Red raspberries have been used for centuries in Europe and North America as treatments for a variety of ailments. Today red raspberries have been documented to have a variety of beneficial, naturally occurring chemicals that help the body ward off sickness.

ANTHOCYANINS
Anthocyanins, which act as pigments to give berries their deep color, are a major component of the phenolic/flavonoid class. Recent research shows that anthocyanins act as antioxidants, providing many potential health benefits. Researchers are currently linking anthocyanin activity to improving vision, controlling diabetes, improving circulation, preventing cancer, and retarding the effects of aging, particularly loss of memory and motor skills.

Anthocyanins 1 & 2
Cyclooxygenase is produced in the body in two or more forms, termed COX-1 and COX-2, for different purposes. COX-1 is built in many different cells to create prostaglandins, which are used for basic "housekeeping" messages throughout the body. The second enzyme, COX-2, is built only in special cells and is used for signaling pain and inflammation. Some pain relief medication works by blocking the messages carried by COX-1, COX-2, or both, and thus the body does not feel pain or inflammation. The anthocyanins that are able to block COX-1 and COX-2 are called Anthocyanins 1 and 2, respectively.

Researchers discovered that the antioxidant activity of anthocyanins from raspberries was superior to vitamin E at a test concentration of 125 µg/ml. The COX inhibitory activities of anthocyanins from red raspberries were comparable to those of ibuprofen and naproxen at 10 µM concentrations. The yields of pure anthocyanins 1 and 2 in 100 g of red raspberries were among the highest of any fruits at 24 mg/100g.

SALICYLIC ACID
Salicylic acid is found in red raspberries and is suspected of having the same protective effect against heart disease as aspirin. Aspirin is a closely related compound known to pharmacists as salicylic acid.
acetate. The therapeutic successes of small daily doses of aspirin to inhibit atherosclerosis suggest the possibility that salicylic acid consumed in foods may provide a similar benefit. A 100-gram serving (about 3 /4 cup) of red raspberries contains around 5 milligrams of salicylic acid.

**QUERCETIN**
Quercetin is a flavonol that works as an anti-carcinogen and an antioxidant. Quercetin has also been shown to reduce the release of histamine and may be effective against allergies. The quercetin content of red raspberries is 12 milligrams per 100 grams of juice.

**CATECHINS**
Catechins are flavonols that support the antioxidant defense system. Catechins found in red raspberries may contribute to cancer prevention. The catechins content found in red raspberries is 0.83 milligrams per 100 g.

**ANTIOXIDANTS**
The Oxygen Radical Absorbance Capacity (ORAC) measures the antioxidant activity of foods. Specifically, ORAC measures the time it takes to prevent an oxidation reaction. Antioxidants inhibit oxidation which is known to have a damaging effect on tissues. Health research indicates that people who consume a diet rich in fruits and vegetables with a high ORAC values may slow the aging process.

ORACfI (µmoleTE/g) analysis, which utilizes fluorescein as the fluorescent probe, provides a measure of the scavenging capacity of antioxidants against the peroxyl radical, which is one of the most common reactive oxygen species (ROS) found in the body. Trolox, a water-soluble Vitamin E analog, is used as the calibration standard and the ORAC result is expressed as micromole Trolox equivalent(TE) per gram.

The ORAC level of red raspberries was determined to be between 42 and 171 µmoleTE/g, which is comparable to other fruits such as blueberries, which are among the fruits with the highest levels of antioxidants.

### Red Raspberries a Good Source of Ellagic Acid

The most promising benefit that red raspberries hold for consumers is their substantial quantity of ellagic acid. Ellagic acid is a phenolic compound that has become a known as a potent anti-carcinogenic/anti-mutagenic compound. Clinical tests conducted at the Hollings Cancer Institute at the Medical University of South Carolina (MUSC) show that ellagic acid, a naturally occurring plant phenol may be the most potent way to prevent cancer, inhibit the growth of cancer cells, and arrest the growth of cancer in subjects with a genetic predisposition for the disease.

Ellagic acid acts as a scavenger to "bind" cancer-causing chemicals, making them inactive. It inhibits the ability of other chemicals to cause mutations in bacteria. In addition, ellagic acid from red raspberries prevents binding of carcinogens to DNA, and reduces the incidence of cancer in cultured human cells exposed to carcinogens.
Healthy Beverages
As the functional beverage market continues its double-digit growth, the dairy industry has been able to latch on to the rise and offer numerous products in the same niche. Drinkable yogurt beverages are a standout among the healthy dairy beverages being offered today, but there is still an exceptional amount of new product development that can occur if dairy manufacturers continue to capitalize on existing product trends. Where soy beverage makers have excelled, dairy manufacturers need to lead. Smoothies, shakes and other functional drinks have been dominated by soy protein-based beverages, but the dairy industry could certainly be taking advantage of the opportunities present. Most of the new functional dairy beverages are still relatively mainstream, such as fortified milk beverages. Blended fruit drinks, high protein beverages and mood-enhancing herb drinks can move the dairy industry away from simply offering flavored milks and into an entirely new category. The dairy industry should be leading in the development of new healthy, functional beverages, and blends with red raspberries and other fruits would certainly help position dairy products as market leaders.

The following is a drinkable yogurt beverage formulated at the University of Wisconsin-Madison that provides manufacturers with an exceptional tasting, high value, marketable product.

Manufacture Protocol: Liquid Yogurt Drink

<table>
<thead>
<tr>
<th>Base composition</th>
<th>Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 1% milkfat milk</td>
<td>• Batch: 180-190°F for 10-20 min</td>
</tr>
<tr>
<td>• 2% additional milk solids nonfat</td>
<td>• Continuous: 190-200°F for 5 min</td>
</tr>
<tr>
<td>• 10% cane or beet sugar</td>
<td></td>
</tr>
</tbody>
</table>

Process:
1. Prepare base composition.
2. Process at indicated time and temperature.
3. Homogenize at 2500 psi (2000 first stage + 500 second stage).
4. Cool to 115°F.
5. Inoculate with yogurt culture (Str. thermophilus, L. bulgaricus).
6. Incubate at 115°F to pH 4.8.
7. Break coagulum and cool to 85°F to slow acid development.
8. Homogenize at low pressure (~1000 psi) to remove graininess and disperse lumps.
9. Add 7.5% 65°Brix Red Raspberry Juice concentrate.
10. Add cold dispersible guar gum to increase viscosity, as needed.
11. Package.
12. Cool to ~40°F.
13. Shelf life 2-3 weeks.
The red raspberry drinkable yogurt and flavored milk products developed at the University of Wisconsin-Madison use a plain cultured milk base. After shearing it, a stabilizer is added, along with red raspberry juice concentrate, flavors and sweetener. These products maintain a smooth mouthfeel and texture, with a distinct red raspberry flavor but no identifiable fruit. This increases the consumer perception and acceptability of the product.

### Manufacture Protocol: Flavored Milk Drink

<table>
<thead>
<tr>
<th>Base composition</th>
<th>Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 2% milkfat milk</td>
<td>• Batch: 150-155°F for 30 min</td>
</tr>
<tr>
<td>• 2% additional milk solids nonfat</td>
<td>• Continuous: 170-175°F for 18+ sec</td>
</tr>
<tr>
<td>• 9% cane or beet sugar</td>
<td></td>
</tr>
</tbody>
</table>

**Process:**
1. Prepare base composition.
2. Process at indicated time and temperature.
3. Homogenize at 2500 psi (2000 first stage + 500 second stage).
4. Cool to <45°F.
5. Add 7.5% 65° Brix Red Raspberry Juice concentrate.
6. Add cold dispersible guar gum to increase viscosity, as needed.
7. Package.
8. Cool to ~40°F.
9. Shelf life 2-3 weeks.

---

**WASHINGTON RED RASPBERRY COMMISSION**

1796 Front St.
Lynden, WA 98264-1260

The Washington Red Raspberry Commission has news, recipes and new product information for consumers and industrial manufacturers about how to use red raspberries in the foods they make. Please visit our website [www.red-raspberry.org](http://www.red-raspberry.org) for more berry good stuff.