

Written Exam
2003 Dairy Foods CDE

1. Tuberculin testing of dairy herds was first introduced in _____
 - a. 1611
 - b. 1890
 - c. 1936
 - d. 1987

2. Designed to increase milk production in dairy cows, recombinant bovine somatotropin (rBST) was approved for commercial use, in the United States, in _____
 - a. 1980
 - b. 1987
 - c. 1994
 - d. 2000

3. Milk products contain high quality proteins. The whey proteins constitute about 18% of the protein content in milk. Casein, a protein found only in milk, contains _____
 - a. significant levels of carcinogens.
 - b. 20% lipids.
 - c. all of the essential amino acids.
 - d. measureable quantities of rBST

4. Which of the following consumer groups is considered a key target for the milk industry?
 - a. teens and kids
 - b. adults, ages 24-36
 - c. adults, ages 40 and over
 - d. pregnant mothers

5. In the supermarket, _____ sales were, once again, a bright spot with respect to increased product sales
 - a. whole milk
 - b. fat-free product
 - c. cultured milk
 - d. flavored milk

6. _____ results in a shelf stable product that does not require refrigeration until opened.
 - a. UHT: Ultra High Temperature pasteurization
 - b. HTST: High Temperature Short Time pasteurization
 - c. UP: Ultra Pasteurization
 - d. Pasteurization at 145 degrees F for not less than 30 minutes

7. Which of the following products would typically contain the highest level of calcium by volume?
 - a. Whole milk
 - b. Lowfat 1% milk
 - c. Reduced Fat 2% milk
 - d. Evaporated Canned milk

8. Milkfat carries the following fat soluble vitamins:
 - a. A, D, E, and K
 - b. B, B12, D and K
 - c. C, A, E and K
 - d. D, riboflavin, niacin and C

9. _____ the disintegration of fat globules in milk to reduce the separation of cream.
 - a. Pasteurization is
 - b. HACCP is
 - c. Homogenization is
 - d. Production of lowfat dairy products is accomplished through

- 10 HACCP (Hazard Analysis and Critical Control Point) is certification program designed to
- establish safe food handling and processing standards.
 - establish a maximum fat content standard in fluid milk.
 - establish a tuberculosis-free milk supply
 - improve efficiency and profitability.
- 11 Bovine spongiform encephalopathy has resulted in
- a prohibition against using most mammalian protein sources to manufacture animal feeds given to ruminant animals
 - an increased number of cases of Mad-cow disease in the United States.
 - decreased regulation of animal and animal product imports into the United States
 - a ban on all animal product exports from the United States to the European Union.
- 12 BSE is a chronic degenerative disease affecting the _____ of cattle.
- heart and lungs
 - mammary glands
 - central nervous system
 - endocrine system
13. The "Food Allergen Labeling and Consumer Protection Act" would mandate regulations regarding food allergen labeling. The act would _____
- require product labels on all products containing a major food allergen, defined as: milk, eggs, crustacean shellfish, fish, wheat, tree nuts, peanuts or soybeans.
 - Require product labels on all products containing a major food allergen, defined as: milk or meat from dairy animals, eggs, crustacean shellfish, fish, wheat, tree nuts, peanuts or soybeans.
 - require new food allergen labeling procedures by January 1, 2004
 - impose a recall of all food products containing major food allergens
- 14 In a study of children ages 6 to 13, a report in the Journal of Pediatrics suggests that
- excessive sweetened drink consumption was associated with increased consumption of flavored milks and increased calcium intake
 - excessive sweetened drink consumption was associated with decreased milk consumption, resulting in higher energy intake, weight gain and decreased intake of protein, calcium phosphorus, magnesium and zinc.
 - children who drank sweetened drinks ate fewer calories from solid food thereby decreasing overall caloric intake.
 - milk consumption is associated with obesity in children ages 6 to 13
15. Cow's milk (i.e., whole, 2% reduced fat, 1% lowfat, nonfat or skim, evaporated) is
- not recommended for infants during the first 12 months of life because of its low iron concentration and low bioavailability
 - recommended for infants during the first 12 months of life because of its iron content and bioavailability
 - much higher in iron than human milk, and is therefore recommended for infants during the first 12 months of life
 - much lower in iron than human milk, and is therefore not recommended for infants during the first 12 months of life.
16. Intake of milk and milk products (e.g., cheese and yogurt) during _____ is important to meet calcium needs for building bone mass and strength. Optimizing the amount of bone deposited during this time is considered to be the most effective strategy to reduce the risk of osteoporosis.
- adolescence
 - pre-adolescence
 - age 50-65
 - age 70 and over
- 17 Fluid whole milk contains not less than _____ milk fat, and fat-free or skim milk contains less than _____ milkfat
- 2%, 1%
 - 3%, 1.25%
 - 3.25%, 0.5%
 - 8.25%, 1.5%

18. Commercially prepared milks in which the milk sugar content has been reduced are widely available. These milks are prepared at a processing plant by adding the liquid enzyme _____ to pasteurized milk and storing it for 24 hours.
- lipase
 - lactase
 - lactose
 - lipose
19. Milk is a complex _____ dispersion of _____ globules and protein in an aqueous solution of _____, minerals, and other minor constituents.
- nutrient, lactose, lipids
 - sugar, protein, blood
 - milk solids, beta, milk sugar
 - colloidal, fat, lactose
20. In infants, some lactose enters the colon, where it promotes the growth of certain beneficial _____.
- antibodies.
 - lipase producing coliforms.
 - lactic-acid producing bacteria.
 - intestinal villi which aid digestion.
21. Milk fat is a natural fat with unique physical, chemical, and biological properties. This fat contributes to the _____.
- high caloric content of ice cream, sour cream, and yogurt
 - appearance, texture and flavor of dairy foods.
 - high cholesterol content of milk
 - low cholesterol content of milk
22. To preserve the quality of milk, use proper containers to protect milk from exposure to _____, which can reduce riboflavin, ascorbic acid, and vitamin B6. Always refrigerate milk at _____ degrees F or less.
- strong fluorescent lights, 40
 - oxygen, 32
 - bacteria, 36
 - heat, 45
23. In cheese production, curd formation results from introducing a coagulating agent such as rennet. The enzyme coagulates milk by precipitating _____.
- casein
 - lactose
 - lactase
 - lipids
24. Yogurt is the product resulting from the culturing of a mixture of milk and cream products with the lactic acid-producing bacteria, *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. The lactic acid increases shelf life by _____.
- creating a slightly sour taste.
 - lowering pH and inhibiting the growth of pathogenic organisms.
 - creating a thicker, creamier texture.
 - destroying the *Lactobacillus bulgaricus*.
25. An International Journal of Obesity study found _____.
- no link between dairy consumption and increased body fat in teenage girls.
 - a correlation between dairy consumption and increased body fat in teenage girls.
 - consumption of dairy products during adolescence is not correlated with maximizing bone mass.
 - while dairy products may contribute to obesity in teenage girls, the consumption of dairy products does not enhance calcium intake in adolescent girls.

26. The Journal of the American Medical Association acknowledges that adoption of the Dietary Approaches to Stop Hypertension (DASH) eating plan may be effective in reducing the risk of heart attack and stroke by lowering blood pressure. The DASH eating plan includes _____.
- a. a restriction in the quantity of milk and dairy products consumed.
 - b. 2 to 3 servings of lowfat dairy foods daily.
 - c. a reduction in calcium intake by limiting servings of dairy products to 2 to 3 servings daily.
 - d. a reduction in lactic acid consumed by reducing yogurt intake.
27. In adults, a calcium deficiency, along with other factors, may result in bone deterioration called _____. The recommendations for calcium are: 1000 milligrams for adults, _____ milligrams for adolescents, 500-800 milligrams for young children, and 1200 milligrams for adults over 51 years of age.
- a. osteoporosis, 1300
 - b. osteoporosis, 1000
 - c. macrodegeneration, 1300
 - d. macrodegeneration, 1000
28. A cow's milk protein, which is rich in _____, compliments many plant proteins, which are normally limited in this amino acid.
- a. leucine
 - b. cystine
 - c. lysine
 - d. methionine
29. The Grade A Pasteurized Milk Ordinance (PMO) is essentially a set of requirements for:
- a. product safety
 - b. milk hauling
 - c. sanitation
 - d. all of the above
30. Cheese contains, in a concentrated form, many of milk's nutrients. About _____ pounds (5 quarts) of whole milk are needed to make 1 pound of whole milk cheese.
- a. 2
 - b. 10
 - c. 22
 - d. 36

Analyze & Interpret Information
Dairy Foods CDE 2003

(Source: Newer Knowledge of Dairy Foods)

- 31 From 1989 to 1997, which increased by the greatest percentage?
- half-pints served in school lunch programs
 - half-pints served in school breakfast programs
 - total half-pints served
 - total gallons served
- 32 Dairy foods, excluding butter, provide the greatest overall contribution of _____, as a measure of U.S. per capita supply
- protein
 - fat
 - calcium
 - iron
- 33 How many grams of fat are present in two cups of reduced fat milk
- 5
 - 10
 - 15
 - 20
- 34 What percentage of saturated fat would be found in two cups of reduced fat milk?
- 8%
 - 5%
 - 10%
 - 16%
- 35 One cup of 2% reduced fat milk provides _____ % of the recommended daily intake of Vitamin B12.
- 0
 - 25
 - 33
 - 100
- 36 Because of our body's ability to synthesize some nutrients, a dietary intake of 120 mg of tryptophan is equivalent to 2 mg of _____
- Biotin
 - Thiamin (B1)
 - Pantothenic acid
 - Niacin
- 37 One cup of 2% reduced fat milk provides less than half of your recommended daily intake of _____
- Ascorbic Acid (Vitamin C)
 - Riboflavin (B2)
 - Vitamin B12
 - Biotin
- 38 Assume a sample of milk has a freezing point of -0.23 degrees Celsius. This could indicate _____
- milk that has been adulterated with water.
 - milk with a higher than average butterfat content.
 - a normal sample of milk.
 - an increase in osmolality.
- 39 If bacterial contamination in milk causes lactic acid production, the titratable acidity % of the milk sample would likely be _____
- unaffected
 - 0.18

- c. offset by an increase in
- d. neutralized.

40. Assume a sample of milk, when cooled to 15 degrees Celsius, had a specific gravity of 1.100. The sample

-
- a. may have been adulterated with water.
 - b. may have a higher than normal fat content.
 - c. may have a lower than normal viscosity.
 - d. may have a higher overall solids content.

TABLE 2

**Percent Nutrient Contribution of Dairy Foods,
Excluding Butter, to the U.S. Per Capita Supply, 1994.**

Nutrient	1994 %
Energy	9.3
Protein	19.3
Fat	12.3
Carbohydrate	5
Minerals	
Calcium	72.8
Phosphorus	32.8
Zinc	18.9
Magnesium	16.4
Iron	2.1
Vitamins	
Riboflavin	30.7
Vitamin B ₁₂	21.0
Vitamin A	17.4
Vitamin B ₆	9.7
Folate	7.3
Thiamin	6.2
Vitamin E	2.8
Ascorbic Acid	2.7
Niacin	1.4

From Gerrior, S., and Bente, L., *Nutrient Content of the U.S. Food Supply, 1909-94*. Home Economics Research Report No. 53, Washington, DC: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion, 1997.

TABLE 1

Milk Consumed Through Schools, 1989-1997

	School Lunch Program ¹	School Breakfast Program ²	Special Milk Program ³	Total Half-Pints Served	Total Gallons	% of U.S. Milk Production
	(half pints)	(half pints)	(half pints)			
1989	3,404,200,413	553,095,455	188,688,263	4,145,984,131	259,124,008	1.6
1990	3,407,714,459	594,321,133	181,248,099	4,183,283,691	261,455,231	1.5
1991	3,443,233,261	648,580,972	177,026,314	4,268,830,547	268,801,909	1.6
1992	3,486,635,622	716,148,024	174,431,839	4,377,213,484	273,575,843	1.6
1993	3,517,055,117	775,797,605	167,265,331	4,460,118,052	278,757,378	1.6
1994	3,571,489,027	841,380,973	158,845,879	4,571,715,679	285,732,230	1.6
1995*	3,615,393,894	906,288,934	151,353,428	4,673,036,256	292,064,766	1.6
1996	3,665,299,884	945,282,271	144,323,505	4,754,814,660	297,175,916	1.7
1997	3,747,681,545	1,000,584,770	140,643,003	4,888,909,318	305,556,832	1.9

¹ Assumes that milk is served with 85% of lunches

² Assumes that milk is served with 84% of breakfasts

³ Special milk program available only at schools that do not participate in school lunch and breakfast programs. Percents of lunches and breakfasts served with milk based on "School Nutrition Dietary Study"

* Revised.

Source: USDA Food Nutrition Service

From International Dairy Foods Association, Milk Facts 1998 Edition, Washington, D.C., Milk Industry Foundation, 1998.

NEWER KNOWLEDGE OF DAIRY FOODS

FIGURE 1
 Typical Nutrition Facts Label
 for Reduced Fat Milk

Nutrition Facts	
Serving Size: 1 cup (240mL)	
Servings Per Container: 1	
Amount Per Serving	
Calories: 130	Calories from Fat: 46
	% Daily Value*
Total Fat: 5g	8%
Saturated Fat: 3g	5%
Cholesterol: 20mg	7%
Sodium: 125mg	5%
Total Carbohydrate:	12g4%
Dietary Fiber: 0g	5%
Sugars: 12g	
Protein: 8g	16%
Vitamin A: 10% • Vitamin C: 2% • Calcium 30%	
Iron: 0% • Vitamin D: 25%	
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:	
	Calories: 2,000 2,500
Total Fat	Less than 65g 80g
Sat. Fat	Less than 20g 25g
Cholesterol	Less than 300mg 300mg
Sodium	Less than 2400mg 2400mg
Total Carbohydrates	300g 375g
Dietary Fiber	25g 30g
Calories Per Gram:	
Fat 9 • Carbohydrate 4 • Protein 4	

TABLE 22

Water-Soluble Vitamins in Milk

Vitamin	Function in Body	Amount in 2% Reduced Fat Milk 1 Cup	% of RDI Provided by 3 Cups	Comments
Thiamin (B ₁)	Coenzyme for many reactions in carbohydrate metabolism	0.095 mg	24 to 26%	
Riboflavin (B ₂)	Precursor for coenzymes important in the oxidation of glucose, fatty acids, amino acids, and purines	0.403 mg	93 to 100%	
Niacin	Part of a coenzyme in fat synthesis, tissue respiration, and utilization of carbohydrate	0.210 mg	46% for women; 40% for men	The amino acid tryptophan in milk protein can be used by the body to synthesize niacin. A dietary intake of 60 mg tryptophan is equivalent to 1 mg niacin in the body. The niacin equivalent in one glass of milk is therefore equal to 2.126 (0.210 mg preformed niacin plus 1.916 mg from tryptophan)
Pantothenic Acid	Acts as a component of coenzyme A which is involved in fatty acid metabolism	0.781 mg	47%	
Vitamin B ₆	Functions as a coenzyme for more than 100 enzymes involved in protein metabolism	0.105 mg	18 to 24% for men; 21 to 24% for women	
Folate	<ul style="list-style-type: none"> • Growth factor • Functions as a coenzyme in the transfer of one-carbon units in the synthesis of nucleotides for DNA synthesis 	12.4 ug	9%	Cow's milk contains a high-affinity folate binding protein, a minor whey protein, which promotes the retention and increases the bioavailability of folate by slowing absorption
Vitamin B ₁₂	Necessary for growth, maintenance of nerve tissues, and normal blood formation	0.89 ug	100%	
Biotin	Necessary for many carboxylation and decarboxylation reactions in carbohydrate, fatty acid, protein, and nucleic acid metabolism	7.32 ug	73%	
Ascorbic Acid (vitamin C)	<ul style="list-style-type: none"> • Forms cementing substances such as collagen in the body • Important in wound healing • Increases resistance to infections • Enhances the absorption of non-heme iron 	2.3 mg	Not a significant source	Vitamin C levels in milk are readily destroyed during handling and storage

TABLE 14

General Physical Properties of Milk

Property	Value	Definition and Significance	Property	Value	Definition and Significance
Titratable acidity, % max	0.16	The total acidity or the amount of alkali required to neutralize the acidic constituents. Generally expressed as lactic acid. Used to determine bacterial growth in fermentations and compliance standards.	Specific heat at		The specific heat of milk products depends on their composition and the temperature. Important in processing as the amount of heat or refrigeration required may be calculated from the weight and specific heat of the different products being pasteurized or cooled.
pH	6.6 ± 0.2 at 25° C	Fresh milk is slightly acid (pH of drinking water is 7.0-8.5). Generally the pH is lower (pH 6.0) in colostrum and higher (up to 7.5) during mastitis than in normal milk of mid-lactation.	0° C	0.92	
Surface tension	50-52 dynes at 20° C	Normally, cow's milk's surface tension is about 70% of that of water. Involved in adsorption and formation and stability of emulsions. Important to creaming, functions of fat globule membranes, foaming, and emulsifier use.	15° C	0.94	
Specific gravity	1.032 at 15° C	Ratio of the density of the product and the density of water at the same temperature. Many milk constituents have a specific gravity (sg) greater than that of water which has a sg of one. The more fat in milk, the lower the sg as fat has an sg less than one. Used to estimate solids not fat.	40° C	0.93	
Freezing point	-0.540° C	Lower than that of pure water (0° C) due to dissolved substances in milk. Used to detect adulteration of milk with water.	Coefficient of expansion at		The ratio of an increase in volume per unit increase in temperature. Milk expands when heated and contracts when cooled. Used for design of dairy equipment.
Boiling point	100.17° C	Greater than that of pure water (100° C) due to dissolved substances in milk. Used to detect adulteration of milk with added water.	10° C	0.9975	
			15.6° C	0.9985	
			21.1° C	1.0000	
			Viscosity	2.0-2.1 cp at 20° C	Refers to resistance to flow measured in centipoise (cp). Used to assess aggregation of protein micelles or fat globules. Also used for design of dairy equipment.
			Electrical conductivity	45-55x10 ⁻⁴ mho	In milk, fat and colloiddally dispersed substances decrease conductivity. Used to detect added neutralizers, follow fermentation, and monitor demineralization of whey.
			Osmolality*	275 m Osm/kg	The osmolality of a solution is based on the number of particles in solution - the greater the number of particles, the higher the osmolality. Osmolality of foods is important in planning diets of low osmolality for certain patients. Since a solution of lower osmolality requires transfer of less water to the stomach and gastrointestinal tract to dilute it, it should be better tolerated than one of higher osmolality.

* Source: The Doyle Pharmaceutical Company, Minneapolis, Minn

Dairy Foods Written Exam Key
2003

1. B
2. C
3. C
4. A
5. D
6. A
7. D
8. A
9. C
10. A
11. A
12. C
13. A
14. B
15. A
16. A
17. C
18. B
19. D
20. C
21. C
22. A

23. A
24. B
25. A
26. B
27. A
28. C
29. D
30. B

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31. B
32. C
33. B
34. A
35. C
36. D
37. A
38. A
39. B
40. D

Dairy Products CDE References 2003

The 2003 Dairy Foods CDE will be written utilizing the following web-based resources. All of these resources are available via the internet.

International Dairy Foods Association

www.idfa.org

Milk Facts

<http://www.idfa.org/facts/milk.cfm>

Milestones of Milk History in the United States

<http://www.idfa.org/facts/milk/milkfact/milk4.pdf>

Importance of Milk in the Diet

<http://www.idfa.org/facts/milk/milkfact/milk5.pdf>

2001 Fluid Milk Sales and Consumption Review

<http://www.idfa.org/facts/milk/milkfact/milk27.pdf>

2001 Fluid Milk and Dairy Product Production Overview

<http://www.idfa.org/facts/milk/milkfact/milk11.pdf>

Pasteurization: Definitions and Methods

<http://www.idfa.org/facts/milk/pasteur.cfm>

Calcium Content of Milk, Milk Products, and Milk-Based Foods

<http://www.idfa.org/facts/milk/milkfact/milk6.pdf>

Definitions: Fluid Milk and Milk Products

<http://www.idfa.org/facts/milk/milkfact/milk7-8.pdf>

Regulation & Food Safety

Food Safety and HACCP

What is the IDFA HAACP Certification Program?

<http://www.idfahaccp.org/>

BSE

U.S. Food & Drug Administration Statement on Canadian Beef Cow/BSE Case, 5/20/03

<http://www.fda.gov/bbs/topics/NEWS/2003/NEW00908.html>

BSE

About BSE

About the Disease

<http://www.idfa.org/reg/bse/fsbse.pdf>

IFDA Position Paper: Food Allergens

Food Allergens: Industry Compliance & Legislation to Mandate Food Label Changes

<http://www.idfa.org/reg/allergen/foodallergens.cfm>

National Dairy Council

<http://www.nationaldairyCouncil.org/>

Home Page (right side)

New Report Suggests Sweetened Drinks put Children at Risk for Obesity

http://www.nationaldairyCouncil.org/1v104/newsres/releases/press_releasesI4E6NW.asp

Consumers

Study finds no link between dairy consumption and increased body fat in teenage girls

http://www.nationaldairyCouncil.org/1v104/newsres/releases/press_releases62W88P.asp

Press Releases

New Blood Pressure Guidelines Highlight DASH Diet

http://www.nationaldairyCouncil.org/1v104/newsres/releases/press_releasesUW4GM7.asp

Health Professionals

Newer Knowledge of Dairy Foods

http://www.nationaldairyCouncil.org/1v104/nutrilib/newknow/3100_newerknowledge_04.htm

Nutrient Content of Milk and Milk Products

<http://www.nationaldairyCouncil.org/1v104/nutrilib/newknow/nka1.html>

Milk and Other Dairy Foods Throughout Life

<http://www.nationaldairyCouncil.org/1v104/nutrilib/newknow/nka3.html>

Kinds of Milk

<http://www.nationaldairyCouncil.org/1v104/nutrilib/newknow/nkb1.html>

Nutrient Content of Milk

<http://www.nationaldairyCouncil.org/1v104/nutrilib/newknow/nkb2.html>

Specific Health Benefits of Milk

<http://www.nationaldairyCouncil.org/1v104/nutrilib/newknow/nkb3.html>

Milk's Physical Characteristics and Constituents

<http://www.nationaldairyCouncil.org/1v104/nutrilib/newknow/nkb4.html>

Protecting the Quality of Milk and Other Dairy Foods

<http://www.nationaldairyCouncil.org/1v104/nutrilib/newknow/nkb5.html>

Cheese Production

<http://www.nationaldairyCouncil.org/1v104/nutrilib/newknow/nkc3.html>

Nutrient Content of Cheese

<http://www.nationaldairyCouncil.org/1v104/nutrilib/newknow/nkc5.html>

Specific Health Benefits of Cheese

<http://www.nationaldairyCouncil.org/1v104/nutrilib/newknow/nkc6.html>

Kinds of Other Dairy Foods

<http://www.nationaldairyCouncil.org/1v104/nutrilib/newknow/nkd1.html>

Interpreting & Analyzing Information:

APPENDIX TABLES from "Newer Knowledge of Dairy Foods" will be utilized for this section of the CDE.