2012 Iowa FFA Milk Quality & Products CDE
Written Knowledge Exam

1. According to the 2010 Dietary Guidelines for Americans (DGA), children 9 years old and older should receive how many cups of dairy each day?
   a. 1 b. 2 c. 3 d. 4

2. Intake of milk and milk products is associated with:
   a. reduced risk of cardiovascular disease
   b. lower blood pressure in adults
   c. reduced risk of type 2 diabetes
   d. all of the above are correct

3. Milk is the number one food source for which of the following nutrients the DGA identifies as lacking in the American diet?
   a. Calcium b. Potassium c. Vitamin K d. both a and b

4. Adding a small amount of sugar to nutrient-rich foods such as reduced-fat milk:
   a. adds excessive calories
   b. enhances palatability
   c. reduces nutrient intake
   d. none of the above are correct

5. If a person is lactose intolerant, the most reliable alternative to milk is:
   a. calcium-fortified soy beverage
   b. rice milk
   c. nut milk
   d. yogurt

6. Cow's milk is more desirable than calcium-fortified milk substitute beverages because:
   a. calcium in fortified substitutes may not be as well absorbed by the body
   b. fortified substitutes contain considerably higher levels of fat
   c. kids prefer the taste of cow's milk over calcium fortified milk substitutes
   d. both a and c

7. To choose a food that is considered "nutrient dense" is to:
   a. choose a food that provides significant calories
   b. choose a food high in beneficial nutrients
   c. choose a food with relatively few calories
   d. both b and c

8. Which of the following is NOT considered to be a nutrient dense food?
   a. low fat milk
   b. cheese
   c. yogurt
   d. all are nutrient dense foods

9. Lactose intolerance
   a. is exactly the same thing as lactose maldigestion
   b. is defined as gastrointestinal disturbances following the consumption of an amount of lactose greater than the body's ability to digest and absorb
   c. is exactly the same thing as a milk allergy
   d. both a and b are correct

10. Dairy and its essential nutrients are associated with:
    a. better bone health
    b. improved nutrient intake and diet quality
    c. weight management
    d. all of the above

11. The prevalence of lactose intolerance is greatest:
    a. among African Americans
    b. among European Americans
    c. among Asian Americans
    d. is equally among all Americans

12. Most cheeses:
    a. are gluten-free
    b. are a good source of calcium
    c. are low in lactose relative to milk
    d. all of the above

13. Whey protein:
    a. can help people feel fuller longer than carbohydrates or fats
    b. helps build and repair muscle after exercise
    c. should not be included as part of a high protein diet
    d. both a and b

14. The enzyme necessary to digest lactose is:
    a. lactase
    b. protease
    c. pepsin
    d. lactose is an enzyme

15. This is a natural complex of enzymes used to produce cheese:
    a. casein
    b. rennet
    c. whey
    d. none of the above

16. This is produced by removing 60% of the water from whole milk:
    a. cheese
    b. butter
    c. ice cream
    d. evaporated milk

17. The liquid remaining after milk has been curdled and strained is known as:
    a. casein
    b. lactose
    c. rennet
    d. whey

18. Pasteurization of milk in the U.S. is accomplished by:
    a. heating milk to a minimum of 145°F for 30 minutes
    b. heating milk to a minimum of 161°F for 15 minutes
    c. heating milk to a minimum of 161°F for 15 seconds
    d. both a and c are correct

19. Hormones:
    a. cannot be present in milk
    b. are present naturally in all milk
    c. are fortified into milk
    d. none of the above

20. The primary protein found in milk is:
    a. casein b. lactose c. rennet d. whey

21. Infants can be fed:
    a. whole milk beginning at 12 months of age
    b. whole milk beginning shortly after birth
    c. skim milk beginning at 12 months of age
    d. skim milk beginning shortly after birth

22. On average, Americans currently:
    a. consume more dairy than the Dietary Guidelines for Americans (DGA)
    b. consume about the same amount of dairy as the DGA
    c. consume less dairy than the DGA
    d. there is no study or evidence that shows how much dairy Americans consume

23. Consumption of dairy foods help reduce the risk of hypertension because:
    a. dairy foods are a good source of protein, which helps regulated fluids and mineral balance
    b. dairy foods are a good source of calcium, which helps regulated fluids and mineral balance
    c. dairy foods are a good source of potassium, which helps regulated fluids and mineral balance
    d. consumption of dairy foods does nothing to help reduce the risk of hypertension

24. To be considered an "excellent source" of a nutrient, a food must provide at least ____ of that nutrient, whereas to be considered a "good source," a food must provide ___ of that nutrient.
    a. 30%, 20%-29%
    b. 25%, 15%-24%
    c. 20%, 10-19%
    d. 15%, 5-14%

25. Milk is considered to be a good or excellent source of ___ nutrients.
    a. 4
    b. 6
    c. 8
    d. 10

26. Vitamin ____ improves calcium absorption.
    a. A
    b. C
    c. D
    d. E

27. Calcium and _____ are the main building materials of each bone.
    a. phosphorus
    b. magnesium
    c. sodium
    d. potassium

28. Chocolate flavoring in milk:
    a. does not affect the calcium absorption
    b. may make milk more easily digested than unflavored milk in people with lactose intolerance
    c. contains as much caffeine as most colas
    d. both a and b

29. It takes approximately ___ pounds of milk to make 1 pound of cheese.
    a. 5
    b. 10
    c. 15
    d. 20

30. Milk is a good source of vitamin A. Vitamin A:
    a. helps build red blood cells
    b. helps convert food into energy
    c. helps maintain normal vision and skin
    d. is involved in metabolism of sugars and fatty acids

TURN SCANTRON ANSWER SHEET OVER TO MARK THE CORRECT ANSWERS

51. The most significant cost associated with the production of milk is:
    a. machinery & equipment
    b. labor
    c. feed
    d. fuel & electricity

52. The increase in production cost from January to July is mostly due to an increase in:
    a. machinery & equipment
    b. custom services
    c. homegrown and harvested feed
    d. purchased feed

53. Comparing 2006 to 2010, U.S. milk production has increased due to:
    a. an increase in the number of milk cows
    b. an increase in milk produced per cow
    c. an increase in number of cows and milk per cow
    d. a decrease in corn-soybean meal mix

54. Which of the following appears to be influenced by the time of year?
    a. cost of replacement cows
    b. milk produced per cow
    c. cost of corn-soybean meal mix
    d. number of milk cows

55. From 1985 to 2011, per capita fluid milk and cream consumption:
    a. decreased
    b. stayed the same
    c. increased
    d. cannot be determined from this data

56. The greatest increase in per capita American Cheese consumption occurred:
    a. from 1990 to 1994
    b. from 1995 to 1999
    c. from 2000 to 2004
    d. from 2005 to 2009

57. In general the number of fluid milk plants in the last 50 years has:
    a. decreased
    b. stayed the same
    c. increased
    d. cannot be determined from this data

58. What could be an explanation for the slight increase in commercial processors in 2009 and 2010?
    a. the increase in per capita fluid milk consumption
    b. the increase in the price of milk paid to the producer
    c. producers who do their own commercial processing
    d. a reduction in the average shelf-life of milk, requiring more processing locations

59. From 2006 to 2010, every region in the United States increased in milk production per cow EXCEPT:
    a. the corn belt
    b. the pacific
    c. the lake states
    d. the delta states

60. From 2006 to 2010, which region in the United States experienced the greatest percentage decrease in the number of cows?
    a. the corn belt
    b. the pacific
    c. the lake states
    d. the delta states

2012 Iowa FFA Milk Quality & Products CDE
Written Knowledge Exam Key

1. C
2. D
3. ~~C~~ → D
4. B
5. D
6. D
7. D
8. D
9. B
10. D
11. A
12. D
13. D
14. A
15. B
16. D
17. D
18. D
19. B
20. A
21. A
22. C
23. C
24. C
25. C
26. C
27. A
28. D
29. B
30. C
51. C
52. D
53. B
54. B
55. A
56. B
57. A
58. C
59. D
60. D

U.S., monthly dairy costs of production per cwt of milk sold, 2012

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Operating costs:						$/cwt						
Feed--												
Purchased feed	5.90	5.95	6.35	6.73	6.92	7.95	9.27					
Homegrown harvested feed	5.90	5.95	6.04	6.14	6.46	6.10	6.42					
Grazed feed	0.15	0.15	0.15	0.15	0.16	0.15	0.16					
Total, feed costs	11.95	12.05	12.55	13.02	13.54	14.20	15.85					
Veterinary and medicine	0.77	0.75	0.74	0.73	0.75	0.76	0.80					
Bedding and litter	0.24	0.23	0.23	0.23	0.23	0.24	0.25					
Marketing	0.23	0.23	0.23	0.23	0.23	0.23	0.23					
Custom services	0.53	0.52	0.51	0.51	0.51	0.52	0.54					
Fuel, lube, and electricity	0.80	0.80	0.84	0.83	0.79	0.75	0.77					
Repairs	0.56	0.55	0.54	0.54	0.55	0.56	0.58					
Other operating costs	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Interest on operating capital	0.01	0.01	0.01	0.01	0.01	0.01	0.01					
Total operating costs	15.09	15.14	15.65	16.10	16.60	17.27	19.02					
Allocated overhead:												
Hired labor	1.46	1.43	1.41	1.43	1.44	1.47	1.52					
Opportunity cost of unpaid labor	2.19	2.14	2.11	2.14	2.16	2.20	2.28					
Capital recovery of machinery and equipment	3.42	3.34	3.39	3.38	3.47	3.55	3.68					
Opportunity cost of land (rental rate)	0.02	0.02	0.02	0.02	0.02	0.02	0.02					
Taxes and insurance	0.20	0.19	0.19	0.19	0.19	0.19	0.20					
General farm overhead	0.67	0.66	0.66	0.65	0.66	0.68	0.70					
Total, allocated overhead	7.96	7.78	7.78	7.82	7.94	8.11	8.41					
Total costs listed	23.05	22.92	23.43	23.92	24.55	25.38	27.43					

Source: Based on USDA's 2010 Agricultural Resource Management Survey of milk producers and updated using current USDA milk production per cow and production input indexes.

U. S. quarterly milk production and related data

Year and quarter	Milk cows	Milk per cow	Milk production	Corn-soybean meal mix 1/	Replacement cow price 2/
	thousands	pounds	mil. pounds	dol. per cwt	dollars
2006					
JAN-MAR	9,121	4,995	45,563	4.58	1,840
APR-JUN	9,156	5,125	46,925	4.72	1,770
JUL-SEP	9,137	4,889	44,675	4.58	1,680
OCT-DEC	9,113	4,896	44,619	5.76	1,650
Avg. or total	9,132	19,907	181,782	4.91	1,735
2007					
JAN-MAR	9,152	5,033	46,063	6.66	1,660
APR-JUN	9,170	5,173	47,438	6.94	1,730
JUL-SEP	9,198	5,013	46,111	6.92	1,950
OCT-DEC	9,236	4,985	46,042	7.73	2,020
Avg. or total	9,189	20,204	185,654	7.06	1,840
2008					
JAN-MAR	9,285	5,128	47,609	9.48	1,960
APR-JUN	9,315	5,235	48,768	10.89	1,940
JUL-SEP	9,329	5,024	46,870	10.89	1,990
OCT-DEC	9,331	5,009	46,735	8.60	1,920
Avg. or total	9,315	20,396	189,982	9.97	1,953
2009					
JAN-MAR	9,297	5,096	47,374	8.59	1,630
APR-JUN	9,264	5,277	48,888	9.14	1,390
JUL-SEP	9,159	5,110	46,799	8.44	1,280
OCT-DEC	9,092	5,089	46,273	8.26	1,240
Avg. or total	9,203	20,572	189,334	8.61	1,385
2010					
JAN-MAR	9,093	5,212	47,392	7.92	1,340
APR-JUN	9,119	5,462	49,809	7.66	1,330
JUL-SEP	9,126	5,267	48,070	8.41	1,320
OCT-DEC	9,130	5,208	47,548	9.76	1,330
Avg. or total	9,117	21,149	192,819	8.44	1,330
2011					
JAN-MAR	9,165	5,283	48,421	11.09	1,300
APR-JUN	9,198	5,483	50,432	12.36	1,420
JUL-SEP	9,209	5,290	48,715	12.66	1,480
OCT-DEC					
Avg. or total					

1/ Value of farm corn and 48 percent soybean meal, Decatur, needed to produce 16-percent protein concentrate feed.

2/ Published in the first month of the quarter.

Source: NASS and ERS calculations.

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Dairy products: Per capita consumption, United States, 1985-2011 1/

Year	Fluid milk and cream 2/	Butter	Cheese			Evaporated and condensed milk		
			American	Other	Cottage	Canned, whole	Bulk, whole	Bulk and canned, skim
1985	241	4.9	12.2	10.4	4.1	2.2	1.4	3.8
1986	240	4.6	12.1	11.0	4.1	2.2	1.4	4.3
1987	237	4.7	12.4	11.7	3.9	2.2	1.5	4.2
1988	237	4.5	11.5	12.2	3.9	2.1	1.4	4.2
1989	237	4.4	11.0	12.8	3.6	2.0	1.1	4.7
1990	233	4.4	11.1	13.5	3.4	2.2	1.0	4.8
1991	232	4.3	11.0	13.9	3.3	2.0	1.1	5.0
1992	229	4.3	11.3	14.6	3.1	2.1	1.1	5.2
1993	224	4.6	11.3	14.7	2.9	1.9	1.1	5.1
1994	223	4.8	11.4	15.1	2.8	1.8	0.8	5.5
1995	221	4.4	11.7	15.2	2.7	1.5	0.8	4.5
1996	220	4.3	11.8	15.5	2.6	1.5	0.8	4.0
1997	216	4.1	11.8	15.7	2.6	1.7	0.8	3.9
1998	213	4.4	11.9	15.9	2.7	1.4	0.6	4.1
1999	213	4.7	12.6	16.4	2.6	1.5	0.6	4.4
2000	210	4.5	12.7	17.2	2.6	1.5	0.5	3.8
2001	208	4.4	12.8	17.3	2.6	1.5	0.5	3.5
2002	207	4.5	12.8	17.7	2.6	1.8	0.5	3.7
2003	208	4.5	12.5	18.1	2.7	1.9	0.7	3.3
2004	207	4.5	12.9	18.4	2.7	1.5	0.7	3.3
2005	206	4.6	13.5	19.1	2.7	1.6	0.6	3.7
2006	208	4.7	13.2	19.6	2.6	1.6	0.6	4.2
2007	207	4.7	13.4	20.1	2.6	1.4	0.6	5.6
2008	204	5.0	13.7	19.2	2.4	1.5	0.7	5.1
2009	206	5.0	14.0	19.0	2.4	1.5	0.6	5.0
2010	206	4.9	13.4	19.5	2.4	1.3	0.5	5.2
2011 5/	201	5.4	13.4	20.3	2.3	1.3	0.5	5.2

1/ Based on total population except for fluid products (resident population).

2/ Product weight of beverage milks, fluid creams, egg nog,and yogurt.

Number and average size of U. S. fluid milk product plants operated by commercial processors, 1960-2010 1/

Year	Number	Average volume processed	Year	Number	Average volume processed
		Million pounds			Million pounds
1960	5,328	8.8	1990	605	93.9
1961	4,959	9.5	1991	580	98.5
1962	4,683	10.3	1992	555	103.0
1963	4,482	11.0	1993	550	103.2
1964	4,103	12.3	1994	521	109.6
1965	3,743	13.7	1995	504	113.3
1966	3,379	15.4	1996	475	121.3
1967	2,978	16.8	1997	462	124.4
1968	2,656	19.0	1998	442	130.0
1969	2,473	20.6	1999	435	133.6
1970	2,216	23.6	2000	405	143.2
1971	2,097	25.4	2001	393	150.2
1972	1,859	28.9	2002	385	154.2
1973	1,627	32.9	2003	386	155.9
1974	1,484	35.3	2004	368	162.0
1975	1,408	37.8	2005	336	180.7
1976	1,361	39.4	2006	335	185.5
1977	1,284	41.9	2007	327	189.8
1978	1,215	44.2	2008	319	194.4
1979	1,135	47.3	2009	326	192.5
1980	1,066	50.1	2010	332	189.2
1981	1,036	51.3			
1982	952	55.1			
1983	863	61.5			
1984	846	63.9			
1985	803	68.9			
1986	754	74.1			
1987	710	78.8			
1988	665	83.6			
1989	638	89.2			

1/ Most recent year are preliminary estimates.
Source: Compiled by ERS from Federal milk market order and various State data.
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Published in Livestock, Dairy, and Poultry Outlook, http://www.ers.usda.gov/publications/ldp

Milk cows and production by State and region, 2006-2010

State and region	Milk cows					Milk per cow				
	2006	2007	2008	2009	2010 /1	2006	2007	2008	2009	2010 /1
	Thousands					Pounds				
Northeast	**1,498**	**1,475**	**1,471**	**1,451**	**1,436**	**18,896**	**19,095**	**19,333**	**19,446**	**19,991**
Maine	32	33	33	33	32	17,938	17,788	18,273	18,061	18,344
New Hampshire	15	15	15	15	15	19,533	19,333	19,933	19,533	19,867
Vermont	141	140	140	135	136	18,383	18,079	18,400	18,289	18,544
Massachusetts	16	15	15	14	14	17,375	17,000	16,933	17,571	17,429
Rhode Island	1	1	1	1	1	17,273	16,364	18,091	17,818	17,727
Connecticut	19	19	19	19	19	19,316	19,211	19,158	18,579	19,263
New York	638	627	626	619	611	18,879	19,303	19,859	20,071	20,807
New Jersey	11	10	10	9	8	16,182	16,800	16,900	17,889	17,500
Pennsylvania	554	550	549	545	541	19,390	19,422	19,262	19,360	19,841
Delaware	7	7	7	6	6	16,286	16,618	16,923	17,000	16,981
Maryland	64	58	56	55	54	17,281	18,121	18,375	18,255	18,537
Lake States	**2,013**	**2,042**	**2,066**	**2,081**	**2,090**	**19,315**	**19,765**	**19,853**	**20,291**	**20,796**
Michigan	320	335	350	355	358	22,234	22,761	22,180	22,445	23,260
Wisconsin	1,243	1,247	1,252	1,257	1,262	18,824	19,310	19,546	20,079	20,630
Minnesota	450	460	464	469	470	18,598	18,817	18,927	19,230	19,366
Corn Belt	**862**	**869**	**875**	**869**	**848**	**18,661**	**18,670**	**18,566**	**18,926**	**19,343**
Ohio	274	275	280	277	271	17,737	18,109	18,321	18,744	19,446
Indiana	165	166	167	168	169	19,861	20,307	19,683	20,137	20,320
Illinois	103	103	102	102	100	19,252	18,612	18,569	18,873	19,170
Iowa	205	213	216	215	209	20,127	20,085	19,995	20,367	20,751
Missouri	115	112	110	107	99	16,000	14,982	14,682	14,654	14,596
Northern Plains	**286**	**283**	**291**	**296**	**291**	**19,014**	**18,894**	**19,629**	**20,152**	**20,395**
North Dakota	32	29	26	23	21	14,688	15,310	16,077	16,739	18,286
South Dakota	81	85	90	94	92	18,580	19,306	19,956	20,128	20,478
Nebraska	61	59	58	61	59	18,328	18,220	18,672	19,672	19,797
Kansas	112	110	117	118	119	20,938	19,882	20,641	21,085	21,000
Appalachian	**331**	**314**	**306**	**292**	**279**	**15,912**	**16,299**	**16,199**	**16,723**	**17,007**
Virginia	102	100	98	96	95	17,363	17,530	17,612	18,083	18,095
West Virginia	13	13	12	11	10	15,385	15,000	15,083	14,727	15,700
North Carolina	51	48	47	45	44	18,510	19,188	18,979	19,644	19,591
Kentucky	98	90	90	84	78	13,296	13,889	13,444	14,190	14,833
Tennessee	67	63	59	56	52	15,657	15,857	16,068	16,232	16,346
Southeast	**240**	**233**	**226**	**220**	**219**	**16,896**	**17,262**	**17,350**	**18,023**	**18,114**
South Carolina	17	18	18	17	16	16,294	17,889	17,889	19,000	17,875
Georgia	77	77	76	77	78	18,234	18,169	17,829	18,182	17,885
Florida	132	125	120	115	114	16,447	16,832	17,167	18,070	18,658
Alabama	14	13	12	11	11	14,500	15,154	15,333	14,909	14,455
Delta States	**75**	**67**	**61**	**54**	**49**	**13,307**	**13,328**	**13,049**	**12,741**	**12,490**
Mississippi	23	21	20	18	17	14,957	15,429	14,550	13,889	13,118
Arkansas	20	17	15	13	12	12,900	12,941	12,400	12,692	12,833
Louisiana	32	29	26	23	20	12,375	12,034	12,269	11,870	11,750
Southern Plains	**440**	**458**	**482**	**482**	**469**	**19,025**	**18,620**	**19,662**	**20,419**	**20,868**
Oklahoma	73	69	64	59	56	19,390	19,422	19,262	19,360	19,841
Texas	367	389	418	423	413	18,383	18,079	18,400	18,289	18,544
Mountain	**1,258**	**1,281**	**1,337**	**1,308**	**1,314**	**22,083**	**22,252**	**22,624**	**22,754**	**23,191**
Montana	19	18	17	15	14	18,632	18,500	18,412	19,933	20,643
Idaho	488	513	549	550	564	22,346	22,513	22,432	22,091	22,658
Wyoming	7	7	7	6	6	17,612	18,873	19,386	19,036	20,067
Colorado	110	118	128	123	119	23,155	22,932	22,930	23,081	23,664
New Mexico	348	332	338	325	321	21,853	21,958	23,269	24,320	24,551
Arizona	173	181	186	177	177	22,855	23,260	23,382	23,028	23,441
Utah	86	85	85	84	85	20,314	20,376	20,894	21,036	21,400
Nevada	27	27	27	28	28	20,148	20,481	20,704	21,821	22,143
Pacific	**2,140**	**2,170**	**2,204**	**2,152**	**2,126**	**21,776**	**22,352**	**22,310**	**22,001**	**22,920**
Washington	237	238	244	240	251	23,055	23,239	23,344	23,171	23,510
Oregon	118	115	114	114	118	19,000	19,417	19,772	19,719	20,331
California	1,780	1,813	1,844	1,796	1,754	21,815	22,440	22,344	22,000	23,025
Alaska	1	1	1	1	1	12,250	15,000	12,000	10,000	11,833
Hawaii	4	3	2	2	2	13,256	12,414	10,882	14,200	13,316
United States	**9,143**	**9,192**	**9,319**	**9,205**	**9,121**	**19,882**	**20,199**	**20,387**	**20,569**	**21,140**

1/ Preliminary

2012 Iowa FFA Milk Quality & Products CDE

Problem Solving Part 1 & Part 2

Chapter: _____ Chapter Number: _____

Team Member Names: _____ _____

_____ _____

Part 1 (2 pts. Each)

- Complete **Table 1**, then submit, and pick up a **Table 1 KEY** to utilize in completing the problems in Part 2.

  (see Table 1 and write answers on the sheet labeled **Problem Solving Part 1**)

- **For calculations purposes on part 2, use the following information:**

  - Milk weighs 8.5 pounds per gallon
  - 10 pounds of milk are needed to make 1 pound of cheese
  - 21 pounds of milk are needed to make 1 pound of butter

Part 2

Neatly write the answer to each of the following questions on the designated line. (If the judges cannot easily read an answer, the answer will receive zero points.)

1. A herd produces milk for a market that has 80% Class I utilization and 20% Class II utilization. Using the information in **Table 1**, calculate the blend price for the milk shipped.

Blend price = (Class I utilization × Class I price) + (Class II utilization × Class II price)

$ _____ per hundredweight (5 pts.)

2. If a grocery store sells milk for $3.89 per gallon, what price are they charging per hundredweight?

$ _____ per hundredweight (5 pts.)

3. Use the information in **Table 1** to calculate the weighted average somatic cell count for a herd of three cows. The herd includes cows **13**, **14**, and **15**.

Herd Average SCC: _____ cells/ml (5 pts.)

4. A dairy producer received $265,000 for 1.5 million pounds of milk shipped in May. What was the average price per hundredweight for the milk?

$ _____ per hundredweight (5 pts.)

5. You are considering starting an on-farm cheese plant to process your own milk. You are milking 440 cows that are averaging 81 pounds of milk per cow per day. How many pounds of cheese would you expect to produce from the milk produced, on a daily basis?

Potential of _____ pounds of cheese per day (5 pts.)

6. Utilizing the information in **Table 1**, calculate the per hundredweight value of Class I milk that is 4.5 % Butterfat, 3.9% Protein, and 6.1% Other Solids. (Other Solids are paid a premium of $0.25/cwt for each point above 5.0%.)

$ _____ per hundredweight (5 pts.)

7. If you want to produce 1200 pounds of cheese and 800 pounds of butter, how much whole milk would you need?

_____ gallons of whole milk (5 pts.)

8. During one week (7 days), **cows 6, 7, 11, and 12** could produce an estimated total of ____ gallons of milk?

_____ gallons (5 pts.)

9. How many pounds of butterfat and protein would **cow 2** produce in one week?

_____ pounds of butter fat (3 pts.)

_____ pounds of protein (3 pts.)

10. Which two cows appear most likely to have mastitis?

a. _____ (2 pts.)

b. List the reason why you selected the cows in the above question:

_____ (2 pts.)

Complete the Table 1, **cells A thru Y** (2 pts. per blank cel, **IF** legible)

Table 1

Cow Production						Feed	Premiums			Part 1 Income Comparisons - Class I @ $18.78/cwt vs. Class II @ $15.31/cwt					
	Lbs. Milk per Day per Cow	Butterfat %	Protein %	Milk pH	Somatic Cell Count (cells/ml)	Feed Cost per Day	Butterfat premium per cwt $0.18 per 0.1 above 3.5%	Protein premium per cwt $0.57 per 0.1 above 3.5%	SCC premium per cwt $0.28 per cwt if less than 200,000 cells/ml	BEFORE PREMIUMS Base Per Day $ Value of Daily Milk if sold as Class I milk @ $18.78/cwt	BEFORE PREMIUMS Base Per Day $ Value of Daily Milk if sold as Class II milk @ $15.31/cwt	WITH PREMIUMS Class I: Total Per Day $ Value of Milk if sold as Class I milk @ $18.78/cwt	WITH PREMIUMS Class II: Total Per Day $ Value of Milk if sold as Class II milk @ $15.31/cwt	**Class I After Feed:** Milk Income minus Feed Cost per day	**Class II After Feed:** Milk Income minus Feed Cost per day
Exampl	25	3.6	3.6	6.4	199,999	$6.75	$0.18	$0.57	$0.28	$4.70	$3.83	$4.95	$4.09	-$1.80	-$2.67
Cow 1	57	3.8	3.6	6.4	290,000	$5.65	$0.54	$0.57	$0.00	$10.70	A	$11.34	B	$5.69	C
Cow 2	63	4.0	3.7	6.6	398,000	$5.85	$0.90	$1.14	$0.00	D	$9.65	E	$10.93	F	$5.08
Cow 3	56	4.2	3.5	6.5	161,000	$5.95	$1.26	$0.00	$0.28	$10.52	$8.57	$11.38	G	$5.43	$4.56
Cow 4	47	4.1	3.6	6.5	1,750,000	$5.25	$1.08	$0.57	$0.00	$8.83	$7.20	H	$7.97	$8.17	$2.72
Cow 5	41	4.5	3.6	6.5	211,000	$6.75	$1.80	$0.57	$0.00	$7.70	$6.28	$8.67	I	$1.92	J
Cow 6	92	4.2	3.5	6.6	160,000	$6.60	$1.26	$0.00	$0.28	$17.28	$14.09	$18.69	$15.50	$12.09	$8.90
Cow 7	72	4.6	4.1	6.3	250,000	$5.95	$1.98	$3.42	$0.00	$13.52	K	$17.41	$14.91	L	$8.96
Cow 8	49	4.8	3.7	6.4	80,000	$5.85	$2.34	$1.14	$0.28	$9.20	$7.50	$11.04	$9.34	$5.19	M
Cow 9	46	5.0	4.4	6.6	110,000	$5.55	$2.70	$5.13	$0.28	$8.64	$7.04	N	$10.77	$10.28	$5.22
Cow 10	29	3.6	3.5	6.5	160,000	$5.75	$0.18	$0.00	$0.28	$5.45	$4.44	$5.58	$4.57	-$0.17	-$1.18
Cow 11	105	3.5	3.5	6.7	195,000	$7.05	$0.00	$0.00	$0.28	$19.72	O	$20.01	$16.37	$12.96	$9.32
Cow 12	81	3.6	3.5	7.4	1,250,000	$6.05	$0.18	$0.00	$0.00	P	$12.40	$15.36	$12.55	$9.31	$6.50
Cow 13	63	3.8	3.6	6.4	175,000	$6.60	$0.54	$0.57	$0.28	$11.83	$9.65	Q	$10.52	$5.79	$3.92
Cow 14	56	4.0	4.2	6.5	760,000	$6.25	$0.90	$3.99	$0.00	R	S	T	U	V	W
Cow 15	43	4.6	4.2	6.6	181,000	$6.15	$1.98	$3.99	$0.28	X	$6.58	$10.76	$9.27	Y	$3.12

Problem Solving Part 1

Chapter: _____

Chapter Number: _____

Team Members: _____

_____

_____

_____

Neatly write answers on the corresponding lines below.

A. _____

B. _____

C. _____

D. _____

E. _____

F. _____

G. _____

H. _____

I. _____

J. _____

K. _____

L. _____

M. _____

N. _____

O. _____

P. _____

Q. _____

R. _____

S. _____

T. _____

U. _____

V. _____

W. _____

X. _____

Y. _____

Complete the Table 1, **cells A thru Y** (2 pts. per blank cel, **IF** legible)

Table 1

Cow Production						Feed	Premiums			Income Comparisons - Class I @ $18.78/cwt vs. Class II @ $15.31/cwt				Part 1	
	Lbs. Milk per Day per Cow	**Butterfat %**	**Protein %**	**Milk pH**	**Somatic Cell Count** (cells/ml)	**Feed Cost** per Day	Butterfat premium per cwt $0.18 per 0.1 above 3.5%	Protein premium per cwt $0.57 per 0.1 above 3.5%	SCC premium per cwt $0.28 per cwt if less than 200,000 cells/ml	BEFORE PREMIUMS Base Per Day $ Value of Daily Milk if sold as Class I milk @ $18.78/cwt	BEFORE PREMIUMS Base Per Day $ Value of Daily Milk if sold as Class II milk @ $15.31/cwt	WITH PREMIUMS Class I: Total Per Day $ Value of Milk if sold as Class I milk @ $18.78/cwt	WITH PREMIUMS Class II: Total Per Day $ Value of Milk if sold as Class II milk @ $15.31/cwt	**Class I After Feed:** Milk Income minus Feed Cost per day	**Class II After Feed:** Milk Income minus Feed Cost per day
Exampl	**25**	**3.6**	**3.6**	**6.4**	**199,999**	**$ 6.75**	**$0.18**	**$0.57**	**$0.28**	**$4.70**	**$3.83**	**$4.95**	**$4.09**	-$1.80	-$2.67
Cow 1	57	3.8	3.6	6.4	290,000	$ 5.65	$0.54	$0.57	$0.00	$10.70	$8.73	$11.34	$9.36	$5.69	$3.71
Cow 2	63	4	3.7	6.6	398,000	$ 5.85	$0.90	$1.14	$0.00	$11.83	$9.65	$13.12	$10.93	$7.27	$5.08
Cow 3	56	4.2	3.5	6.5	161,000	$ 5.95	$1.26	$0.00	$0.28	$10.52	$8.57	$11.38	$9.44	$5.43	$4.56
Cow 4	47	4.1	3.6	6.5	1,750,000	$ 5.25	$1.08	$0.57	$0.00	$8.83	$7.20	$9.60	$7.97	$8.17	$2.72
Cow 5	41	4.5	3.6	6.5	211,000	$ 6.75	$1.80	$0.57	$0.00	$7.70	$6.28	$8.67	$7.25	$1.92	$0.50
Cow 6	92	4.2	3.5	6.6	160,000	$ 6.60	$1.26	$0.00	$0.28	$17.28	$14.09	$18.69	$15.50	$12.09	$8.90
Cow 7	72	4.6	4.1	6.3	250,000	$ 5.95	$1.98	$3.42	$0.00	$13.52	$11.02	$17.41	$14.91	$11.46	$8.96
Cow 8	49	4.8	3.7	6.4	80,000	$ 5.85	$2.34	$1.14	$0.28	$9.20	$7.50	$11.04	$9.34	$5.19	$3.49
Cow 9	46	5	4.4	6.6	110,000	$ 5.55	$2.70	$5.13	$0.28	$8.64	$7.04	$12.37	$10.77	$10.28	$5.22
Cow 10	29	3.6	3.5	6.5	160,000	$ 5.75	$0.18	$0.00	$0.28	$5.45	$4.44	$5.58	$4.57	-$0.17	-$1.18
Cow 11	105	3.5	3.5	6.7	195,000	$ 7.05	$0.00	$0.00	$0.28	$19.72	$16.08	$20.01	$16.37	$12.96	$9.32
Cow 12	81	3.6	3.5	7.4	1,250,000	$ 6.05	$0.18	$0.00	$0.00	$15.21	$12.40	$15.36	$12.55	$9.31	$6.50
Cow 13	63	3.8	3.6	6.4	175,000	$ 6.60	$0.54	$0.57	$0.28	$11.83	$9.65	$12.71	$10.52	$5.79	$3.92
Cow 14	56	4	4.2	6.5	760,000	$ 6.25	$0.90	$3.99	$0.00	$10.52	$8.57	$13.26	$11.31	$7.01	$5.06
Cow 15	43	4.6	4.2	6.6	181,000	$ 6.15	$1.98	$3.99	$0.28	$8.08	$6.58	$10.76	$9.27	$4.61	$3.12

Problem Solving Part 1

Chapter: _____

Chapter Number: _____

Team Members: _____

_____

_____

_____

Neatly write answers on the corresponding lines below.

A. _____ $8.73

B. _____ $9.36

C. _____ $3.71

D. _____ $11.83

E. _____ $13.12

F. _____ $7.27

G. _____ $9.44

H. _____ $9.60

I. _____ $7.25

J. _____ $0.50

K. _____ $11.02

L. _____ $11.46

M. _____ $3.49

N. _____ $12.37

O. _____ $16.08

P. _____ $15.21

Q. _____ $12.71

R. _____ $10.52

S. _____ $8.57

T. _____ $13.26

U. _____ $11.31

V. _____ $7.01

W. _____ $5.06

X. _____ $8.08

Y. _____ $4.61

2012 Iowa FFA Milk Quality & Products CDE

Problem Solving Part 1 & Part 2

Chapter: **KEY** Chapter Number: _____

Team Member Names: **(Accepted Ranges Are Shown)** _____

_____ _____

Part 1 (2 pts. Each)

- Complete **Table 1**, then submit, and pick up a **Table 1 KEY** to utilize in completing the problems in Part 2.

  (see Table 1 and write answers on the sheet labeled **Problem Solving Part 1**)

- **For calculations purposes on part 2, use the following information:**

  - Milk weighs 8.5 pounds per gallon
  - 10 pounds of milk are needed to make 1 pound of cheese
  - 21 pounds of milk are needed to make 1 pound of butter

Part 2

Neatly write the answer to each of the following questions on the designated line. (If the judges cannot easily read an answer, the answer will receive zero points.)

1. A herd produces milk for a market that has 80% Class I utilization and 20% Class II utilization. Using the information in **Table 1**, calculate the blend price for the milk shipped.

Blend price = (Class I utilization × Class I price) + (Class II utilization × Class II price)

$18.09 per hundredweight (5 pts.) **(.8 * 18.78) + (.2*15.31) =**

2. If a grocery store sells milk for $3.89 per gallon, what price are they charging per hundredweight?

$45.76 to $45.77 per hundredweight (5 pts.) **$3.89/8.5*100 = 45.76471**

3. Use the information in **Table 1** to calculate the weighted average somatic cell count for a herd of three cows. The herd includes cows **13**, **14**, and **15**.

63 + 56 + 43 = 162 **63/162 = .389** **56/162 = .346** **43/162 = .265**
.389*175,000 = 68,075 **.346*760,000 = 262,960** **.265*181,000 = 47,965**

68,075 + 262,960 + 47,965 = 379,000

Herd Average SCC: **371,000 to 384,000** cells/ml (5 pts.)

4. A dairy producer received $265,000 for 1.5 million pounds of milk shipped in May. What was the average price per hundredweight for the milk?

$17.67 per hundredweight (5 pts.) **265,000/1,500,000*100 = 17.67**

5. You are considering starting an on-farm cheese plant to process your own milk. You are milking 440 cows that are averaging 81 pounds of milk per cow per day. How many pounds of cheese would you expect to produce from the milk produced, on a daily basis?

Potential of **3564** pounds of cheese per day (5 pts.) **440*81 = 35640/10 = 3564**

6. Utilizing the information in **Table 1**, calculate the per hundredweight value of Class I milk that is 4.5 % Butterfat, 3.9% Protein, and 6.1% Other Solids. (Other Solids are paid a premium of $0.25/cwt for each point above 5.0%.)

$25.61 per hundredweight (5 pts.) **BF: 4.5-3.5 = 1.0/.1 = 10*.18 = 1.80 Prot: 3.9-3.5 = .4/.1 = 4*.57 = 2.28**
OS: 6.1-5.0 = 1.1/.1 = 11*.25 = 2.75
18.78 + 1.80 + 2.28 + 2.75 = 25.61

7. If you want to produce 1200 pounds of cheese and 800 pounds of butter, how much whole milk would you need?

3388 to 3389 gallons of whole milk (5 pts.) **(1200*10) + (800*21) = 28,800/8.5 = 3388.24**

8. During one week (7 days), **cows 6, 7, 11, and 12** could produce an estimated total of ____ gallons of milk?

288 to 289 gallons (5 pts.) **92+72+105+81 = 350*7 = 2450/8.5 = 288.2**

9. How many pounds of butterfat and protein would **cow 2** produce in one week?

17 to 18 pounds of butterfat (3 pts.) **63*.04 = 2.52*7 = 17.64**

16 to 17 pounds of protein (3 pts.) **63*.037 = 2.331*7 = 16.317**

10. Which two cows appear most likely to have mastitis?

a. **Cow 4 and Cow 12** (2 pts.)

b. List the reason why you selected the cows in the above question:

They have significantly higher Somatic Cell Counts (SCC). Both are over 1,000,000 (2 pts.)

Dairy Products Exam RESOURCES 2008

In an effort to de-emphasize the significance of memorizing facts, which may change, a basic list of dairy-foods--related FACTS is provided below. Outside of memorizing these facts, students should UNDERSTAND and REMEMBER the major concepts outlined in the following web-based information links. (Exam questions were written from the information found in the following references.)

FACTS:

Pasteurization: involves heating raw milk to a certain temperature for a specific period of time. In the U.S., pasteurized milk must be heated to a minimum of 145°F for 30 minutes or to 161°F or more for 15 seconds.

Pathogen: an **infectious agent**, or more commonly germ, is a biological agent that causes disease or illness to its host. (from Wikipedia)

> The body contains many natural defenses against some of the common pathogens (such as *Pneumocystis*) in the form of the human immune system and by some "helpful" bacteria present in the human body's normal flora. However, if the immune system or "good" bacteria is damaged in any way (such as by chemotherapy, human immunodeficiency virus (HIV), or antibiotics being taken to kill other pathogens), pathogenic bacteria that were being held at bay can proliferate and cause harm to the host.

Lactose: milk sugar

Lactase: Lactase is essential for digestive hydrolysis of lactose in milk. Deficiency of the enzyme causes lactose intolerance.

Casein: primary protein found in milk

Whey: Also known as milk plasma, is the liquid remaining after milk has been curdled and strained; it is a by-product of the manufacture of cheese or casein and has several commercial uses. Sweet whey is manufactured during the making of rennet types of hard cheese like cheddar or Swiss cheese. Acid whey (also known as sour whey) is obtained during the making of acid types of cheese such as cottage cheese. [Whey is used to produce ricotta and brown cheeses and many other products for human consumption. It is also an additive in many processed foods, including breads, crackers and commercial pastry, and in animal feed.]

Lactic Acid: The casein in fermented milk is coagulated (curdled) by lactic acid.

Rennet: is a natural complex of enzymes produced in any mammalian stomach to digest the mother's milk, and often used in the production of cheese.

Hydrolysis: is a chemical reaction during which one or more water molecules are split into hydrogen and hydroxide ions which may go on to participate in further reactions.

Dental caries: is a disease that damages tooth structures, resulting in what is commonly called tooth decay or cavities, which are holes in the teeth.

Whole Milk : 3.25% fat, contains 150 calories and 8 grams (g) of fat per serving (8 fluid oz).

2% Reduced-Fat Milk: 2% fat, contains 120 calories and 5 grams (g) of fat per serving (8 fluid oz).

1% Lowfat Milk: (also called Light Milk) 1% fat, contains 100 calories and 2.5 grams (g) of fat per serving (8 fluid oz).

Fat-Free Milk: (also called Skim or Nonfat Milk) 0% fat, contains 80 calories and 0 grams (g) of fat per serving (8 fluid oz).

Chocolate Milk : (fat-free, 1% lowfat, 2% reduced-fat, whole milk) is milk to which chocolate or cocoa and a sweetener have been added.

Evaporated Milk: 6.5% fat, is made by removing about 60% of the water from whole milk.

Evaporated Fat-Free Milk: 0.5% fat or less, is a concentrated, fortified (vitamins A and D) fat-free (skim or nonfat) milk that is canned and sterilized.

Sweetened Condensed Milk: 8% fat or less, is a canned milk concentrate of whole milk to which sugar has been added.

Storing Milk: Refrigerate milk at 40 degrees F, or less, as soon as possible after purchase and store in the original container.

Children Consuming Milk: Infants can be fed whole milk, not lowfat or reduced-fat milks, beginning at 12 months of age, according to the American Academy of Pediatrics.

Is Milk Fattening?
Not necessarily, being overweight, results from consuming too many calories and getting too little exercise. There are a variety of milks with different calorie and fat contents. Fat-free milk, for example, has only 80 calories, no fat and all the calcium of other milks. (Mountain Dew has 110 calories per 8 oz. serving.)

Lactose Intolerance: Many individuals who have difficulty digesting lactose (milk's sugar) can consume a glass or two of milk a day with meals with few, if any, symptoms.

Origin of Cheese: Cheese is an ancient food whose origins predate recorded history. There is no conclusive evidence indicating where cheese making originated. Proposed dates for the origin of cheese making range from around 8000 BCE (when sheep were first domesticated) to around 3000 BCE. Since animal skins and inflated internal organs have, since ancient times, provided storage vessels for a range of foodstuffs, it is probable that the process of cheese making was discovered accidentally by storing milk in a container made from the stomach of an animal, resulting in the milk being turned to curd and whey by the rennet from the stomach. There is a widely-told legend about the discovery of cheese by an Arab trader who used this method of storing milk. The legend has many individual variations.

Processed cheese, **process cheese**, **prepared cheese**, or **cheese food:** is a food product made from regular cheese and sometimes other unfermented dairy ingredients, plus emulsifiers, extra salt, food colorings, and/or whey. Processed cheese is sometimes sold in blocks, but more often sold packed in individual slices, sometimes with plastic wrappers or wax paper separating them. The various definitions are mainly used to distinguish minimum/maximum amounts of cheese ingredient, moisture content, and milkfat.

- **Pasteurized process cheese** (Includes "American Cheese" and "Pasteurized process American cheese"), (e.g., "Kraft Deli Deluxe American Cheese"

- **Pasteurized process cheese food**, which contains as little as 51% cheese

- **Pasteurized process cheese product** (e.g. *Kraft Singles*, Velveeta), which contain less than 51% cheese

Milk's Unique Nutrient Package Fact Sheet
(nine essential nutrients provided by milk)

Calcium -- 30% Daily Value
An 8-ounce serving of milk provides 30% of the Daily Value of calcium. Calcium helps build and maintain strong bones and teeth. This mineral also plays an important role in nerve function, muscle contraction and blood clotting.

Vitamin D -- 25% Daily Value
When fortified, a glass of milk provides about 25% of the Daily Value for vitamin D. Vitamin D helps promote the absorption of calcium and enhances bone mineralization. Milk is one of the few dietary sources of this important nutrient.

Protein -- 16% Daily Value

The protein in milk is high quality, which means it contains all of the essential amino acids or "building blocks" of protein. Protein builds and repairs muscle tissue, and serves as a source of energy during high-powered endurance exercise. An 8-ounce glass of milk provides about 16% of the Daily Value for protein.

Potassium -- 11% Daily Value
Potassium regulates the body's fluid balance and helps maintain normal blood pressure. It's also needed for muscle activity and contraction. By providing 11% of the Daily Value of potassium, milk contains more than the leading sports drink.

Vitamin A -- 10% Daily Value
A glass of milk provides 10% of the Daily Value of vitamin A. This nutrient helps maintain normal vision and skin. It also helps regulate cell growth and maintains the integrity of the immune system.

Vitamin B_{12} -- 18% Daily Value
Vitamin B12 helps build red blood cells that carry oxygen from the lungs to working muscles. Just one 8-ounce glass of milk provides about 13% of the Daily Value for this vitamin.

Riboflavin -- 24% Daily Value
Milk is an excellent source of riboflavin, providing 24% of the Daily Value. Riboflavin, also known as vitamin B2, helps convert food into energy – a process crucial for exercising muscles.

Niacin -- 10% Daily Value
(or Niacin Equivalent)
Niacin is important for the normal function of many enzymes in the body, and is involved in the metabolism of sugars and fatty acids. A glass of milk contains 10% of the Daily Value for niacin.

Phosphorus -- 23% Daily Value
Phosphorus helps strengthen bones and generates energy in your body's cells. Providing 20% of the Daily Value, milk is an excellent source of phosphorus.

Other Milk Facts

Hormones: Hormones are present naturally in all milk.

Bovine somatotropin (bST) is a hormone that is naturally produced by cows; it directs how energy and nutrients are used for growth and milk production. rbST is a synthesized copy of this naturally occurring hormone. Milk from rbST-supplemented cows is safe for human consumption. This has been affirmed and reaffirmed since the use of rbST was approved in the early 1990s. The FDA has determined that there is

no difference between milk from cows treated with rbST and those not given rbST.

***Antibiotics*:** All milk is tested for antibiotics to ensure it meets the government's stringent quality and safety standards.

***Pesticides*:** The most recent FDA data available (2003) indicate that all of the milk tested was found to be completely free from pesticide residue.

The Role of Pasteurization

- Pasteurization involves heating raw milk to a certain temperature for a specific period of time. In the U.S., pasteurized milk must be heated to a minimum of 145°F for 30 minutes or to 161°F or more for 15 seconds. It is a simple, effective method to kill bacteria without affecting the taste or nutritional value of milk.

An Antibiotic-Free Milk Supply

- Sometimes it's necessary for farmers to treat cows with antibiotics when they are ill, just as humans sometimes need medication when they are sick. If a cow is being treated with antibiotics, the milk is taken out of the milk supply and not put back into the milk supply until her milk tests free of antibiotics.

Human Nutrition

Intestinal Health: Yogurt with specific strains of live active cultures has been demonstrated to help maintain the normal intestinal micro-flora balance and suppress harmful bacteria in the intestine. A particular strain of bacteria used in yogurt, *Lactobacillus* strain GG, aids in treatment and prevention of antibiotic-associated diarrhea, traveler's diarrhea, and acute diarrhea in children. In adults, this particular strain of *Lactobacillus* has been shown to stimulate bowel function by altering the micro-flora and suppressing fermentation in the intestine. Yogurt with *Lactobacillus gasseri* may be beneficial for older adults with "atophic gastritis," a condition that predisposes to intestinal infections and constipation.