

**2021 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.

1. Bacteria exhibit exponential growth when left at room temperature meaning that they can double in number every hour. If your milk sample contains 25 CFU/ml at 9:00 AM and is left at room temperature, how many CFU/ml would be expected at 5:00 PM?
 - A. 1,600
 - B. 3,200
 - C. 6,400
 - D. 12,800
2. A local baker makes 100 pound cakes each day. Their recipe calls for 1 cup of butter per cake. How many sticks of butter does the baker need for the cakes each week if pies are baked five days per week?
 - A. 250
 - B. 500
 - C. 1,000
 - D. 2,000
3. The value of milk containing 3.5% fat and 3.2% protein is \$20.00 per cwt. The fat differential is \$0.15 per point and the protein differential is \$0.35 per point. What is the value of milk at 3.8% fat and 3.0% protein?
 - A. \$18.85
 - B. \$21.15
 - C. \$21.35
 - D. \$25.75
 - E. None of the above
4. How many pounds of 30% cream must be added to 1,000 pounds of skim milk (0% fat) to bring the fat test to 18%?
 - A. 667
 - B. 1,200
 - C. 1,500
 - D. 1,800
5. If 3,000 pounds of milk with 3.6% fat, 5,000 pounds of milk with 3.8% fat, and 8,000 pounds of milk with 4.0% milk are mixed, what would the fat percent of the mixture be?
 - A. 3.68
 - B. 3.72
 - C. 3.80
 - D. 3.86

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Table 1: Cow Data

Cow	Milk per day (pounds)	Fat (%)	Protein (%)	SCC (cells/ml)
A	82	3.8	3.3	123,000
B	105	3.9	3.0	76,000
C	85	3.8	3.5	71,000
D	102	4.3	3.1	105,000

Use the data in Table 1 to answer questions 6-8.

6. How many total pounds of fat were produced per day by the four cows?
 - A. 11.993
 - B. 14.773
 - C. 14.827
 - D. 15.800
 7. Which cow produced the most pounds of protein per day?
 - A. A
 - B. B
 - C. C
 - D. D
 8. Which cow contributes the most total somatic cells to the bulk tank?
 - A. A
 - B. B
 - C. C
 - D. D
-
9. It takes approximately how many pounds of whole milk to produce a ton of cheddar cheese?
 - A. 200
 - B. 1,200
 - C. 10,000
 - D. 20,000
 10. A tanker load of milk was delivered to the milk plant. There were 400 hundredweights of milk on the trailer. The milk tested 3.8% fat and 3.1% protein. How many pounds of protein were delivered in the load?
 - A. 12.4
 - B. 124
 - C. 1,240
 - D. 124,000

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Table 2: Dairy Cooperative Data

Farm	Cows	Milk shipped* (cwt)	Fat (%)	Protein (%)	SCC (cells/ml)
A	250	375	3.8	3.2	160,000
B	500	900	3.7	3.1	235,000
C	400	760	3.6	3.1	190,000
D	1,000	1,700	3.5	3.0	210,000

*Milk is picked up from the farm every other day.

Use the data in Table 2 to answer questions 11-14.

11. Which farm shipped the most pounds of fat?

- A. A
- B. B
- C. C
- D. D

12. What is the weighted average somatic cell count of the milk if the milk from all four farms was commingled? (Round to the nearest whole number.)

- A. 193,225
- B. 198,750
- C. 206,934
- D. 221,473

13. Which farm produced the most milk per cow?

- A. A
- B. B
- C. C
- D. D

14. How many total pounds of milk do these four farms produce on a daily basis?

- A. 1,867.5
- B. 3,735
- C. 186,750
- D. 373,500

**2021 Virginia FFA Milk Quality and Products Career Development Event
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Use the information below to answer questions 15-17.

- Your herd ships milk in a market with 70% Class I and 30% Class II utilization.
 - 750,000 pounds of milk were produced this month.
 - You own 500,000 pounds of milk base for which you receive the blend price.
 - Excess milk receives Class II price.
 - Class I price = \$22.50 per hundredweight; Class II price = \$16.20 per hundredweight
-

15. What is the blend price for your milk?

- A. \$15.75
- B. \$18.09
- C. \$19.35
- D. \$20.61

16. How many hundredweights of excess milk did you ship?

- A. 250
- B. 2,500
- C. 25,000
- D. 250,000

17. How much were you paid for the total amount of milk you shipped?

- A. \$132,525
 - B. \$143,550
 - C. \$153,000
 - D. \$154,575
-

18. You are considering starting an on-farm ice cream plant to process your own milk. You are milking 450 cows that are averaging 92 pounds of milk per cow per day. How many gallons of ice cream would you expect to produce on a daily basis?

- A. 1,953
- B. 3,450
- C. 4,140
- D. 4,814

19. A farmer milks 800 cows in a double-twelve parallel parlor three 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. 12
- B. 24
- C. 100
- D. 200

**2021 Virginia FFA Milk Quality and Products Career Development Event
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20. The average retail price for whole milk in selected U.S. cities during May 2021 was \$3.60 per gallon. What would the price be per hundredweight?
- A. \$0.42
 - B. \$23.89
 - C. \$30.96
 - D. \$41.86

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