

**2019 Virginia FFA Milk Quality and Products Career Development Event  
Problem Solving**

Name: \_\_\_\_\_ FFA Chapter: \_\_\_\_\_

**General instructions:** This exercise consists of 20 multiple-choice questions. Each question is worth 5 points. Mark your answer in the “Problem Solving” section on your Scantron sheet. Time limit is 40 minutes.

Use the attached “Milk Cows and Production by State and Region” to answer questions 1-4.

**1. Which of the following statements describes the U.S. trend for total milk production from 2014 to 2018?**

- A) Milk production decreased by 4.0%
- B) Milk production decreased by 5.6%.
- C) Milk production increased by 4.0%.
- D) Milk production increased by 5.6%.

**2. Which region lost the largest share of total milk production in the U.S. from 2014 to 2018?**

- A) Lake States
- B) Northeast
- C) Pacific
- D) Southern Plains

**3. What happened to Virginia’s milk production per cow from 2017 to 2018?**

- A) It decreased by 1.3%.
- B) It decreased by 3.0%
- C) It increased by 1.3%.
- D) It increased by 3.0%.

**4. What is the equivalent number of gallons produced per cow per year for cows in Virginia in 2018?**

- A) 1,694
- B) 1,969
- C) 2,291
- D) 169,411

**5. Assuming the following utilization percentages and prices for the four classes of milk in the market during the pay period, first calculate the individual value of the four classes. What is the overall value per hundredweight (cwt) of milk from this producer?**

<u>Class</u>	<u>Utilization (%)</u>	<u>Price/cwt (\$)</u>	<u>Value (\$)</u>
I	60	\$18.00	_____
II	30	\$16.00	_____
III	5	\$12.00	_____
IV	5	\$14.00	_____
All milk price /cwt			_____

- A) \$10.80
- B) \$15.00
- C) \$15.60
- D) \$16.90

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*Table 1 - Cheese – Per Capita Consumption (pounds)*

Year	Cheddar	Mozzarella	Swiss	Brick	Muenster	Cream and Neufchatel
1995	9.04	7.89	1.09	0.04	0.41	2.04
2000	9.87	9.05	1.02	0.03	0.30	2.39
2005	10.15	9.93	1.24	0.03	0.26	2.38
2010	10.06	10.58	1.18	0.02	0.36	2.30
2015	10.17	11.27	1.05	0.01	0.50	2.49
2017	11.07	11.57	1.05	0.01	0.53	2.64

Source: USDA

Use the data in Table 1 to answer questions 6-7.

- 6. Which cheese had the largest percentage increase in per capita consumption since 2015?**
- A) Cheddar
  - B) Cream and Neufchatel
  - C) Mozzarella
  - D) Muenster
- 7. Which cheese had the largest increase in per capita consumption (pounds) since 1995?**
- A) Cheddar
  - B) Cream and Neufchatel
  - C) Mozzarella
  - D) Muenster

*Table 2 - Frozen Dairy Products – Domestic Use (millions of pounds)*

Year	Ice Cream			Frozen Yogurt	Sherbet
	Regular	Low-fat	Non-fat		
1995	3,996	1,654	203	911	320
2000	4,545	1,732	143	566	311
2005	4,475	1,679	97	396	338
2010	4,322	1,933	74	301	296
2015	4,131	2,022	63	441	266
2017	4,151	2,117	52	376	262

Source: USDA

- 8. Which product decreased in consumption by the largest percentage since 1995?**
- A) Frozen yogurt
  - B) Low-fat ice cream
  - C) Non-fat ice cream
  - D) Regular ice cream

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A processor wishes to sell ice cream with the following compositional formula in Table 3:

*Table 3*

<b>Constituent</b>	<b>Ice Cream</b>
Milkfat	11.0%
Nonfat milk solids	11.0%
Sucrose	15.0%
Stabilizer-emulsifier	0.3%
<b>Total solids</b>	<b>37.3%</b>

The processor will use the following ingredients to comprise the formula for ice cream:

- Cream, which contains 40% milkfat and 5.4% NMS
- Condensed skim milk, which contains 30% NMS
- Cane sugar = 100% sugar
- Stabilizer-emulsifier = 95% of total solids
- Water

**9. How much cane sugar will be required to make a 1,000-pound batch of ice cream mix?**

- A) 11
- B) 15
- C) 110
- D) 150

**10. How much cream will be required for the ice cream to contain 11% milkfat?**

- A) 40
- B) 110
- C) 275
- D) 400

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**11. A half-gallon of organic whole milk is sold for \$3.90. What is the equivalent price per hundredweight for this milk?**

- A) \$0.45
- B) \$22.67
- C) \$45.35
- D) \$90.70

**12. You are considering starting an on-farm ice cream plant to process your own milk. You are milking 600 cows that are averaging 88 pounds of milk per cow per day. How many gallons of ice cream would you expect to produce on a daily basis?**

- A) 2,491
- B) 4,400
- C) 5,280
- D) 6,140

**13. How many pounds of skim milk (0% fat) must be added to 500 pounds of 30% cream to bring the fat test to 20%?**

- A) 250
- B) 333
- C) 750
- D) 833

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14. If 3,500 pounds of milk with 4.0% fat, 4,500 pounds of milk with 3.8% fat, and 6,000 pounds of milk with 3.5% milk are mixed, what would the fat percent of the mixture be?
- A) 3.60%  
B) 3.72%  
C) 3.77%  
D) 3.85%
15. You are catering a dairy banquet and need to provide 512 2-oz servings of milk for the milk toast. How many gallons of milk do you need to purchase for the event?
- A) 8  
B) 64  
C) 128  
D) 1024
16. A farmer milks 320 cows in a double-eight parallel parlor two times per day. The manufacturer of the inflations that they use recommends that the inflations be changed after 1,200 cow milkings. Given the information provided, the farmer will need to change the inflations in their parlor after how many days?
- A) 4  
B) 15  
C) 30  
D) 60

Table 4

Cow	Milk/day (lb)	Fat (%)	Protein (%)	SCC (cells/ml)
1	94	2.4	3.3	440,000
2	154	1.8	2.6	13,000
3	64	4.7	3.6	600,000
4	160	3.7	2.9	71,000

Use the data in Table 4 to answer questions 17-20.

17. How many total pounds of fat to the nearest tenth were produced per day by the four cows?
- A) 3.5  
B) 12.6  
C) 14.0  
D) 1,395.6
18. Which cow produced the most pounds of protein per day?
- A) 1  
B) 2  
C) 3  
D) 4
19. Which cow contributed the most somatic cells to the bulk tank?
- A) 1  
B) 2  
C) 3  
D) 4
20. What is the weighted average somatic cell count for the four cows?
- A) 197,292  
B) 232,805  
C) 281,000  
D) 23,280,500

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