

National FFA Convention - Dairy Nutrition Scenario

November 2023

Scenario: You received a call from Fabian F. Alameda, owner of FFA Dairies, LLC, located in the Central Valley of California. Mr. Alameda has some questions about the nutrition program on his dairy. His current nutritionist is on vacation and he doesn't want to bother her, so he is hoping that your team will help him in the meantime.

FFA Dairies milks 1200 cows, 3 times a day in a double-30 parallel parlor. The calves and heifers are all raised on a neighboring facility. The dry cows are housed in a separate barn close to the lactating cow facilities. The lactating cows are averaging 90 lb/day with a 4.0% milk fat and 3.2% protein test. The somatic cell count (SCC) is at 120,000 cells/ml. The cows are housed in 3 free stall barns (Figure 4) with each barn divided into 2 pens with 200 cows per pen. Each barn is 350 ft long and has headlocks down the center alleyway where the total mixed ration is fed to the cows on each side of the alleyway. The barns are equipped with fans and soakers over the feed lanes so cow cooling is good and is not an issue. There are 2 head-to-head rows of stalls in each pen (4 row barn). The stalls in the pens are sized correctly and the cows are able to comfortably lie in the stalls with no issues.

All of the cows are fed 2 times per day using a Total Mixed Ration (TMR) mixer fitted with a double screw assembly for mixing the feed (see Figures 1a & 1b). Pens 1 through 4 are fed one ration and Pens 5 and 6 are fed a different ration. Cows in Pens 1 through 4 are averaging 96 lb of milk and the cows in Pens 5 and 6 are later lactation cows and are averaging 78 lb of milk.

Challenge #1:

FFA Dairies recently received two separate rations from their nutritionist (see Table 1). The rations list the ingredients each cow should receive daily on an individual basis. The rations do not state which one should be fed to which pen of cows.

- Which ration should be fed to Pens 1 through 4 and which ration should be fed to Pens 5 and 6? Explain to Mr. Alameda how you know that you are feeding the right ration to the correct pen of cows.

Challenge #2:

The employee that feeds the milking and dry cows asked Mr. Alameda if they could feed one of the milking cow rations to the dry cows.

- Do you think this is or is not a good idea? Please explain your answer so that Mr. Alameda can explain it to the person feeding the cows.

Challenge #3:

Both of the new rations include soybean meal (Table 1), but there is only enough left for 10 more days at the current feeding rate. Mr. Alameda is going to need to add in a different ingredient to replace a portion of the soybean meal as delivery of additional soybean meal can not occur until next month. Mr. Alameda has looked into his options and can either get or has enough of the following ingredients available to put in the ration (additional information about each ingredient is available in Table 2):

- Corn (ground)
- Canola meal
- Wheat
- Oats
- Straw

- Which of these ingredients should he use to replace a portion of the soybean meal in the ration? Explain why you selected this ingredient and the reasons you did not select EACH of the other ingredients available.
- To make sure that he does not run out of soybean meal in the future, Mr. Alameda would like to plan ahead and avoid this issue in the future. He would like for you to help with the following items:
 1. Calculate how many tons of soybean meal he needs to feed his milking herd for the next 3 months.
 2. He can contract with his supplier a set number of semi-tractor loads for delivery. How many semi-loads should he contract? (A semi-load holds 25 tons of soybean meal and partial loads are not sold.)

Challenge #4:

When the nutritionist formulates a new ration, they provide a feeding sheet. The feeding sheet gives the total amount of each ingredient and the order that the feed ingredients should be added to the TMR mixer to make a batch of feed for either multiple barns or pens of cows. However, the feeding sheet that the nutritionist just sent along with the new rations was lost. Mr. Alameda would like for you to make him a new feeding sheet to mix a batch of feed for 200 cows using Ration A.

- State how much of each ingredient should be added to the TMR mixer.
- In what order would you recommend the feed ingredients be added to the TMR? Explain WHY you added the ingredients in the order you listed them to be added to the TMR mixer.

Challenge #5:

Mr. Alameda is interested in exploring new types of technology for his dairy operation. Recently, he was visiting with a friend that was telling him about robot feed pushers (Figure 3).

- Explain why pushing up feed is important for the lactating cows at FFA Dairy.
- Discuss the advantages and disadvantages of a robotic feed pusher for Mr. Alameda's dairy operation.

Figure 1a. The double screw TMR mixer used for feeding the cows at FFA Dairy.



Figure 1b. Diagram of how the double-screw TMR mixer works to mix the feed. (Photo credit: <https://www.agcentral.coop/dairy-services/patz>)



Gray arrows indicate direction of screw rotation.
Green arrows indicate Balanced Flow™ of feed

Table 1. Rations received from the nutritionist for the lactating cows.

Feed ingredients	Ration A Pounds per cow per day (as fed)	Ration B Pounds per cow per day (as fed)
Corn Silage	50.0	55.0
Alfalfa Haylage	15.0	18.5
Ground Corn	14.3	9.3
Byproduct/Mineral and Vitamin Mix	8.8	7.5
Alfalfa Hay	5.0	4.0
Almond Hulls	5.0	4.0
Soybean Meal	3.75	2.6
Straw	1.0	0.0
Nutrient		
Dry matter, %	56.8	51.5
Crude Protein, %	16.5	16.2
NDF, %	29.5	31.1
Starch, %	28.0	26.0

Figure 2. Soybean meal and almond hulls that FFA Dairy is currently feeding.



Table 2. Nutrient composition of potential ingredients to include in the ration to extend the supply of soybean meal.

Ingredient	Crude Protein (% DM)	Starch (% DM)	Calcium (% DM)	Phosphorus (% DM)
Corn	8.5	70.4	0.04	0.31
Canola meal	41.5	1.6	0.79	1.15
Wheat	13.5	63.0	0.10	0.36
Oats	12.2	44.7	0.13	0.38
Straw	4.5	1.8	0.38	0.12

Figure 3. One example of a rotating feed pusher. (Photo credit: <https://agupdate.com>)



Figure 4. Picture of one of the freestall barns

