UF|IFAS
UNIVERSITY of FLORIDA
Department of Animal Sciences

Dairy Update

Quarterly Newsletter Summer 2024

In this Issue

U.S. Dairy Education and Training Consortium Offers Real-World Dairy Training for UF Dairy Science Students

Albert De Vries

The U.S. Dairy Education and Training Consortium is an intercollegiate program designed to meet the education and training needs of students interested in working in the dairy industry. The 5- or 6-week full time program is held annually in Clovis, New Mexico. The program is primarily organized by faculty from New Mexico State University and Texas A&M University. Over 50 students from around the US, and some from abroad, are admitted every year to learn from nationally known industry experts and visit over 40 dairy farms and interact with allied industry representatives.

UF students interested in dairy science have participated in the USDETC program for over 10 years. The program offers dairy science learning and an exposure to the dairy industry that is not available in Florida. This summer, two UF students, Rebecca Lyons and Jenna Chorus, were able to take part in this program. They reported a wonderful learning experience and building a network with current and future dairy leaders.

For more information about the UDETC, visit https://usdetc.tamu.edu/, or contact Albert De Vries, devries@ufl.edu

UF students Jenna Chorus and Rebecca Lyons at the USDETC dairy program in Clovis, NM. Photo credit: https://www.facebook.com/UFAnimalSciences

Ranking Cows by Value of Milk versus Milk Yield

Albert De Vries

Most dairy producers in the Southeast get paid for skim milk and fat pounds. The fat percentage between cows varies quite a bit. Therefore, the value of a pound of milk varies between cows. The revenue of a pound of milk of one cow is not the same as the revenue of a pound of milk of another cow. Yet few producers test their cows for milk components, such as fat.

Culling (marketing) decisions and do-not-breed decisions are often based on an estimate of the value of the cow's daily milk yield. The fat percentage may not be known but the daily milk yield is known. A question is how much the fat percentage of a cow's milk affects the value of a cow's milk relative to the value of other cows' milk. In other words, how does knowing the fat percentage of a cow change her ranking among the other cows in the herd? We'll investigate with data from the June 26, 2024, DHI test of 391 cows at the UF Dairy Unit located in Hague, Florida.

The average milk yield of those 391 cows was 83 pounds with a range from 9 to 142 pounds. The fat percentage varied from 1.3% to 7.3%. The simple average fat percentage of the 391 cows was 4.48%. However, lower producing cows tended to have higher fat percentages as shown in figure 1. A line through the data points shows that for every 10 pounds less milk, the fat percentage increased by 0.17, for example from 4.00% to 4.17%. However, there is much variation in fat percentage at the same milk yield, as can be seen in the scatter around the line. When we account for differences in milk yield between cows, the weighted average fat percentage was 4.38%. This was the same as the bulk tank fat percentage that day.

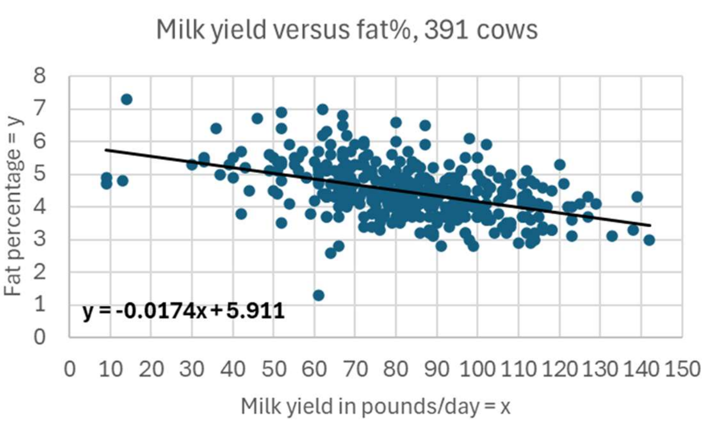

Figure 1. Fat percentage versus milk yield for 391 cows at the June 2024 DHI test at the UF Dairy Unit.

In June 2024, skim milk (milk without fat) was priced at \$11.12 per cwt or \$0.1112 per pound. Fat was priced at \$3.48 per pound of fat. Milk value is then calculated as \$0.1112 x pounds of skim milk + \$3.48 x pounds of fat. The milk value for the 391 cows is shown in figure 2.

We see in figure 2 that the daily milk value among the 391 cows varied from \$2.43 to \$35.59. The average milk value was \$21.40. Again, we see quite a bit of variation in milk value for cows from about the 60 to 120 pounds. These differences are due to variation in fat percentage and amount of skim milk.

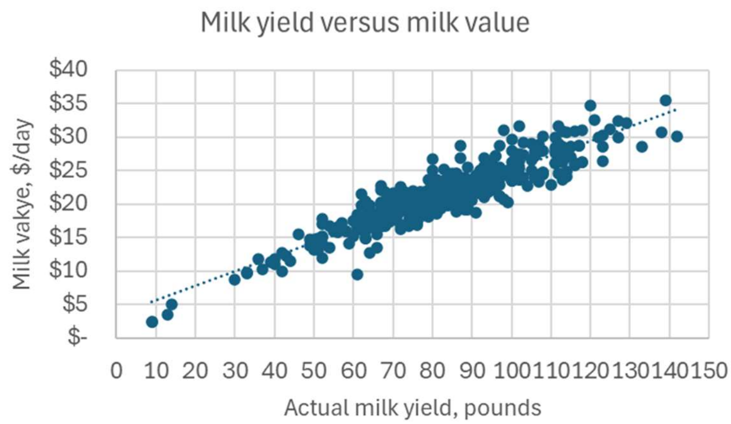

Figure 2. Milk value versus milk yield for 391 cows at the June 2024 DHI test at the UF Dairy Unit.

Figure 2 makes clear again that not all milk has the same value. A direct way to compare the values of cows' daily milk production is obviously to calculate the daily milk values when components and their prices are known, as is done in figure 2.

Alternatively, "revenue corrected milk" (or money corrected milk or value corrected milk) is the calculation of a cow's milk yield with default components that has the same economic value as the cow's milk yield with her actual components. Traditionally, it has been customary to set the default components to 3.5% fat, 3% protein, and 5.7% other solids. When we get paid for skim milk and fat, we only need the default fat component.

Take for example a cow that produces 90 pounds of milk with 4.20% fat. That means that skim milk is 90 x (1 - 0.042) = 86.22 pounds and fat is 90 x 0.042 = 3.78 pounds. Using the same prices for skim milk and fat as before, that means that the value of the milk is 86.22 x $0.1112 + 3.78 x $3.48 = $22.74. If these 90 pounds of milk had default components (3.5% fat), then the value of the milk would have been 86.85 x $0.1112 + 3.15 x $3.48 = $20.62. Therefore, 3.5% fat revenue corrected milk yield for this cow is $22.74 / $20.62 x 90 = 99.26 pounds. In other words, the value of 99.26 pounds of milk at 3.5% fat is the same value as 90 pounds of milk at 4.2% fat.

We can fairly compare the revenue corrected milk yield for every cow because the value of components is standardized. Figure 3 is the 3.5% fat revenue corrected milk yield versus actual milk yield of the 391 cows. Note that the y-axis is now in pounds of revenue corrected milk. Also note the similarities with figure 2. The red line through the figure 3 is where actual milk yield equals 3.5% fat revenue corrected milk.

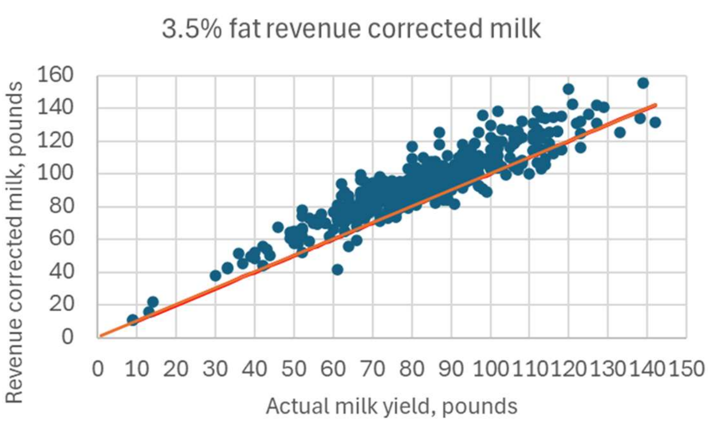

Figure 3. 3.5% fat corrected milk versus milk yield for 391 cows at the June 2024 DHI test at the UF Dairy Unit.

It is traditional to calculate revenue corrected milk at 3.5% fat. However, we are free to choose any default percentage. For example, let's set the default fat percentage to the bulk tank fat percentage, which was 4.38%. Now we calculate 4.38% fat (bulk tank fat) revenue corrected milk for every cow, as shown in figure 4.

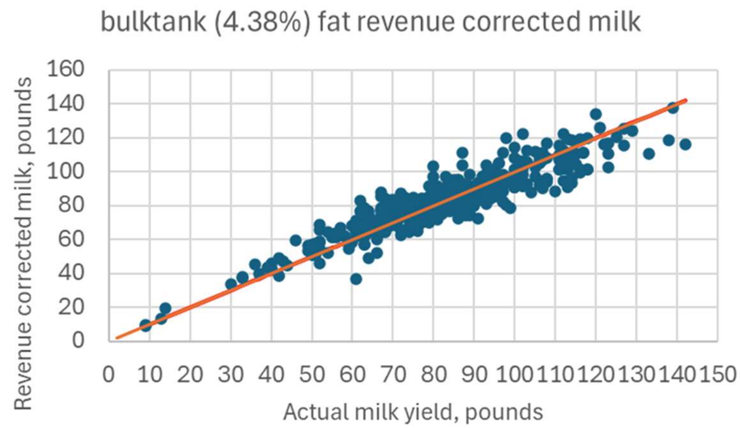

Figure 4. Bulk tank (4.38%) fat corrected milk versus milk yield for 391 cows at the June 2024 DHI test at the UF Dairy Unit. The cow rankings are the same as in figure 3.

It turns out that the bulk tank fat revenue corrected milk for every cow is just 89% of their 3.5% fat revenue corrected milk yields. Therefore, the default fat percentage we choose (say 3.5% or 4.38%) does not make a real difference when comparing cows based on revenue corrected milk yield.

Back to 3.5% fat revenue corrected milk. When we look at the 40 cows that produced less than 60 pounds of milk, we see that the revenue corrected milk calculation changed their ranking in this group quite a bit for some cows. The cow that produced almost 60 pounds of milk, at 3.8% fat, changed from number 1 in this group not considering fat to number 19 when fat value was included. Another cow changed from number 24 without fat to number 11 when fat was included. The rank correlation of the 40 cows between their rank when only milk yield was used and when 3.5% fat revenue corrected milk was used, was 87%. Clearly, if we are making decisions on low producing cows, including fat percentage, and therefore the value of their milk, can make a difference.

Contact Albert De Vries at devries@ufl.edu

Feeding Management: What is the Value and the Best Use of Weigh Backs?

José Eduardo P. Santos and Mariana Nehme Marinho

Proper feeding management requires accurate numbers of cows in each pen, continuous dry matter measurements of wet feedstuffs, and accurate weighing of amounts of totally mixed rations to be fed to a given pen. Constant cow movements among pens result in changes in cow numbers, which is a minor issue in large pens, but it can have a big impact on small pens, especially in fresh pens that are dynamic and have continuous movement of cows in and out. Errors in pen counts will result in inaccurate amounts of feed offered per pen.

Individual cow daily dry matter intake can be variable, but housing cows in groups minimizes the variability of intake per cow because when one cow decides to eat less, another might decide to eat more, thus resulting in somewhat steady intake on a pen. That minimizes the daily variability in pen intakes, which helps minimize errors in feed availability and issues with excessive amounts left in the bunk at the end of the feeding cycle. Proper feeding management requires measuring weigh backs in individual pens daily so a farm can monitor pen intakes to calculate dry matter intake per cow and gross feed efficiency (Figure 1).

Figure 1. Left over feed from two pens on a farm immediately before removing weigh backs. The left over feed of each pen should be removed daily, before the first feeding of the day, and weighed to calculate the dry matter intake and gross feed efficiency of cows per pen.

Recommendations for amounts of feed to be offered per cow in a pen are based on an expected dry matter intake which is derived from the expected production of energy-corrected milk per cow, the body size and the stage of lactation of those cows. Nevertheless, amounts offered are often targeted to result in 3 to 5% weigh backs. If you think of a 200-cow pen in which the amount offered daily is 60 lbs of dry matter per cow (6 tons of dry matter delivered to the pen), a 5% weigh back would result in 600 lbs of dry matter, enough to feed another 10 to 11 cows. At $0.15 per pound of dry matter, the weigh back in this pen is valued at $90 per day or $0.45 per cow in the pen. A question that you should ask is how good is this weigh back?

Weigh back nutrient content

We have analyzed weigh backs from individual cows in experiments and from groups of cows in pens in commercial farms. Relative to the diet offered, the weigh backs often have 1 to 2-percentage units less protein, 3 to 4-percentage units less starch, 5 to 6-percentage units more neutral detergent fiber, more longer particles, particularly in diets in which long forage is fed or straw is incorporated, and a more variable moisture content mostly because of sprinklers and soakers above the feedline resulting in water drift falling on the feed bunk.

Table 1 depicts the results of three experiments and that of one farm in which the composition of the weigh backs was evaluated relative to the diet offered. For the 3 experiments, measurements originated from 192 individually fed cows and the amounts offered resulted in 8, 14, and 9% refusals for experiments 1, 2, and 3, respectively. For the commercial farm, diet and weigh backs were collected from 6 pens and the amounts offered resulted in 3.4% refusals (2.2 to 4.6%).

Table 1. Difference in composition of weigh back relative to the diet offered[1]

Item	Experiment 1	Experiment 2	Experiment 3	Commercial dairy	Mean[2]
Dry matter	8.4 (-3.1 to 14.4)	6.1 (-2.2 to 10.8)	5.1 (-1.1 to 13.1)	3.3 (1.4 to 8.1)	6.2
Crude protein	-2.3 (-4.8 to 1.4)	-1.4 (-4.1 to 2.0)	-2.8 (-4.8 to 1.3)	-1.7 (-2.6 to -0.4)	-2.2
Ether extract	-1.1 (-2.6 to 1.2)	-1.8 (-3.1 to -0.2)	-1.0 (-3.6 to 0.9)	-1.2 (-2.5 to -0.7)	-1.3
Starch	-3.4 (-5.9 to 0.3)	-2.9 (-7.4 to 2.4)	-4.2 (-8.2 to 0.9)	-2.4 (-5.1 to -1.2)	-3.5
NDF[3]	5.6 (2.3 to 7.2)	4.6 (-0.9 to 8.7)	5.7 (0.2 to 9.1)	4.5 (0.8 to 6.9)	5.3
Ash	0.7 (-1.6 to 1.9)	1.6 (-0.8 to 4.9)	1.5 (0.2 to 3.8)	0.9 (0.4 to 1.8)	1.3

[1] Values represent the mean difference in percentage units and those between parenthesis represent the minimum and maximum observed difference for individual cows (Experiments 1 to 3) or for individual pens (Commercial dairy). E.g., the original diet offered to an individual cow or pen contained 26.5% starch and the weigh back 24 h later contained 23% starch. The difference would represent a reduction of 2.5-percentage units or -2.5.

[2] Mean = represents the mean value of all individual observations (192 cows and 6 pens).

[3] NDF = neutral detergent fiber.

Comparing the results from the 192 individual cows and those of the 6 pens, it is expected that the individual cows would result in wider ranges of values because of the larger number of observations. With only 6 observations for the commercial farm, the range of values for the difference between left over and offered should be narrower than that from 192 cows. Nevertheless, the deviations in nutrient content between weigh backs and diet offered to individual cows and that offered to pens of cows follow the same pattern with small reductions in crude protein, ether extract, and starch, and increases in neutral detergent fiber and ash. The magnitude of changes reflects the concentrations of those nutrients in the diet and the ability of cows to select dietary components, for instance, to select against long particles of forages. As an example, the neutral detergent fiber in most lactating diets represent >28% of the dry matter and 60 to 70% of the dietary fiber is provided by forages, the latter more prone to sorting and selection. Thus, it is expected that, of all measurements taken, fiber would suffer the largest deviation in content between weigh back and the diet offered.

Although the variation in nutrient content is relatively small, there are other factors to consider. For instance, spoilage increases, and heat stability decreases after feed stays on the bunk for half or a full day. Recovery of weigh backs and proper discernment between edible from non-edible refusals will result in a "diet" that suffered relatively small changes in composition compared to what was originally fed. Obviously, there will be days in which the weigh backs will be complete refusals and considered mostly inadequate to be fed to lactating cows. Feeders and those managing the day-to-day decisions on feeding management need to understand the difference between weigh backs that can be incorporated into the diet of other cows and refusals that should be considered inedible and not be fed to lactating cows. In some cases, inedible refusals should be disposed of and not fed to any animal in the farm.

Who should get weigh backs?

A question often asked is what to do with weigh backs. Should it be incorporated into the diet of lactating cows? Should it be fed to heifers? If so, what heifers? Should it be fed to dry cows?

Let us assume a hypothetical 2,000-cow dairy farm with 11 pens that averages 90 lbs of energy-corrected milk yield per cow per day for the year and with 1.70 gross feed efficiency (pounds of energy-corrected milk yield per pound of dry matter consumed).

The farm segregates primiparous (lactation 1) from multiparous cows (lactation >1). Of the 11 pens, 2 pens of 100 cows each are assigned to fresh cows, one for primiparous and one for multiparous. All other 9 pens house 200 cows each. Of those 9 pens, 6 pens are assigned to the high-cows, 4 to multiparous and 2 to primiparous. The last 3 pens are assigned to the low-cows, 2 for multiparous and 1 for primiparous. The calving interval for this farm averages 390 days, of which 340 are lactating days and 50 are dry days, of which 25 days are in the far-off pen and 25 days in the close-up pen. Thus, for a period of 390 days, 87.2% of the time cows are producing milk (340/390) and 12.8% of the time they are dry (50/390). This would result in 318 days lactating and 47 days dry in a 1-year period (365 days). In theory, this farm of 2,000 lactating cows would have approximately 294 dry cows, half in the far-off pen (147 cows). See Table 2 for theoretical distribution of cows in a 2000-lactating cow farm. In this example, the amounts offered are to result in the following proportions of weigh backs: 8% in the fresh pens; 5% in the high pens; and 3% in the low pens.

Table 2. Hypothetical distribution of cows over the year on a 2,000-lactating cow dairy farm.

				Amount of diet dry matter, lbs				
Pen #	Category[1]	Cows, n	Diet	Offered/cow	Offered to pen	WB[2]	ECM,[3] lbs/cow	ECM/DMI[4]
1	Prim	100	Fresh	42	4,400	336	80	2.07
2	Mult	100	Fresh	52	5,200	416	100	2.09
3	Prim	200	High	52	10,400	520	90	1.82
4	Prim	200	High	50	10,000	500	85	1.79
5	Mult	200	High	66	13,200	660	120	1.91
6	Mult	200	High	66	13,200	660	110	1.75
7	Mult	200	High	60	12,000	600	100	1.75
8	Mult	200	High	56	11,200	560	90	1.69
9	Prim	200	Low	52	10,400	312	78	1.55
10	Mult	200	Low	56	11,200	336	75	1.38
11	Mult	200	Low	50	10,000	300	62	1.28
Total				55	110,800	5,200	90	1.70

1 Prim = primiparous; Mult = multiparous.
2 WB = weigh back.
3 ECM = energy-corrected milk (milk with 3.5% fat, 3.1% true protein, and 4.8% lactose).
4 ECM/DMI = pounds of ECM per pound of dry matter intake.

In this farm, there would be approximately 5,200 lbs of dry matter from the lactating cows daily that was not consumed by the cows. Most of that amount, 82% would originate from the fresh and high-cow pens, presumably the best diets with the best quality forages, the highest protein content, better sources of protein, and likely a greater incorporation of supplemental fatty acids. It would not be surprising that the expected changes in composition in those diets, with 2-percentage points less protein, 5-percentage points less starch, and 5-percentage points more fiber would result in a diet that resembles the low-cow diet on a farm. Furthermore, the total amount of weigh backs would represent only 16.5% of the total amount of diet offered to the low pens, a proportion that would unlikely influence the nutrient content of the low-cow diet or affect the freshness of the diet if the feeding crew discern between weigh backs and non-edible refusals.

A group that should not receive any weigh backs are close-up cows and heifers for numerous reasons, but an obvious one is prevention of hypocalcemia. Lactating cow diets are often high in sodium, potassium, and phosphorus, minerals that can increase the risk of hypocalcemia when the prepartum diet is rich in those elements. Thus, close-up cows are not eligible to receive any weigh back at the farm.

What other options do farmers have to use weigh backs?

Remember, this farm is expected to have approximately 147 dry cows in the far-off pen. Those cows typically consume 30 lbs of dry matter daily and would be offered 32 lbs/cow/day. If the farm decides to feed the far-off cows, then the amount of weigh back from lactating cows would represent more than the total amount needed to feed the far-off pen. The typical lactating cow diet contains a lot more protein, fat, and starch, and a lot less forage fiber than recommended for diets of far-off dry cows. That would likely result in cows gaining excessive amounts of body fat, which often results in increased risk of diseases in early lactation. Thus, the far-off pen should not be considered for use of weigh backs.

The other options would be to feed to weaned bull calves if the farm raises them or to growing heifers raised on farm. Let us assume that bull calves are sold at birth, so the last option is growing heifers. A dairy milking 2,000 cows will likely have 1500 heifers on site, half pre-breeding between 0 and 11 months of age, and half between 12 and 22 months of age. Of the 750 pre-breeding age heifers, only approximately 500 would be fed totally mixed rations. The other 250 heifers would be in the pre-weaning period or in the transition pens in the first 6 weeks after weaning. Thus, 500 pre-breeding and 750 post-breeding heifers could receive the weigh back.

From a nutritional point of view, it is almost certain that the nutrient content of the weigh backs will be richer in protein, fat, and starch, and have less fiber than the typical diet fed to a heifer in the post-breeding pens. The weigh back could be an ingredient of the diet fed to heifers, but not the main ingredient, otherwise it will result in excessive weight gain and overconditioned heifers.

If fed to the 500 pre-breeding heifers, then the 5,200 lbs of weigh back dry matter from lactating cows would represent approximately 80% of the amount of dry matter needed to feed them. The average heifer between 4 and 11 months of age weighs 520 lbs and consumes approximately 13 lbs of dry matter daily to achieve a 1.8 to 2.0-lb average daily gain. If heifers are fed to intake, the total amount of diet dry matter needed for the 500 pre-breeding heifers would be approximately 6,500 lbs. Weigh backs can work well for that group of heifers, but will likely have more energy, particularly from starch and fat, and less fiber and possibly protein than these young heifers need for proper frame growth.

Depending on how weigh back is priced, it will be similar to or likely more expensive than a growing heifer diet. Remember, weigh backs have value, and the composition is similar to a low-cow diet on a farm. In today's market, a low-cow diet would likely cost $0.14/lb of dry matter, whereas the typical pre-breeding heifer diet would cost $0.12 for the same pound of dry matter. That is a $0.02 differential in benefit to feeding weigh backs to the low cows and not the heifers. That translates into a value of $104 daily for a 2,000-cow dairy (5,200 lbs x $0.02), representing the equivalent of $0.05 savings per milking cow in the herd.

In addition to economics, another important point to consider if weigh backs are fed to heifers is the risk of affecting development. If quality and composition of weigh backs become more variable and less desirable, particularly during summer months, then it could negatively influence heifer development. Holstein heifers grow approximately 3.3 cm (1.3 inches) per month in height until 11 months of age. From 12 to 22 months, they only grow 1.1 cm (0.4 inches) per month. If important nutritional mistakes occur in the first year of life, that could compromise development of heifers for life.

Revisit weigh back use in your farm

Revisit the policies in place for use of weigh backs. Including them as part of the low-cow diet probably represents the best use of weigh backs in most farms. Remember, discernment is needed between weigh backs and inedible refusals. In farms with multiple pens and proper feeding management with 3 to 5% weigh backs, feeding to low cow pens is probably the most economical and the least risk decision, and it should represent < 20% of the total ration. Keeping this proportion limited should protect those groups of cows from unexpected losses in production or changes in milk composition. If the farm decides to feed to heifers, then those younger than 12 months should be the target, but inclusion should be limited and not represent most of their diet. This means that if fed to heifers, the pre-breeding groups will not be able to absorb all the available weigh back resulting in surplus and the need for other groups of animals to receive some amount.

José Santos is a Research Foundation Professor and Mariana Nehme is a PhD student. Both are in the Department of Animal Sciences, University of Florida. Contact José Santos at jepsantos@ufl.edu

Sign up for **UFL-DAIRYUPDATE-L**: Receive *Dairy Update* and other announcements of UF Dairy Extension events by email. Subscribe and unsubscribe at https://animal.ifas.ufl.edu/dairy/uf-dairyupdate-L/

Dairy Update is published quarterly by the Department of Animal Sciences, Institute of Food and Agricultural Sciences, University of Florida. Please address any comments to Albert De Vries, Editor, Dairy Update, PO Box 110910, Gainesville, FL 32611-0910. Phone: (352) 294-6983. E-mail: devries@ufl.edu.
The opinions expressed in this newsletter are those of the authors and do not necessarily reflect the view of the University of Florida.
Past issues are posted on the UF/IFAS Animal Sciences Dairy Extension website at https://animal.ifas.ufl.edu/dairy/. This issue was published on **July 26, 2024**