



**Reading Supports**

**Teacher’s Guide:**

**“Making Sense of Milk”**

*February/March 2019*

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# Reading Supports

The pages that follow include reading supports in the form of an Anticipation Guide, a Graphic Organizer, and Student Reading Comprehension Questions. These resources are designed to help students prepare to read the article and then locate and analyze information from the article.

* **Anticipation Guide (page 5):** The Anticipation Guide helps to engage students by activating prior knowledge and stimulating student interest before reading. If class time permits, discuss students’ responses to each statement before reading each article. As they read, students should look for evidence supporting or refuting their initial responses.

**Or** consider the following ideas to engage your students in reading:

**Making Sense of Milk**

* Before reading, ask students if they drink milk other than cow’s milk, and why. Ask them what questions they might have about the differences in cow’s milk and plant-based milks.
* As they read the article, students should look for answers to their questions.
* **Graphic Organizer (page 6):** The Graphic Organizer is provided to help students locate and analyze information from the article. Student understanding will be enhanced when they explore and evaluate the information themselves, with input from the teacher, if students are struggling. Encourage students to use their own words and avoid copying entire sentences from the article. The use of bullets helps them do this.

If you use the aforementioned organizers to evaluate student performance, you may want to develop a grading rubric such as the one below.

|  |  |  |
| --- | --- | --- |
| **Score** | **Description** | **Evidence** |
| 4 | Excellent | Complete; details provided; demonstrates deep understanding. |
| 3 | Good | Complete; few details provided; demonstrates some understanding. |
| 2 | Fair | Incomplete; few details provided; some misconceptions evident. |
| 1 | Poor | Very incomplete; no details provided; many misconceptions evident. |
| 0 | Not acceptable | So incomplete that no judgment can be made about student understanding |

* **Student Reading Comprehension Questions (page 7):** The Student Reading Comprehension Questions are designed to encourage students to read the article (and graphics) for comprehension and attention to detail, to provide the teacher with a mechanism for assessing how well students understand the article and/or whether they have read the assignment, and, possibly, to help direct follow-up, in-class discussion, or additional, deeper assignments.

Some of the articles in this issue provide opportunities, references, and suggestions for students to do further research on their own about topics that interest them.

To help students engage with the text, ask students which article **engaged** them most and why, or what **questions** they still have about the articles. The “Web Resources for More Information” section of the Teacher’s Guide: Tools and Resources provides sources for additional information that might help you answer these questions.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## Anticipation Guide

**Directions: *Before reading the article*,** in the first column, write “A” or “D,” indicating your agreement or disagreement with each statement. As you read, compare your opinions with information from the article. In the space under each statement, cite information from the article that supports or refutes your original ideas.

|  |  |  |
| --- | --- | --- |
| **Me** | **Text** | **Statement** |
|  |  | 1. Plant-based beverages have been used for centuries. |
|  |  | 1. The nutritional purpose of cow’s milk is similar in some ways to that of nuts. |
|  |  | 1. Homogenized milk is a mixture containing small suspended fat particles. |
|  |  | 1. Most proteins in cow’s milk are soluble in water. |
|  |  | 1. Plant-based milks are suspensions. |
|  |  | 1. Dairy products are excellent sources of minerals needed for bone health. |
|  |  | 1. No plant-based milks are high in protein. |
|  |  | 1. Almond milk is high in saturated fat. |
|  |  | 1. Milk allergies are caused by proteins. |
|  |  | 1. There is not much difference between botanical milks and cow’s milk. |

## Graphic Organizer

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Directions**: As you read, complete the graphic organizer below to compare cow’s milk to plant-based milks.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Types of Proteins** | **Minerals** | **Vitamins** | **Fat content** |
| **Cow’s milk** |  |  |  |  |
| **Soy milk** |  |  |  |  |
| **Almond milk** |  |  |  |  |
| **Rice milk** |  |  |  |  |
| **Coconut milk** |  |  |  |  |

**Summary:** In the space below, or on the back of this paper, write one or two sentences describing which type of milk you choose to drink, and why using information from the article.

## Student Reading Comprehension Questions

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Directions**: Use the article to answer the questions below.

* 1. How does the nutritional purpose of animal milk resemble that of nuts and seeds?
  2. How can milk be both a solution and a suspension?
  3. What is homogenization?
  4. Describe the structure and composition of micelles in milk.
  5. Explain how milk can be classified as a colloid.
  6. Name the sources of the four most widely-available plant-based milk alternatives?

**Student Reading Comprehension Questions, cont.**

* 1. What do nutritionists look at when they are evaluating protein quality?
  2. Besides protein, calcium, potassium, and vitamin D, what seven nutrients are contained in cow’s milk that are not always contained in plant-based milk alternatives?
  3. Compare the nutrient content of each of the four main plant-based kinds of milk to that of cow’s milk.
  4. What are the potential health effects of (a) soy milk, (b) almond milk, and (c) coconut milk?

**Critical-Thinking Questions**

***Write your answers on another piece of paper, if needed.***

* 1. What type of milk would be the best choice for a distance runner or swimmer prior to their competition? Explain your choice.
  2. Explain how (a) skim milk and (b) 2% milk could be made from unhomogenized whole milk. (Whole milk is approximately 3.5% milkfat, depending on the cow—Holsteins, the black and white cows, produce milk with lower fat (cream) content, while Jerseys, the light-brown cows, produce milk with higher fat (cream) content.)

## Answers to Reading Comprehension Questions

1. **How does the nutritional purpose of animal milk resemble that of nuts and seeds?**

The nutritional purpose of animal milk is to feed young animals, while plant seeds provide nutrients for embryonic plants to use to develop into seedlings.

1. **How can milk be both a solution and a suspension?**

Milk is a solution because the sugars and minerals in milk are dissolved in the watery portion of milk, while the lipids in milk form small clumps of fat that stay suspended in the watery base in store-bought milk.

1. **What is homogenization?**

Homogenization is the mechanical process that breaks up larger particles of fat into smaller particles so that they will stay suspended in the watery mixture.

1. **Describe the structure and composition of micelles in milk.**

The micelles in milk are spherical casein protein particles that have a hydrophilic, or “water-loving”, side that faces outward and a hydrophobic, or “water-hating”, side that gets tucked inside the sphere along with clusters of calcium phosphate.

1. **Explain how milk can be classified as a colloid.**

Milk can be classified as a colloid because of the droplets of fat and protein that are dispersed and suspended in the watery mixture.

1. **Name the sources of the four most widely-available plant-based milk alternatives.**

The sources of the four widely-available plant-based milk alternatives are

1. soy,
2. rice,
3. almonds, and
4. coconuts.
5. **What do nutritionists look at when they are evaluating protein quality?**

When evaluating protein quality, nutritionists look at the amino acid composition, digestibility, and how much of the protein the body can use—its bioavailability.

1. **Besides protein, calcium, potassium, and vitamin D what seven nutrients are contained in cow’s milk that are not always contained in plant-based milk alternatives?**

The seven nutrients that are found in cow’s milk that are not always contained in plant-based milk alternatives are phosphorus, zinc, thiamin, vitamin B6, vitamin E, vitamin K, and folate.

1. **Compare the nutrient content of each of the four main plant-based kinds of milk to that of cow’s milk.**
   1. Soy milk is the closest in nutrient content to that of cow’s milk. It contains the nine essential amino acids that the human body can’t synthesize, so it is a complete protein source like cow’s milk. It is often fortified with B vitamins, vitamin D, and calcium.
   2. Almond milk is low in protein but has a high vitamin E content and does not contain saturated fats. It can be fortified with other nutrients that are found in cow’s milk.
   3. Rice milk is low in protein and high in carbohydrates. It is often suggested for individuals with multiple allergies.
   4. Coconut milk is a good source of potassium and contains iron and fiber but it is low in protein and has a higher saturated fat content than the other plant-based milks.
2. **What are the potential health effects of (a) soy milk, (b) almond milk, and (c) coconut milk?**
3. “Soy milk contains isoflavones that some research suggests can protect against cardiovascular disease and osteoporosis.”
4. Almond milk contains antioxidants and vitamin E that can guard against cellular damage.
5. “Coconut milk contains lauric acid, which some research suggests promotes brain development and helps boost the immune system.”

**Critical-Thinking Questions**

1. **What type of milk would be the best choice for a distance runner or swimmer prior to their competition? Explain your choice.**

Rice milk would be the best choice for a distance runner or swimmer because of its high carbohydrate content. An athlete that participates in an endurance sport such as distance running or swimming needs stored energy to improve their performance. Carbohydrates from the diet are stored as glycogen in the muscles and in the liver. Endurance athletes need to make sure they get enough carbohydrates in their diet to ensure that they will have adequate amounts of glycogen stored in their bodies in order to have enough energy to finish their races.

1. **Explain how (a) skim milk and (b) 2% milk could be made from unhomogenized, whole milk. (Whole milk is approximately 3.5% milkfat, depending on the cow—Holsteins, the black and white cows, produce milk with lower fat (cream) content, while Jerseys, the light-brown cows, produce milk with higher fat (cream) content.)**

Possible Student Answer

Since fat is less dense than the watery portion of milk, it will rise to the top and form a fat layer (the cream). This layer should be removed and set aside, and the remaining watery portion below it would be the skim milk.

To make 2% milk, weigh a quantity of the skimmed milk. Calculate 2% of this weight to determine the weight of fat removed in (a) above to be added back into the milk in order to make milk that is 2% milkfat. Weigh out the calculated amount of cream and then add it to the weighed skim milk.