Part 1. General Knowledge Exam

1. Lactase is essential for digestive hydrolysis of lactose in milk. Hydrolysis is a _____during which one or more water molecules are split into hydrogen and hydroxide ions.
   a. chemical reaction
   b. mechanical separation
   c. dialysis
   d. de-homogenization

2. The fat content of whole milk is _____.
   a. 0.5%
   b. 1.0%
   c. 2.0%
   d. 3.25%

3. In the 1990s, Recombinant bovine Somatotropin (rBST) was approved for commercial use in the United States. Bovine Somatotropin is _____.
   a. used to make cows milk longer.
   b. a reproductive hormone.
   c. naturally produced by cows.
   d. a cost effective resource for all cows.

4. Enzymes _____.
   a. break down polymeric macromolecules into their smaller building blocks.
   b. do not affect polymeric molecules.
   c. are not found in saliva.
   d. are not found in digestive juices.

5. In cheese production, curd formation results from introducing a coagulating agent such as rennet. The enzyme coagulates milk by precipitating casein. Precipitation is the formation of a _____in a solution during a chemical reaction.
   a. solid
   b. gas
   c. enzyme
   d. protein

6. Lactose intolerance: In most mammals the production of _____ gradually decreases with maturity due to a lack of constant consumption of milk.
   a. casein
   b. lactase
   c. galactose
   d. sucralose

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. For optimum storage, milk should be refrigerated at _____ degrees F.
   a. 44
   b. 40
   c. 36
   d. 32

10. _____ the disruption 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

11. Pasteurization
   a. kills all organisms in milk.
   b. kills only somatic cells.
   c. kills all illness causing bacteria.
   d. neutralizes the milk.

12. Reduced-Fat milk contains
   a. 3.25% fat, 150 calories and 8 grams (g) of fat per serving (8 fluid oz)
   b. 2% fat, 120 calories and 5 grams (g) of fat per serving (8 fluid oz)
   c. 6.5% fat, 220 calories and 8 grams (g) of fat per serving (8 fluid oz)
   d. 2% fat, 120 calories and 5 grams (g) of fat per serving (12 fluid oz)

13. _____ includes the addition of one or more of the following optional dairy ingredients: cream, milk, nonfat milk, buttermilk, cheese whey, anhydrous milk fat, dehydrated cream, or skim milk cheese, and at least 51% of the weight must consist of the cheese ingredient.
   a. Cottage cheese
   b. Pasteurized process cheese food
   c. Pasteurized process cheese
   d. Swiss cheese

14. In preventing off-flavors in milk and maintaining animal health, the most important prevention is
   a. maintaining a clean, well ventilated environment for the cows.
   b. feeding antibiotics to maintain a low Somatic Cell Count.
   c. properly cooling milk.
   d. using strong smelling sanitizers in cleaning milking equipment.

15. _____, 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
   e. 65%

16. An 8-ounce serving of milk provides 30% of the Daily Value of _____. This nutrient helps build and maintain strong bones and teeth. This mineral also plays an important role in nerve function, muscle contraction and blood clotting.
   a. Protein
   b. Vitamin A
   c. Riboflavin
   d. Calcium

17. _____ represents one of the most common types of food allergies.
    a. Milk
    b. Strawberry preserves
    c. Pork
    d. Corn

18. Food allergies …
    a. are generally nothing to worry about.
    b. make the person sneeze.
    c. can be cured by consuming large quantities of milk.
    d. can have cause a rapid onset of symptoms, and may be deadly.

19. Probiotic generally refers to live bacteria that _____ affect the host's intestinal microbial balance.
    a. negatively
    b. digest
    c. beneficially
    d. infect

20. The _____ is a set of requirements for milk production, milk hauling, pasteurization, product safety, equipment sanitation and labeling. It is one of the most effective tools to protect the safety of milk. It is very effective; today, less than 1 percent of food-borne illness outbreaks in the U.S. involve dairy products.
    a. Pasteurization Order
    b. Antibiotic-free milk Standard
    c. Intestinal Health Standard
    d. federal Pasteurized Milk Ordinance

21. A diet soda may contain: 0% fat, and 0 calories per serving (8 fluid oz); whereas, whole Milk contains: 3.25% fat, contains 150 calories and 8 grams (g) of fat per serving (8 fluid oz). Which of the following statements is most accurate?
    a. Because of the fat content in milk, all milks are potentially more fattening than soda pop.
    b. Soda pop does not contains sugar (fructose), but flavored milks do contain sugar.
    c. Diet Soda Pop may contain more phosphoric acid, which is detrimental to teeth.
    d. Flavored milks are as nutritious as Soda pop.

22. Because of its low iron concentration and bioavailability, cow's milk is not recommended for infants under _____.
    a. 12 months old.
    b. 2 years old.
    c. 3 years old.
    d. 4 years old.

23. Many individuals with _____ can consume 2 cups of milk, one at breakfast and another at dinner, without developing symptoms
    a. casein adaptor sequence
    b. enzyme infraction
    c. lactose tolerance
    d. lactose intolerance

24. _____ 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.
    a. Milk plasma
    b. Casein
    c. Lactose
    d. Lactase

25. Fermented milk is coagulated by _____.
    a. casein
    b. lactose
    c lactic acid
    d. whey

26. Exposure to "white metal" or rusty surfaces on milk handling equipment can cause _____ off-flavor.
    a. oxidized
    b. spoiled or unclean
    c. rancid
    d. malty or high acid

27. The _____ is a rapid, accurate, cow-side test to help determine _____ in a specific cow. The test can also be conducted on bucket and bulk tank milk samples.
    a. PMO, Buttertfat percentage
    b. California Mastitis Test, disease levels
    c. California Mastitis Test, somatic cell counts
    d. pasteurization process, bacteria

28. The analysis identified in question number 27 (above), utilizes a reagent which reacts with _____ causing the mixture to thicken or gel in proportion to the amount of infection present.
    a. lactase
    b. Butterfat
    c. milk protein
    d. white blood cells

29. Milk contains nine essential nutrients:
    a. Calcium, Vitamin D, Protein, Potassium, Vitamin A, Vitamin B12, Riboflavin, Niacin, and Phosphorus
    b. Magnesium, Vitamin D, Protein, Potassium, Vitamin A, Vitamin B12, Riboflavin, Niacin, and Phosphorus
    c. Calcium, Vitamin D, Protein, Potassium, Vitamin C, Vitamin B12, Riboflavin, Niacin, and Phosphorus
    d. Calcium, Vitamin D, Iron, Potassium, Vitamin A, Vitamin B12, Riboflavin, Niacin, and Phosphorus

30. _____ is a common laboratory method of quantitative chemical analysis that is used to determine the unknown concentration of a known reactant. Because volume measurements play a key role in titration, it is also known as volumetric analysis. Due to the logarithmic nature of the pH curve, the reactions can be extremely sharp; and, thus, a single drop of titrant just before the endpoint can change the pH significantly—leading to an immediate color change in the indicator.
    a. Titration
    b. Gel electrophoresis
    c. Photometric analysis
    d. Dilution

TURN SCANTRON ANSWER SHEET OVER TO MARK THE CORRECT ANSWERS.

Analyze and Interpret

51. How many servings of vegetables should a group of 30 teenagers consume per day?
    a. 30 to 60 servings
    b. 60 to 90 servings
    c. 100 to 140 servings
    d. 150 to 190 servings

52. How many servings of milk should a group of 30 teenagers consume per day?
    a. 30 to 60 servings
    b. 60 to 90 servings
    c. 90 to 120 servings
    d. 150 to 200 servings

Family A	Family B
Mother 49 years old	Mother 30 years old
Father 53 years old	Father 24 years old
Daughter 10 years old	Daughter less than 1 week old
Son 17 years old	Son 21 months old

53. Which of the families listed above needs the greatest daily allowance of Calcium:
    a. Family A
    b. Family B
    c. No Difference
    d. cannot determine

54. Which of the following would be the richest source of Calcium?
    a. Rhubarb
    b. Yogurt
    c. Pinto Beans
    d. 2% Milk

55. Which of the following is the poorest source of Calcium?
    a. Salmon
    b. Soymilk
    c. Tuna
    d. Ice Cream

56. Which of the families above has the needs the greatest daily allowance of Vitamin D:
    a. Family A
    b. Family B
    c. No Difference
    d. can not determine

57. Which of the families above has the needs the greatest daily allowance of Phosphorus:
    a. Family A
    b. Family B
    c. No Difference
    d. cannot determine

58. Based upon the following milk properties, which of the following cows appears most likely to have mastitis?
    a. Cow A – pH of 6.6
    b. Cow B – Titratable acidity of .015
    c. Cow C – Osmality of 274 m
    d. Cow D – Specific gravity of Milk 1.032

59. Which of the following cow's milk appears most likely to have been adulterated with water?
    a. Cow A – Freezing Point of 0.0 degrees C
    b. Cow B – Freezing point of -0.54 degrees C
    c. Cow C – Boiling Point of 100.20 degrees C
    d. Cow D – Viscosity of 2.0 cp at 20 degrees C

60. How much Calcium would be provided by the following meal?
- 4 oz. of Sardines
- 1 cup of Spinach
- 1 cup of Broccoli
- 1 cup of ice cream

    a. 741 mg
    b. 825mg
    c. 933 mg
    d. 979 mg

Table 2. Calcium content in common foods

Non-milk Products	Calcium Content
Rhubarb, frozen, cooked, 1 cup	348 mg
Sardines, with bone, 3 oz.	325 mg
Spinach, frozen, cooked, 1 cup	291 mg
Salmon, canned, with bone, 3 oz.	181 mg
Soy milk, unfortified, 1 cup	61 mg
Orange, 1 medium	52 mg
Broccoli, raw, 1 cup	41 mg
Pinto beans, cooked, 1/2 cup	40 mg
Lettuce greens, 1 cup	20 mg
Tuna, white, canned, 3 oz.	12 mg
Milk and Milk Products	
Yogurt, with active and live cultures, plain, low-fat, vitamin D-fortified, 1 cup	415 mg
Milk, reduced fat, vitamin D-fortified, 1 cup	285 mg
Swiss cheese, 1 oz.	224 mg
Cottage cheese, 1/2 cup	87 mg
Ice cream, 1/2 cup	84 mg

Source: Adapted from U.S. Department of Agriculture, Agricultural Research Service. 2008. USDA National Nutrient Database for Standard Reference, Release 21.

TABLE 8
SERVING GUIDELINES FOR ALL AGES

FOOD GROUP	SERVINGS: CHILDREN 1-3	4-5	6-8*	9-18*	ADULTS 19+	FOODS	SERVING SIZE
MILK GROUP	3†	3‡	3	4	3-4	▲ milk ▲ yogurt ▲ cheese ▲ cottage cheese ▲ pudding ▲ ice cream, frozen yogurt	1 cup 1 cup 1½-2 oz ½ cup ½ cup ½ cup
MEAT GROUP	2†	2	2	2	2-3	▲ cooked lean meat, fish or poultry ▲ egg ▲ peanut butter ▲ cooked dried peas ▲ cooked dried beans ▲ nuts, seeds	2-3 oz 1 2 tbsp ½ cup ½ cup ⅓ cup
VEGETABLE GROUP	3†	3	3	3	3-5	▲ cooked vegetables ▲ chopped, raw vegetables ▲ raw, leafy vegetables ▲ vegetable juice	½ cup ½ cup 1 cup ¾ cup
FRUIT GROUP	2†	2	2	2	2-4	▲ apple, banana, orange, pear ▲ grapefruit ▲ cantaloupe ▲ raw, canned, or cooked fruit ▲ raisins, dried fruit ▲ fruit juice	1 medium ½ ¼ ½ cup ¼ cup ¾ cup
GRAIN GROUP	6†	6‡	6	6	6-11	▲ bread ▲ tortilla, roll, muffin ▲ bagel, English muffin, hamburger bun ▲ rice, pasta, cooked cereal, grits ▲ ready-to-eat cereal	1 slice 1 ½ ½ cup 1 oz
"OTHERS" CATEGORY	Eat in moderation					▲ fats, oils, and spreads ▲ candy ▲ cookies ▲ chips and other salty snacks ▲ soft drinks	1tsp/1tbsp 1 oz 2 small 1 oz 12 oz

† For children 1-3, serving sizes are about 2/3 typical serving sizes.

‡ For children 4-5, serving sizes depend on the appetite of the child. If you offer smaller-sized servings, you should increase the number of servings so that children 4-5 eat the equivalent of 3 cups of milk, 4 oz. of meat, 6 slices of bread, etc., daily.

* These represent the ***minimum*** number of servings recommended each day for children and teens ages 6-18. Some children and teens may need more servings–depending on their size, activity level, and growth.

TABLE 3

Food and Nutrition Board, Institute of Medicine-National Academy of Sciences
Dietary Reference Intakes: Recommended Intakes For Individuals

Life-Stage Group	Calcium (mg/d)	Phosphorus (mg/d)	Magnesium (mg/d)	Vitamin D (µg/d)[a,b]	Fluoride (mg/d)	Thiamin (mg/d)	Riboflavin (mg/d)	Niacin (mg/d)[c]	Vitamin B_6 (mg/d)	Folate (µg/d)[d]	Vitamin B_{12} (µg/d)	Pantothenic Acid (mg/d)	Biotin (µg/d)	Choline[e] (mg/d)
Infants														
0-6 months	210*	100*	30*	5*	0.01*	0.2*	0.3*	2*	0.1*	65*	0.4*	1.7*	5*	125*
7-12 months	270*	275*	75*	5*	0.5*	0.3*	0.4*	4*	0.3*	80*	0.5*	1.8*	6*	150*
Children														
1-3 years	500*	**460**	**80**	5*	0.7*	**0.5**	**0.5**	**6**	**0.5**	**150**	**0.9**	2*	8*	200*
4-8 years	800*	**500**	**130**	5*	1*	**0.6**	**0.6**	**8**	**0.6**	**200**	**1.2**	3*	12*	250*
Males														
9-13 years	1,300*	**1,250**	**240**	5*	2*	**0.9**	**0.9**	**12**	**1.0**	**300**	**1.8**	4*	20*	375*
14-18 years	1,300*	**1,250**	**410**	5*	3*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	25*	550*
19-30 years	1,000*	**700**	**400**	5*	4*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	30*	550*
31-50 years	1,000*	**700**	**420**	5*	4*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	30*	550*
51-70 years	1,200*	**700**	**420**	10*	4*	**1.2**	**1.3**	**16**	**1.7**	**400**	**2.4**[f]	5*	30*	550*
> 70 years	1,200*	**700**	**420**	15*	4*	**1.2**	**1.3**	**16**	**1.7**	**400**	**2.4**[f]	5*	30*	550*
Females														
9-13 years	1,300*	**1,250**	**240**	5*	2*	**0.9**	**0.9**	**12**	**1.0**	**300**	**1.8**	4*	20*	375*
14-18 years	1,300*	**1,250**	**360**	5*	3*	**1.0**	**1.0**	**14**	**1.2**	**400**[g]	**2.4**	5*	25*	400*
19-30 years	1,000*	**700**	**310**	5*	3*	**1.1**	**1.1**	**14**	**1.3**	**400**[g]	**2.4**	5*	30*	425*
31-50 years	1,000*	**700**	**320**	5*	3*	**1.1**	**1.1**	**14**	**1.3**	**400**[g]	**2.4**	5*	30*	425*
51-70 years	1,200*	**700**	**320**	10*	3*	**1.1**	**1.1**	**14**	**1.5**	**400**	**2.4**[f]	5*	30*	425*
> 70 years	1,200*	**700**	**320**	15*	3*	**1.1**	**1.1**	**14**	**1.5**	**400**	**2.4**[f]	5*	30*	425*
Pregnancy														
≤ 18 years	1,300*	**1,250**	**400**	5*	3*	**1.4**	**1.4**	**18**	**1.9**	**600**[h]	**2.6**	6*	30*	450*
19-30 years	1,000*	**700**	**350**	5*	3*	**1.4**	**1.4**	**18**	**1.9**	**600**[h]	**2.6**	6*	30*	450*
31-50 years	1,000*	**700**	**360**	5*	3*	**1.4**	**1.4**	**18**	**1.9**	**600**[h]	**2.6**	6*	30*	450*
Lactation														
≤ 18 years	1,300*	**1,250**	**360**	5*	3*	**1.5**	**1.6**	**17**	**2.0**	**500**	**2.8**	7*	35*	550*
19-30 years	1,000*	**700**	**310**	5*	3*	**1.5**	**1.6**	**17**	**2.0**	**500**	**2.8**	7*	35*	550*
31-50 years	1,000*	**700**	**320**	5*	3*	**1.5**	**1.6**	**17**	**2.0**	**500**	**2.8**	7*	35*	550*

NOTE: This table presents Recommended Dietary Allowances (RDAs) in bold type and Adequate Intakes (AIs) in ordinary type followed by an asterisk (*). RDAs and AIs may both be used as goals for individual intake. RDAs are set to meet the needs of a e d a t a prevent being able to specify with confidence the percentage of individuals covered by this intake.

[a] As cholecalciferol. 1 µg cholecalciferol = 40 IU vitamin D.

[b] In the absence of adequate exposure to sunlight.

[c] As niacin equivalents (NE). 1 mg of niacin = 60 mg of tryptophan; 0-6 months = preformed niacin (not NE).

[d] As dietary folate equivalents (DFE). 1 DFE = 1 µg food folate = 0.6 µg of folic acid (from fortified food or supplement) consumed with food = 0.5 µg of synthetic (supplemental) folic acid taken on an empty stomach.

[e] Although AIs have been set for choline, there are few data to assess whether a dietary supply of choline is needed at all stages of the life cycle, and it may be that the choline requirement can be met by endogenous synthesis at some of these stages.

[f] Because 10 to 30 percent of older people may malabsorb food-bound B_{12}, it is advisable for those older than 50 years to meet their RDA mainly by consuming foods fortified with B_{12} or a supplement containing B_{12}.

[g] In view of evidence linking folate intake with neural tube defects in the fetus, it is recommended that all women capable of becoming pregnant consume 400 µg of synthetic folic acid from fortified foods and/or supplements in addition to intake of food folate from a varied diet.

[h] b e .

TABLE 4

Recommended Dietary Allowances[a], Revised 1989

Food and Nutrition Board, National Academy of Sciences-National Research Council
Designed for the Maintenance of Good Nutrition of Practically All Healthy People in the U.S.A.

	Age or condition	Protein	Fat-Soluble Vitamins			Water-Soluble Vitamins	Minerals			
	(years)	(g)	Vitamin A (μg RE)[b]	Vitamin E (μg α-TE)[c]	Vitamin K (μg)	Vitamin C (mg)	Iron (mg)	Zinc (mg)	Iodine (μg)	Selenium (μg)
Infants	0.0-0.5	13	375	3	5	30	6	5	40	10
	0.5-1.0	14	375	4	10	35	10	5	50	15
Children	1-3	16	400	6	15	40	10	10	70	20
	4-6	24	500	7	20	45	10	10	90	20
	7-10	28	700	7	30	45	10	10	120	30
Males	11-14	45	1,000	10	45	50	12	15	150	40
	15-18	59	1,000	10	65	60	12	15	150	50
	19-24	58	1,000	10	70	60	10	15	150	70
	25-50	63	1,000	10	80	60	10	15	150	70
	51+	63	1,000	10	80	60	10	15	150	70
Females	11-14	46	800	8	45	50	15	12	150	45
	15-18	44	800	8	55	60	15	12	150	50
	19-24	46	800	8	60	60	15	12	150	55
	25-50	50	800	8	65	60	15	12	150	55
	51+	50	800	8	65	60	10	12	150	55
Pregnant		60	800	10	65	70	30	15	175	65
Lactating	1st 6 mos.	65	1,300	12	65	95	15	19	200	75
	2nd 6 mos.	62	1,200	11	65	90	15	16	200	75

[a] The allowances, expressed as average daily intakes over time, are intended to provide for individual variations among most normal persons as they live in the United States under usual environmental stresses. Diets should be based on a variety of common foods in order to provide other nutrients for which human requirements have been less well defined.
[b] Retinol equivalents. 1 retinol equivalent = 1 μg retinol or 6 μg ß-carotene.
[c] α-Tocopherol equivalents. 1 mg d-α tocopherol = 1 α-TE.

TABLE 14

General Physical Properties of Milk

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.
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.
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.
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.
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.
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.
Specific heat at 0° C 15° C 40° C	 0.92 0.94 0.93	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.
Coefficient of expansion at 10° C 15.6° C 21.1° C	 0.9975 0.9985 1.0000	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.
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	$45\text{-}55 \times 10^{-4}$ mho	In milk, fat and colloidally 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.

KEY Dairy Foods 2009

1. a
2. d
3. c
4. a
5. a
6. b
7. d
8. a
9. b
10. c
11. c
12. b
13. b
14. a
15. a
16. d
17. a
18. d
19. c
20. d
21. c
22. a
23. d
24. a
25. c
26. a
27. c
28. d
29. a
30. a
31. c
32. c
33. a
34. b
35. c
36. a
37. a
38. b
39. a
40. c
51. c
52. c
53. a
54. b
55. c
56. a
57. a
58. b
59. a
60. c

Dairy Foods 2009 ***Problem Solving <u>Part 1</u> & <u>Part 2</u>***

Chapter: _____ Chapter Number: _____

Team Member Names: _____

_____

_____

_____

<u>Part 1</u> (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**)

<u>Part 2</u> (5 pts. Each)

<u>Neatly</u> 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 $3.75 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 **3**, **6**, and **15**.

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

4. A dairy producer received $175,000 for 1 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 350 cows that are averaging 82 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 1000 pounds of cheese, 1000 pounds of butter, and 1000 gallons of ice cream, how much whole milk would you need?

Estimate: _____ gallons of whole milk (5 pts.)

8. During a 305 day lactation, **cows 1, 2, 6, and 7** could produce an estimated total of ____ gallons of milk?

_____ gallons (5 pts.)

9. How many pounds of skim milk (0% fat) must be added to 400 pounds of 27.0% cream to reduce the butterfat test, of the 400 pounds to 22.0%?

_____ pounds of Skim milk (5 pts.)

10. Which cow appears most likely to have mastitis?

a. _____ (1 pt.)

b. List two reasons why you selected the cow in the above question:

_____ (2 pts.)

_____ (2 pts.)

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

Table 1 **Part 1**

Cow Production						Feed	Premiums			Income Comparisons - Class I @ $15.00/cwt vs. Class II @ $13.45/cwt					
	Lbs. Milk per Day per Cow	**Butterfat %**	**Protein %**	**Milk pH**	**Somatic Cell Count** (cells/ml)	**Feed Cost** per Day	**Butterfat** premum per cwt $0.17 per 0.1 above 3.5%	**Protein** premium per cwt $0.58 per 0.1 above 3.5%	**SCC** premium $0.25 per cwt if less than 200,000 cells/ml	**BEFORE PREMIUMS** Base Per Day $ Value of Daily Milk **if** sold as **Class I** milk @ **$15.00/ cwt**	**BEFORE PREMIUMS** Base Per Day $ Value of Daily Milk **if** sold as **Class II** milk @ **$13.45/ cwt**	**WITH PREMIUMS Class I:** Total Per Day $ Value of Milk if sold as Class I milk @ **$15.00/ cwt**	**WITH PREMIUMS Class II:** Base Per Day $ Value of Milk if sold as Class II milk @ **$13.45/ 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		199,999	**$4.74**	**$0.17**	**$0.58**	**$0.25**	$3.75	$3.36	**$4.75**	**$4.36**	$0.01	-$0.38
Cow 1	45	4.0	5.0	6.6	161,000.00	$5.50	$0.85	$8.70	$0.25	**A**	$6.05	**B**	$15.85	C	$10.35
Cow 2	55	3.6	4.8	6.5	210,000.00	$5.75	$0.17	$7.54	$0.00	$8.25	**D**	$15.96	**E**	$10.21	**F**
Cow 3	65	3.5	3.7	6.4	195,000.00	$6.10	$0.00	$1.16	$0.25	$9.75	$8.74	$11.16	$10.15	$5.06	**G**
Cow 4	75	3.5	3.5	7.4	1,750,000.00	$5.55	$0.00	$0.00	$0.00	$11.25	$10.09	$11.25	$10.09	$5.70	**H**
Cow 5	95	3.6	3.5	6.7	210,000.00	$6.55	$0.17	$0.00	$0.00	$14.25	$12.78	$14.42	$12.95	**I**	$6.40
Cow 6	31	5.0	5.0	6.5	160,000.00	$5.00	$2.55	$8.70	$0.25	$4.65	**J**	$16.15	**K**	$11.15	**L**
Cow 7	44	5.0	4.4	6.6	145,000.00	$5.10	$2.55	$5.22	$0.25	$6.60	$5.92	$14.62	$13.94	$9.52	$8.84
Cow 8	53	4.6	4.0	6.4	176,000.00	$5.35	$1.87	$2.90	$0.25	$7.95	$7.13	$12.97	$12.15	$7.62	$6.80
Cow 9	71	4.7	4.1	6.3	201,000.00	$5.45	$2.04	$3.48	$0.00	$10.65	$9.55	$16.17	$15.07	**M**	$9.62
Cow 10	81	4.7	3.6	6.6	190,000.00	$6.10	$2.04	$0.58	$0.25	$12.15	$10.89	$15.02	$13.76	$8.92	$7.66
Cow 11	46	4.3	3.7	6.5	211,000.00	$6.15	$1.36	$1.16	$0.00	$6.90	$6.19	$9.42	$8.71	$3.27	**N**
Cow 12	49	4.4	4.1	6.5	199,990.00	$4.90	$1.53	$3.48	$0.25	$7.35	$6.59	$12.61	$11.85	$7.71	$6.95
Cow 13	54	4.4	3.6	6.5	163,000.00	$5.55	$1.53	$0.58	$0.25	$8.10	$7.26	$10.46	$9.62	**O**	$4.07
Cow 14	64	3.9	3.7	6.6	402,000.00	$5.45	$0.68	$1.16	$0.00	**Q**	**R**	**S**	**T**	**U**	P
Cow 15	66	3.8	4.0	6.4	367,000.00	$5.65	$0.51	$2.90	$0.00	$9.90	$8.88	**W**	**X**	**Y**	$6.64

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. _____

Table 1 KEY **Part 1 KEY**

Cow Production						Feed	Premiums			Income Comparisons - Class I @ $15.00/cwt vs. Class II @ $13.45/cwt					
	Lbs. Milk per Day per Cow	**Butterfat %**	**Protein %**	**Milk pH**	**Somatic Cell Count** (cells/ml)	**Feed Cost** per Day	**Butterfat** premum per cwt $0.17 per 0.1 above 3.5%	**Protein** premium per cwt $0.58 per 0.1 above 3.5%	**SCC** premium $0.25 per cwt if less than 200,000 cells/ml	**BEFORE PREMIUMS** Base Per Day $ Value of Daily Milk **if** sold as **Class I** milk @ **$15.00/ cwt**	**BEFORE PREMIUMS** Base Per Day $ Value of Daily Milk **if** sold as **Class II** milk @ **$13.45/ cwt**	**WITH PREMIUMS Class I**: Total Per Day $ Value of Milk **if** sold as Class I milk **@ $15.00/ cwt**	**WITH PREMIUMS Class II:** Base Per Day $ Value of Milk **if** sold as Class II milk @ **$13.45/ cwt**	**Class I After Feed**: Milk Income minus Feed Cost per day	**Class II After Feed:** Milk Income minus Feed Cost per day
Example	**25**	3.6	3.6		199,999	**$4.74**	**$0.17**	**$0.58**	**$0.25**	$3.75	$3.36	**$4.75**	**$4.36**	$0.01	-$0.38
Cow 1	45	4.0	5.0	6.6	161,000.00	$5.50	$0.85	$8.70	$0.25	$6.75	$6.05	$16.55	$15.85	$11.05	$10.35
Cow 2	55	3.6	4.8	6.5	210,000.00	$5.75	$0.17	$7.54	$0.00	$8.25	$7.40	$15.96	$15.11	$10.21	$9.36
Cow 3	65	3.5	3.7	6.4	195,000.00	$6.10	$0.00	$1.16	$0.25	$9.75	$8.74	$11.16	$10.15	$5.06	$4.05
Cow 4	75	3.5	3.5	7.4	1,750,000.00	$5.55	$0.00	$0.00	$0.00	$11.25	$10.09	$11.25	$10.09	$5.70	$4.54
Cow 5	95	3.6	3.5	6.7	210,000.00	$6.55	$0.17	$0.00	$0.00	$14.25	$12.78	$14.42	$12.95	$7.87	$6.40
Cow 6	31	5.0	5.0	6.5	160,000.00	$5.00	$2.55	$8.70	$0.25	$4.65	$4.17	$16.15	$15.67	$11.15	$10.67
Cow 7	44	5.0	4.4	6.6	145,000.00	$5.10	$2.55	$5.22	$0.25	$6.60	$5.92	$14.62	$13.94	$9.52	$8.84
Cow 8	53	4.6	4.0	6.4	176,000.00	$5.35	$1.87	$2.90	$0.25	$7.95	$7.13	$12.97	$12.15	$7.62	$6.80
Cow 9	71	4.7	4.1	6.3	201,000.00	$5.45	$2.04	$3.48	$0.00	$10.65	$9.55	$16.17	$15.07	$10.72	$9.62
Cow 10	81	4.7	3.6	6.6	190,000.00	$6.10	$2.04	$0.58	$0.25	$12.15	$10.89	$15.02	$13.76	$8.92	$7.66
Cow 11	46	4.3	3.7	6.5	211,000.00	$6.15	$1.36	$1.16	$0.00	$6.90	$6.19	$9.42	$8.71	$3.27	$2.56
Cow 12	49	4.4	4.1	6.5	199,990.00	$4.90	$1.53	$3.48	$0.25	$7.35	$6.59	$12.61	$11.85	$7.71	$6.95
Cow 13	54	4.4	3.6	6.5	163,000.00	$5.55	$1.53	$0.58	$0.25	$8.10	$7.26	$10.46	$9.62	$4.91	$4.07
Cow 14	64	3.9	3.7	6.6	402,000.00	$5.45	$0.68	$1.16	$0.00	$9.60	$8.61	$11.44	$10.45	$5.99	$5.00
Cow 15	66	3.8	4.0	6.4	367,000.00	$5.65	$0.51	$2.90	$0.00	$9.90	$8.88	$13.31	$12.29	$7.66	$6.64

2009 Dairy Foods
Team Problem Solving Event Key

Part 1

A. $6.75
B. $16.55
C. $11.05
D. $7.40
E. $15.11
F. $9.36
G. $4.05
H. $4.54
I. $7.87
J. $4.17
K. $15.67
L. $10.67
M. $10.71
N. $2.56
O. $4.91
P. $5.00
Q. $9.60
R. $8.61
S. $11.44
T. $10.45
U. $5.99
V. NA
W. $13.31
X. $12.29
Y. $7.66

Part 2

1. $14.69
2. $43.60
3. 258,124
4. $17.50
5. 2,870
6. $21.77
7. 5,000
8. 6,206.4
9. 74.07
10. A. 4
    B. High Somatic Cell, High pH