around four times the RE available in mandarins **(6)**.

Potassium is an essential nutrient used to maintain fluid and electrolyte balance in the body, and prevents high blood pressure. An average sized blood orange provides roughly 10% of the daily recommended intake (RDI) for potassium.

1 average sized blood orange – 200g • Edible portion 150g

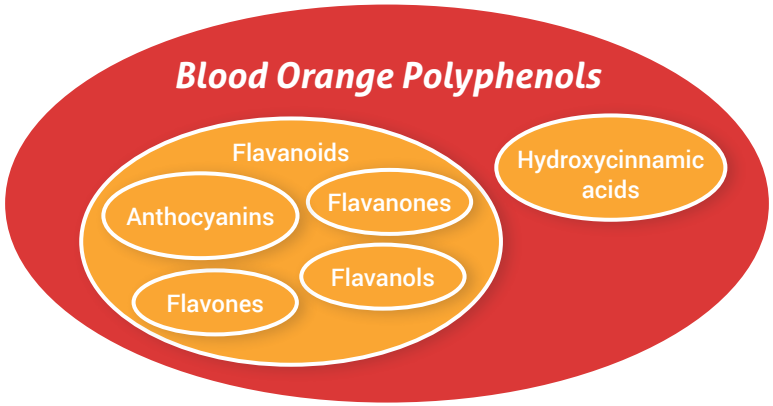
1 average sized blood orange provides:

- *25.2mg of anthocyanins*
- *14.7mg of hydroxycinnamic acids*
- *111mg total polyphenols*
- *Vitamin C – 75mg*
- *Vitamin A – 92 RE*

Polyphenol Profile

Anthocyanins, hydroxycinnamic acids and flavonoids are the main phenolic compounds contained within the blood orange (see **Table 2**). These highly functional ingredients have been recognised for their positive health effects, however to date, there are no daily recommended intake (RDI) levels for these bioactive compounds.

There are many potential ways in which these bioactive nutrients may improve the health of the consumer. One of the major ways in which this occurs is via their 'antioxidant' effects. However, as many of the studies in this area have shown, the health benefits attributed to the compounds in blood oranges is not soley due to their antioxidant activity. Emerging research is showing these compounds also have anti-inflammatory, anti-carcinogenic and several metabolic effects that help protect against cancer cell growth, diabetes, obesity and risk factors of heart disease **(2)**.



Research indicates it is the combination of these polyphenols in blood oranges that act synergistically to provide the health benefits detailed in the following pages. See **Table 3**.

Table 2 Blood Orange Polyphenols

Polyphenol Sub-Class	Blood Orange Polyphenol Constituents
Anthocyanins	Cyanidin 3-O-Glucoside Cyanidin 3-O-(6-malonyl-glucoside)
Flavanones	Hesperidin Narirutin Didymin
Flavones	Sinensetin Nobiletin Tangeritin
Flavanols	3-Methoxynobiletin
Hydroxycinnamic Acids	Cinnamoyl glucose Cinnamic Acid p-Coumaric Acid Caffeic Acid Ferulic Acid Sinapic Acid

Table 3

Bioactive components of blood orange and their positive health effect

RISK FACTOR	EFFECT OF BLOOD ORANGE BIOACTIVE COMPOUNDS (e.g. hydroxycinnamic acids, anthocyanins, flavonoids)	DISEASE
Blood pressure	Decreased vascular inflammation, which in turn improves blood flow to the heart and stabilises plaque build up in the arteries **(2, 9, 13)**	Heart disease
Cholesterol	Help cholesterol levels by raising HDL "healthy" and lowering LDL "bad" cholesterol **(2, 9)**	Heart disease
Oxidation, in general (excess oxidation drives all chronic diseases)	Decrease oxidation **(2)**	Heart disease, cancers
Inflammation (higher levels of inflammation seems to play a role in promoting most chronic disease)	Decrease inflammation **(2)**	Heart disease, cancers, obesity
Cell mutation	Anti-carcinogenic - promotes apoptosis in human cancer cells (e.g. ovarian and lung cancer calls) and prevents tumor growth **(2)**	Cancer
Abdominal fat (central adiposity)	Enhanced lipase (fat) enzyme activity so that more fat is metabolised **(10)** Restores normal metabolic pathways found in overweight subjects **(11)**	Overweight and obesity, fatty liver, type 2 diabetes, metabolic syndrome
Blood levels of glucose	Improved insulin sensitivity (makes insulin work better) **(2, 9)**	Type 2 diabetes, heart disease cancers (excess glucose contributes to the risk of these diseases)

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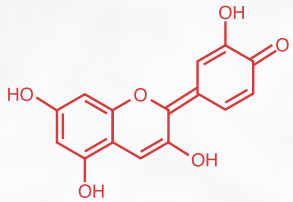
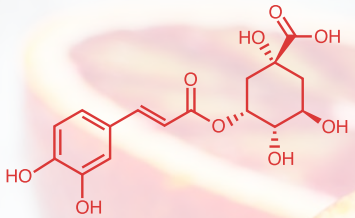
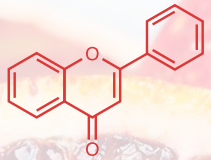


Anthocyanins



Hydroxycinnamic Acids



Flavonoids

Blood oranges deliver a unique mix of phytonutrients that have positive health effects. In addition to being potent antioxidants, these compounds have been researched for their anti-inflammatory, anti-obesity and anti-cancer properties.

Healthy Weight

Naturally low in sugar and kilojoules (just 3% of your daily energy in one average-size orange). Their low energy density, together with their unique mix of nutrients, has been demonstrated to reduce fat stores and prevent obesity.

Skin Health

The phytonutrients in blood orange can help repair your skin and build up its defense against the sun, giving you a more youthful complexion.

Heart Health

The antioxidants and anti-inflammatory properties in blood orange are great for maintaining a healthy circulatory system.

Immune Booster

Provides all the recommended daily intake of Vitamin C in just one blood orange. This essential nutrient helps with iron and zinc absorption, which is vital in increasing resistance to infection.

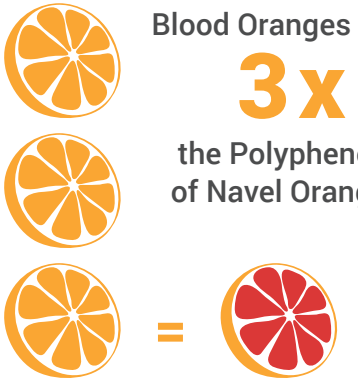
Comparison With Other Fruits

When compared with other citrus fruits there are significant differences in nutrients between blood oranges and other orange varieties. These differences are set out in **Table 4**. The tests were conducted using the juices derived from the various citrus fruit as a proxy for their content in the actual fruit (which is an accepted method for investigations concerning water soluble nutrients in citrus) **(7A)**.

The data clearly shows that blood oranges have a very high capacity for scavenging free radicals as compared to navel and valencia varieties (9.5x & 6x respectively). They also contain significantly more polyphenols than navel and valencia varieties (3.2x & 2.4x respectively).

Table 4 Comparison between polyphenol contents in citrus varieties

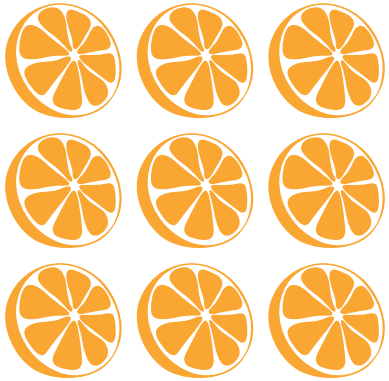
	Blood Orange	Navel	Valencia
Anthocyanin mg/L	**278**	0	0
Flavanones mg/L	**444**	202	244
Hydroxycinnamic Acids mg/L	**135**	33	56
Total Phenolics mg/L	**1147**	361	488
Antioxidant Capacity (trolox eq mM)	**7.05**	0.74	1.13



Blood Oranges have

3x

the Polyphenols of Navel Oranges



Blood Oranges have

9x

the Antioxidant capacity of Navel Oranges

$/mg Total Polyphenols

Raspberry

$47.20 / kg

54.65mg / 100g

$8.50 / 1g

Total Polyphenols

Pomegranate

$25 / kg edible

169mg / 100g

$1.56 / 1g

Total Polyphenols

Blueberry

$63.20 / kg

223.41mg / 100g

$2.83 / 1g

Total Polyphenols

Blood Orange

$7.90 / kg edible

74mg / 100g

$1.08 / 1g

Total Polyphenols

(Prices as at June 2017, Polyphenol Source – Phenol Explorer)

A factor not often considered when comparing the nutrient qualities of certain foods is the cost of obtaining them. Some foods, whilst high in anthocyanins and other polyphenols, are expensive to obtain and often need to be transported across the globe to get to consumers. Blood oranges have the benefits of being highly nutritious and at the same time quite affordable when compared to other fruits with high anthocyanin and polyphenol levels. In fact, per $/g basis of total phenolics, blood oranges are one of the cheaper fresh sources of phytonutrients available during the winter and spring months.

Research on Health Benefits

The research on blood oranges spans decades, however there have been few randomised-controlled trials in humans compared to other more commonly eaten fresh produce. That said, the literature to date is intriguing, and most researchers are calling for more studies to explore the potential health benefits of the naturally occurring compounds found in blood oranges.

Metabolic Syndrome, Weight Management & Obesity

Metabolic syndrome is a condition characterised by abdominal obesity, high glucose and cholesterol levels, and high blood pressure – all strong risk factors for type 2 diabetes and heart disease. One study investigated the effects of drinking 750ml of red orange juice over 8 weeks on risk factors for metabolic syndrome. The results spoke for themselves: improved insulin resistance, lower cholesterol and systolic blood pressure. Interestingly, there was no increase in body weight, despite the participants increasing their total calorie and carbohydrate intake per day by 344 cals and 86 grams of sugar respectively. Besides improvements in metabolic risk factors, the study showed that daily blood orange juice consumption does not promote weight gain **(9)**.

A landmark study conducted in 2010 found blood orange juice can alter the function of fat cells so they're less likely to be stored as fat. One group of mice was fed a standard diet with the addition of water, blood orange or navel (blonde) orange juice. The other mice group was given a high fat diet teamed with one of the same three drinking options. Interestingly, mice drinking blood orange juice alongside a standard diet were found to gain less weight and had no affect on both blood sugar and lipid (fat) levels than those drinking navel juice or even water. This is despite the increased calorie intake being received from the sugar content of the juice.

Furthermore, blood orange juice was found to significantly reduce or almost completely abolish the weight gain in mice receiving the high fat diet – with a 50% reduction in the belly fat mass being recorded **(10)**.

A follow up study was conducted in 2012 in which mice were fed a high fat diet or standard diet and each group was further subdivided into those that were administered water or blood orange juice. Body weight and various biomarkers, including the liver and metabolic enzymes were assessed. With respect to weight, all mice had similar body weights at the beginning of the experiment, however at the end of the 12 weeks, the mice fed blood oranges juice in conjunction with a high fat diet had the same body weights as the mice fed a standard diet and water despite the additional 10% in calories attributed to the sugar in the juice.

Interestingly, those mice fed blood orange juice had lower cholesterol and trigycerides and also enhanced insulin sensitivity. In the mice fed water and a high fat diet there was evidence of steatosis (a marker of fatty liver disease).

With the study revealing that blood orange juice can reverse most of the metabolic abnormalities exhibited by obese mice, researchers noted that it may, indeed, represent a promising dietary option for the prevention of metabolic syndrome, including fatty liver, with clinical trials now warranted **(11)**.

While studies conducted on animals show promise, results do not always translate to the same or similar effects in humans. A 2015 clinical study was conducted with overweight human subjects over a 12-week period. The study evaluated the effects of a standardised blood orange extract Morosil®. Results showed blood orange extract can significantly reduce weight, BMI and hip circumference when compared to the effect of a placebo.

The participants in this study received 400mg a day of Morosil® (made exclusively from moro blood oranges). According to the manufacturers website this equates to a dose of about 4mg each of blood oranges hydroxycinnamic acids and anthocyanins, both of which would be available through eating one blood orange a day **(12)**.

Heart Health

A 2017 report published in American Journal of Clinical Nutrition followed 43,880 healthy men and looked at the habitual intake of anthocyanin-rich foods, including blood oranges and the risk of heart disease. The report's authors note that the bioactive compounds present in both citrus and red or blue fruits appear to decrease vascular inflammation, which in turn keeps blood running smoothly to the heart. This study highlights a potential benefit for protection against cardiovascular disease, however further trials are needed before the exact dose is determined **(13)**.

In a 2012 study, 19 non-diabetic patients with increased cardiovascular risks were included in a randomised double-blind study, along with 12 healthy, non-obese control subjects. The treatment group received 500ml blood orange juice a day. After 7 days, blood flow significantly improved and was normalised and several inflammatory biomarkers, including C-reactive protein significantly decreased. These results indicate an anti-inflammatory effect of blood orange that is beneficial to the patient's cardiovascular system **(14)**.

Dietary intake of anthocyanins may also help protect against high blood pressure (a major risk factor for heart disease), according to a 2011 study. This study suggests an intake between 12.5 to 15 mg per day of anthocyanins in blood orange juice can positively contribute to the reduction of hypertension **(15)**.

While one could argue that the evidence to date is inadequate to define a specific dietary recommendation for anthocyanins and other polyphenols, it's clear that consuming polyphenol-rich foods, such as blood oranges, should be encouraged.

Anti-ageing

The skin is our body's first line of defence, meaning it's continually exposed to a wide variety of chemical and physical attacks, such as pollution, cigarette smoke and the sun's ultraviolet rays. A 2014 study evaluated the skin photo-protecting and anti-ageing effects of 100mg/daily of a standardised red orange extract. This dose was equivalent to approximately 3mg anthocyanins and 2mg hydroxycinnamic acids, amongst other components. The results showed a significant reduction to the degree of skin erythema (redness), with an average reduction of 40%. Similar protective results were found in the second part of the study, where skin age spot pigmentation was found to decrease from 27% to 7% when subjects were exposed to the solar lamp during the red orange extract supplementation period. Both experiments revealed that the blood orange extract was able to offset the harmful effects of UV radiation – almost like a natural sunscreen **(16)**.

A similar study using the same standardised blood orange extract also revealed that the consumption of blood orange extract has the ability to decrease oxidative damage caused by exposure to air pollution and smoking, by increasing one's antioxidant defences. They attribute this ability not only to the fruit's anthocyanin content, but also to the complex mix of other bioactive compounds contained within blood oranges used to make the extract **(17)**.

Blood Orange Juice

From a health perspective there is no better way to obtain the full benefits of fresh fruit than eating them whole, however drinking blood orange juice is no doubt a more convenient and even economical way in which to obtain the nutrients contained within juice. What's more, a glass (250ml) of pure blood orange juice (ie. no added sugar) can count as a serving of fruit each day (it is not recommended for juice to count for more than 1-2 serves of the recommended 5 serves per day).

Can Fruit Juice Be Healthy?

It's commonly perceived that fruit juice is no substitute for consuming whole fruits. This is generally true. Why? Processing fruit into juice and storing it will remove a lot of the fibre and damage some of the nutrients. What's more, fruit juice is often accused of being too high in sugar to be considered a healthy drink for adults or children. Despite these generalisations, it must be noted that not all juices and fruit drinks are the same. Some are certainly better for you than others (see breakout box "Types of Juices and Fruit Drinks). Indeed, as shown in the Health Benefits section of the report, certain types of blood orange juice can be positive to your health and your waistline at the same time **(9)**.

A recent study showed the level of anthocyanins and antioxidant activityin flash pasteurised (sold refrigerated) blood orange juice is similar to that in the fresh/cold pressed varieties **(8)** (See **Table 5**). Both freshly squeezed and flash pasteurised juices are the types of juices that deliver the health promoting and weight limiting nutrients contained in the fruit and should not be avoided simply because of their sugar content.

Blood orange juices and fruit drinks made via aseptic (sterilisation) processing and/or reconstitution from concentrate and hot filled, on the other hand, are generally subject to higher levels of heat for long periods of time, at some point during their manufacture and subsequent storage, which is often in liquid form. As a result, many of the phenolic compounds contained within blood oranges are compromised and their bioactivity is relatively low compared to freshly squeezed and flash pasteurised juices. One study found that many of these types of commercially manufactured juices had negligible anthocyanins and over 50% less antioxidant activity than flash pasteurised blood orange juice **(18)**. In many cases, additional artificial colourants were added in order to provide a red coloured beverage. These juices and drinks are less likely to provide the highly functional nutrients that promote good health, and have not been found to prevent weight gain.

Table 5 Comparison between fresh and pasteurised blood orange juices (8)

Nutrients	% loss during flash pasteurisation
Vitamin C (mg/100mL)	2.6%
Total anthocyanins (mg/L)	5%
Total flavanones (mg/L)	4.7%
Total phenolics (mg/L)	13.3%
ORAC units (μM trolox equiv./100mL)	5.5%

The data presented in Table 5 illustrates the minimal effect of flash pasteurisation has on freshly squeezed blood orange juice (8).

Juicing Techniques and Nutrient Quality

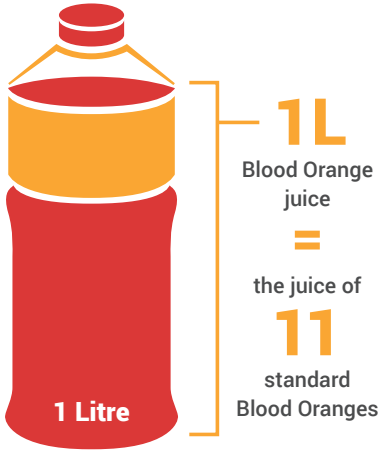
All of the different processing and storage techniques used to create blood orange juices result in the same amount of sugar content. The notable exception being blood orange "drinks" which are allowed to have added sugar and other components that are not derived from the fruit. As such, strictly speaking, they are not a juice.

With respect to the juices, they do vary in their flavour, colour, vitamin and antioxidant content. These differences are usually attributed to the different processing methods and storage conditions as a result of exposure to heat and oxygen.

Tips For Obtaining Highly Bioactive Blood Orange Juice

In summary, blood orange juice can be a good source of nutrition and bioactive components if the product has been prepared and stored in a way that minimises degradation.

As manufacturing and storage methods are difficult to discern in most cases at the supermarket shelf, if you want to ensure maximum bioactivity of the juice, freshly squeeze it from fruit and consume it within 1-2 days and/or freeze it and rethaw when required within 12 months. Otherwise, look for a commercial blood orange juice from the refrigerated cabinet with use by date within a few weeks of purchase. A use by date measured in months or years indicates it is sterile and likely to be lacking in bioactivity.



1L
Blood Orange juice
=
the juice of
11
standard Blood Oranges

1 glass
of Blood Orange juice provides

69mg anthocyanins
40mg hydroxycinnamic acids
308mg total polyphenols
208mg Vitamin C

To ensure maximum bioactivity of the juice, freshly squeeze it from fruit and consume it within 1-2 days and/or freeze it and rethaw when required within 12 months.

Buying orange juices can often be confusing. **In practical terms it can be difficult to distinguish between the various types of juices and drinks set out in the table below. From most nutritious to least nutritious the order is as set out below.**

1. **Untreated freshly squeezed:** these juices are sold fresh at farmers markets and in cafes or more rarely in the refrigerated cabinets of some shops. These have a very short shelf life and are often needed to be consumed within 2-3 days. Whilst derived through "cold pressed" processes, these are not to be confused with high pressure pasteurisation products (see below).

2. **High pressure pasteurised:** these are fresh juice products that are pasteurised not by heating them, but by subjecting them to intense pressures. The pressure kills the living organisims such that they have a long shelf life like thermally pasteurised juices, but with the nutrient profile of untreated freshly squeezed juices. Sometimes these are marketed as "cold pressed". The producer will usually highlight the use of "high pressure" somewhere on the container.

3. **Flash pasteurised juice:** these juices are generally quickly brought up to a high temperature and rapidly cooled. The process doesn't kill all microorganisms and they are generally sold in refrigerated cabinets with a shelf life of around 28 days.

4. **Aseptic and hot fill pasteurised juice:** these are often found on the shelves of supermarkets at room temperature, often from overseas. They are heated to such a high temperature that they become "aseptic" or practically sterile. This allows them to be stored for long periods in unrefrigerated storerooms in bulk or "hot filled" into the bottles they are sold in. The main way to differentiate them from flash pasteurised juice is the use by date, which may be months or years from the date of purchase on the bottle.

5. **Reconstituted from concentrate:** these juices are most often found as imported product. They are often very cheap compared to the other juice types. Most concentration methods involve a great degree of thermal processing, more so than the highly pasteurised blood orange juices. They often have naturally derived flavours added back in during the reconstitution step.

6. **Fruit "drinks":** these are not 100% juice and may have added sugars, colours, flavours and preservatives. The juice content is often reconstituted from concentrates, but in some cases they use flash pasteurised or aseptic ingredients. In either case they are not "juices" and are a manufactured product with little fruit content.

Usage information

Enjoying Blood Oranges

Fresh is best. The best way to consume blood oranges is by eating the fresh flesh of the fruit. This will give you the most nutrients out of the fruit, including all of the fibre, which keeps the digestive tract in tip-top shape. However these nutrients decrease once the juice is reconstituted from concentrate or treated thermally until such time they are essentially sterile. These juices often have added colouring to make up for the losses in anthocyanins.

Freezing. Freshly squeezed juice can last up to 12 months in the freezer, allowing you to enjoy the health benefits all year around.

Cooking. Blood oranges are incredibly versatile and can be enjoyed with a plethora of both sweet and savoury dishes.

For more usage tips and recipe ideas visit www.**redbellycitrus**.com.au

De-peeling Blood Oranges

1. Wedging – the most popular way to eat the fruit. Cut fruit equatorially then cut each half in thirds. Each orange produces 6 wedges that can easily be eaten in a bite. These are great for lunch boxes and eating on the go.

2. Slicing – top and bottom are sliced off and then the outside peel sliced off in multiple slices to reveal the inner jewel of the blood orange, minus the white pith. These can be sliced horizontally.

3. Supreming – blood orange supremes are often called for in high end desserts and other recipes. First you peel the pith and membrane off the entire orange as if you were going to slice it up, but instead of slicing right across the orange, the orange is held in the hand and each segment sliced out by carefully slicing down the inside surface of each dividing membrane. Larger fruit is better suited to supreming than smaller fruit.

Selecting Blood Oranges

The best blood oranges are the ones with the darkest, reddest interiors. It's is not always easy picking out such fruit. Sometimes external blush (the red colour on the skin) can be used as a general guide, but not always. Technology is still developing to allow blood oranges to be graded by their internal colour using NIR spectroscopy. Until then, your best bet lies in picking blood oranges grown in the Riverina, Riverland or Sunraysia regions of Australia, as the climatic conditions in those regions are close to that of the home of the Australian blood orange variety, Sicily.

If you have purchased blood oranges and they are not as bloody as you would have liked them, you can put them in the fridge for at least a week, preferably two to four, and the internal colour will develop as a result of the cold temperature.

Storing Blood Oranges

During winter, storing blood oranges in a fruit bowl at room temperature is fine provided you don't have the heaters up too high. Alternatively, if you have a box or more that needs to be stored over a period of weeks, store them outside in the cold temperatures in a shady place like the garage.

Once spring brings a little warmth to the air, store your blood oranges in the fridge to prevent them going soft quickly in response to the heat.

For commercial storage, temperatures of 6-7 degrees Celsius are ideal.

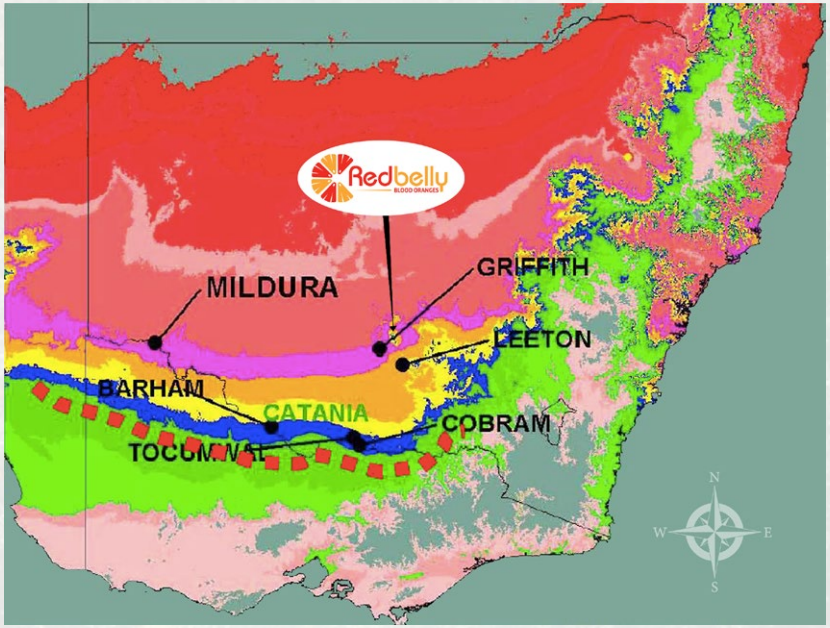
Key Blood Orange Growing Areas

Anthocyanins, the phenolic compounds that give blood oranges, and many other plant based foods their distinctive red colour, are produced by the blood orange tree in response to stresses. In particular, the colour of the flesh of the blood orange will not develop unless subjected to high diurnal temperature variations (cold night time temperatures and warm day time temperatures). This reduces the areas in which they can be grown successfully in Australia, and indeed worldwide.

Absent of the right growing conditions, blood oranges grown in less than ideal climates will not have the full complement of health giving properties, mainly due to the lack of anthocyanin accumulation. This has been an important consideration when reviewing the literature as some studies were conducted using blood oranges that were not grown in areas with high diurnal temperature variations and were clearly lacking in anthocyanins, particularly Florida USA.

The best growing conditions for blood oranges are those found in Mediterranean countries and in particular Sicily, Italy where most of the commercial blood orange varities originated. When the climate of Catania, Sicily is mapped onto south eastern Australia, as shown in the image (right), a clear band of ideal growing conditions can be identified (the yellow band).

The band of perfect climate conditions comes close to Mildura in Victoria and the Riverland in South Australia and also key growing areas near Griffith and Leeton. It is because of this that blood oranges grown outside of these regions are often lacking in red colour and disappointing to consumers.



Best Blood Orange growing regions are in the yellow zone.

Redbelly Citrus

With the use of the map (pg 20), produced by the NSW Department of Primary Industries, third generation citrus growers Anthony, Vito and Len Mancini established Redbelly Citrus' blood orange orchards in a microclimate surrounding Lake Wyangan that almost perfectly matches the climatic conditions of Catania, Sicily.

With their dedicated farming practices geared towards growing the bloodiest blood oranges in Australia, they have mastered blood orange farming such that you'll be transported to Sicily with each segment of their delizioso blood oranges.

Leonard and Vito Mancini,
Co-Directors Redbelly Citrus Pty Ltd

About the Author

Kathleen Alleaume is a trusted health expert in the field of nutrition and fitness. She is an Exercise Physiologist and Nutritionist, Author, founder of The Right Balance Consultancy Ltd.

Highly regarded for her professional yet easy-to-understand advice, Kathleen has established herself as a leading figure among health and fitness experts in Australia where she continues to develop and deliver fresh, cutting edge health content to millions via her publications and as a spokesperson across print, broadcast and online media.

Qualifications: Bachelor of Exercise Science and Masters Human Nutrition (MSc).

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