Making Moo-ves in Dairy Calf Heat Stress Abatement

Bethany Dado-Senn and Jimena Laporta

While many U.S. dairies cool lactating cows and have started implementing dry cow cooling, pre- and post-weaned dairy calves are often not considered in heat stress abatement decisions. However, heat stress in calves can have lasting negative consequences on productivity. For example, calves experiencing heat stress in the womb, that is before they are born, are lighter and shorter at birth and weaning, are less likely to survive to lactation, and if entering the lactating herd, yield less milk across their entire first and second lactations. Further, dairy calves directly exposed to high ambient temperatures during the pre-weaning period will experience reduced average daily gain, impaired immune responses, and increased mortality. We conducted a survey with the goal of assessing Florida dairy producer application of heat stress abatement in dairy calves. The survey was circulated between December 2017 to December 2018 with a total of 23 dairy producer responses, representing approximately 25% of dairy farms in Florida. Of the 23 producers, 56% were in northern Florida and 44% in southern Florida.

As expected, dairy calf management and housing varied greatly across farms. For example, 26% of farms sold calves between one to seven days old. Of the remaining producers who retained calves on-farm, 53% housed calves in individual hutches and 35% used group pens (Figure 1A). Studies have shown that individual calf hutches can contribute to increased heat stress. In an individual hutch environment, particularly in high temperature and humidity climates, heat loss is restricted (as in-hutch air temperatures are often greater than body temperatures) and shade is limited. However, modifications to hutch environments can reduce heat load. White wooden hutches, shaded hutches, and addition of radiative insulation to hutches reduces air and calf body temperatures under summer conditions but lack improvements in production variables like average daily gain. Group pen systems, used by 35% of producers in this survey, can contribute to heat stress abatement due to increased area for shade and airflow plus the option to add ventilation systems such as natural ventilation, fans, or positive-pressure tubing. However, its effectiveness depends on the season, bedding, and technologies applied.

Figure 1. (A) Type of housing provided for Florida dairy calves. Out of 23 farms surveyed, 26% sell their calves, and of those farms keeping their calves 53% use individual hutches and 35% group pens. Others = type of housing not specified. (B) Percent of farms that provide heat stress abatement (or not) to pre-weaned calves.
Only 13% of Florida dairy producers provided heat stress abatement (outside of shade) to their pre-weaned dairy calves (Figure 1B). This lack of heat stress abatement could be partially attributed to the high percentage of producers using individual hutches for housing, where supplemental abatement beyond shade cannot be easily achieved. Further, producers may not prioritize cooling calves because pre-weaned dairy calves have a higher thermal tolerance due to smaller stature, less net energy requirements, and a monogastric digestive system. Producers also may not find cooling calves economically beneficial, as some studies indicate that calves are less likely to show improvement in production responses like feed intake and average daily gain under improved hutch microclimates. However, calves under three weeks of age have a thermal neutral zone ranging from 59-78°F while calves over three weeks begin to experience heat stress at 68-70°F, indicating that they can suffer profound effects of heat stress at least in Florida and the southeastern U.S. Indeed, when calves are grown under higher temperature-humidity index conditions (>70, a study performed in Mexico), they experience reduced birth weights, lower rates of gain, and decreased weaning weights. While moderate microclimate changes may not lead to productive differences, one study in Ohio shows that providing additional heat stress abatement like ventilation and fans improves average daily gains by 23%. Because heifer raising is a high-cost investment, producers should analyze the economic returns of cooling heifers in terms of growth responses, especially as growth rate has been implicated to impact mammary development and milk production once these animals reach lactation.

Interestingly, of those producers that did provide heat stress abatement, all of them utilized basket fan systems (as opposed to tubes or curtains) that were provided year-round, however the main goal of these fans is improving ventilation and not active cooling. Further research must be conducted to determine if this abatement technique is the most effective in providing cooling for pre-weaned dairy calves in Florida climate. We recently completed a study that provided cooling to calves through high-throughput fans at the calf level which provided approximately 3.5 m/s wind speed. With the results from this study, we can determine if this abatement strategy is practical for producer implementation and effective enough to improve calf microclimate and induce positive productive responses in Florida.

We would like to thank the Florida dairy producers who completed the survey, Dr. Geoffrey Dahl and Dr. Albert de Vries from the University of Florida, Brian Chapman from Florida Dairy Farmers, and Travis Senn from Southeast Milk for their assistance in the design and/or distribution of this survey. For more information, contact Jimena Laporta, Assistant Professor of Mammary Gland Physiology, at jlaporta@ufl.edu or call 352-294-6985.

UF Dairy Students Participated in the Southern Regional Student Affiliate Division Meeting of the American Dairy Science Association

The University of Florida Dairy Science Club recently traveled to the 2019 Southern Regional American Dairy Science Association’s Student Affiliate Division Meeting organized by North Carolina State University. The meeting was held February 21-23, 2019 in Hickory, NC. Dairy Science clubs at universities located in the Southeast participated. The club and several of its members took home numerous awards, including 2nd Place in the Dairy Quiz Bowl Contest and 3rd Place in the Website Development Category. Quiz Bowl team members included Gloria Rodriguez, Cole Diepersloot, Huridises Torrealba, and Cash Rice (picture). Club member Cole Diepersloot also won 1st Place in the Original Research Division (Oral Competition) and Huridises Torrealba won 2nd Place in the Dairy Foods Division (Oral Competition). Congratulations on a job well done and for representing UF and the Florida Dairy Industry so well!
The proceedings of the 30th Florida Ruminant Nutrition Symposium are now online at [http://dairy.ifas.ufl.edu/rns](http://dairy.ifas.ufl.edu/rns). The Symposium was held in Gainesville, FL, on February 4-6, 2019, and attracted over 280 attendees, mostly from the allied dairy and beef feed industries. More information about the annual Florida Ruminant Nutrition Symposium: José E.P. Santos, Phone: 352-294-6998, jepsantos@ufl.edu

### 2018 Corn Silage Test Results Available

The Universities of Florida and Georgia perform corn and sorghum silage variety trials every year. Trial results may help growers decide on which varieties to grow. Results from the 2018 trials are available at [http://animal.ifas.ufl.edu/corn_silage_forage_field_day_extension/2018/presentations_index.shtml](http://animal.ifas.ufl.edu/corn_silage_forage_field_day_extension/2018/presentations_index.shtml)

The universities alternate in organizing an annual corn silage and forage field day. In 2019, the event will take place in Georgia on June 20. Location is to be decided.

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### Milking for the Future: University of Florida is Fundraising to Renovate the UF Dairy Farm

The UF/IFAS Department of Animal Sciences is fundraising to renovate the UF Dairy Farm, a multi-year fundraising project. When finished, the Dairy Farm will be more economically sustainable, and its facilities more representative of the industry standard. These renovations will ensure the longevity of UF’s preeminence in dairy science and allow the Dairy Farm to contribute to the research, teaching and Extension needs of the Florida and national dairy industries.

We are utilizing the capital campaign to partner with people invested in promoting research and innovation in the dairy industry - including pharmaceutical companies, friends of UF, internal funds, funds earmarked by the FL state legislature and commercial partners.

The plans to improve and renovate the dairy include every aspect of the research facility, including intensive research facilities, teaching facilities, new state of the art milking parlor (with robots), crop land improvements, cow comfort and development barns. We propose a dairy farm that will be at the forefront of the industry and be a cornerstone of learning for students and dairy producers alike.

The University and faculty are open to all ideas for return on your contribution, whatever form that may take. A snapshot of the campaign is highlighted on [https://give.ifas.ufl.edu/special-projects/dairy-farm/](https://give.ifas.ufl.edu/special-projects/dairy-farm/)

For more information about supporting the Dairy Farm Renovation Campaign, please contact: Dr. Peter J. Hansen, UF/IFAS Dept. of Animal Sciences, P.O. Box 110910, Gainesville, FL 32611, (352) 392-1981, pjhansen@ufl.edu. Or Christy Chiarelli, UF/IFAS Advancement, P.O. Box 110170, Gainesville, FL 32611, (352) 273-0353, ccw@ufl.edu
Prediction of the Future Florida Mailbox Price: March 2019 – February 2020

Albert De Vries

In the previous issue of this newsletter (Fall 2018, http://dairy.ifas.ufl.edu/dairyupdate/DairyUpdateFall2018.pdf), I wrote about updates to a University of Wisconsin website that predicts future mailbox prices based on the Class III and Class IV futures market. This idea works because these futures market settlement prices are our best estimates of what the announced Class III and Class IV prices are going to be. Class III and IV futures contracts are traded almost daily at the Chicago Mercantile Exchange.

Nevertheless, milk prices are difficult to predict, especially more than a few months into the future. Therefore, predictions tend to regress towards the mean. This means that when the milk price is low today, in the future we expect higher milk prices. When the milk price is high today, in the future we expect lower milk prices. Farther into the future, we tend to expect the historical average.

The table has predicted mailbox prices for Florida for March 2019 to February 2020. For these predictions, historical Class III and IV milk prices from January 2004 to November 2018 were used in a formula to explain the historical mailbox prices for Florida for the same years. Next, Class III and IV futures prices of March 8, 2019, and the formula, were used to predict prices for March 2019 to February 2020.

Mailbox prices reflect the actual price dairy farms receive for their milk, and include all premiums, as well as marketing costs, including hauling. For November 2018, the mailbox price received at the UF Dairy Unit was $18.54/cwt milk. This is calculated as $19.22 gross pay - $0.15 promotion - $0.20 dues – $0.77 hauling = $18.54. The promotion and dues data are found on the settlement sheet, the hauling cost are the sum of the hauling costs on the advance, second advance and settlement sheets. The UF dairy Unit is a member of Southeast Milk, Inc. The Florida mailbox price for November 2018 was $18.87/cwt.

The figure shows the mailbox prices for the UF Dairy Unit and for Florida over time. The mailbox prices are close but in 20 of the 23 months, the UF Dairy Unit’s mailbox price is lower than the Florida mailbox price. The UF Dairy Unit’s mailbox price was on average $0.66/cwt lower in these 23 months. The difference between both mailbox prices depends mostly on the butterfat content at the UF Dairy Unit. The correlation between butterfat and the difference between the UF and Florida mailbox prices is -0.94. This means that the lower the butterfat on the UF Dairy Unit, the greater the difference with the Florida mailbox price typically is. For January 2017 to November 2018, butterfat at the UF Dairy Unit was on average 3.64%.

Forecast of the future Florida Mailbox Prices: March 2019 – February 2020. $/cwt

<table>
<thead>
<tr>
<th>Month</th>
<th>Class III</th>
<th>Class IV</th>
<th>Future FL Mailbox</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar-19</td>
<td>14.97</td>
<td>15.79</td>
<td>19.67</td>
</tr>
<tr>
<td>Apr-19</td>
<td>14.80</td>
<td>15.92</td>
<td>18.63</td>
</tr>
<tr>
<td>May-19</td>
<td>15.03</td>
<td>16.08</td>
<td>18.83</td>
</tr>
<tr>
<td>Jun-19</td>
<td>15.40</td>
<td>16.33</td>
<td>19.15</td>
</tr>
<tr>
<td>Jul-19</td>
<td>15.89</td>
<td>16.49</td>
<td>20.83</td>
</tr>
<tr>
<td>Aug-19</td>
<td>16.15</td>
<td>16.71</td>
<td>21.08</td>
</tr>
<tr>
<td>Nov-19</td>
<td>16.25</td>
<td>16.88</td>
<td>21.42</td>
</tr>
<tr>
<td>Dec-19</td>
<td>16.20</td>
<td>16.75</td>
<td>21.33</td>
</tr>
<tr>
<td>Jan-20</td>
<td>15.85</td>
<td>16.55</td>
<td>20.50</td>
</tr>
<tr>
<td>Feb-20</td>
<td>15.75</td>
<td>16.55</td>
<td>20.45</td>
</tr>
</tbody>
</table>

Based on futures prices of March 8, 2019.

We can correct for variation in butterfat to get a better prediction of future farm mailbox prices. Based on these 23 months of data, the correction for the UF Dairy Unit is 10.7018 – 2.766 * butterfat content (in %). This correction explains 88% of the variation between the UF and Florida mailbox prices. For example, in January 2017, the UF mailbox price was $19.90 and butterfat was 3.64%. Using the correction formula, the correction was $0.63. Adding the $0.63 to the UF
mailbox price gives $20.53. This is very close to the Florida mailbox price of $20.52 for that month. For November 2018, the corrected UF mailbox price is $19.00. We can improve the prediction of the future mailbox price on the farm by providing a forecast of the farm’s future butterfat content.

For more information, contact Albert De Vries at devries@ufl.edu or (352) 294-6983.

### Dairy Extension Agenda

- **Family Day at the Dairy Farm**, the open house at the UF Dairy Unit for the public. March 23, 2019 [https://www.facebook.com/FamilyDayattheDairyFarm](https://www.facebook.com/FamilyDayattheDairyFarm)
- **Southeast Dairy Stewardship Program**, April 2, 2019. Okeechobee, FL. Topics: lameness and euthanasia, including a hooftrim workshop. For more information, including registration, contact Ricardo Chebel, rcchebel@ufl.edu, or Colleen Larson, cclarson@ufl.edu.
- **Corn Silage and Forage Field Day**, June 20, 2019. Location in Georgia to be decided. More info: [https://site.extension.uga.edu/forageteam/upcoming-events/](https://site.extension.uga.edu/forageteam/upcoming-events/)