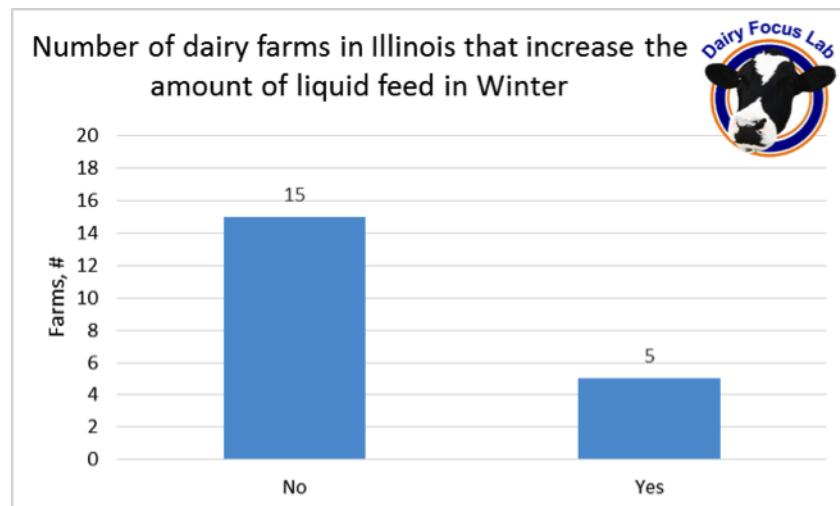




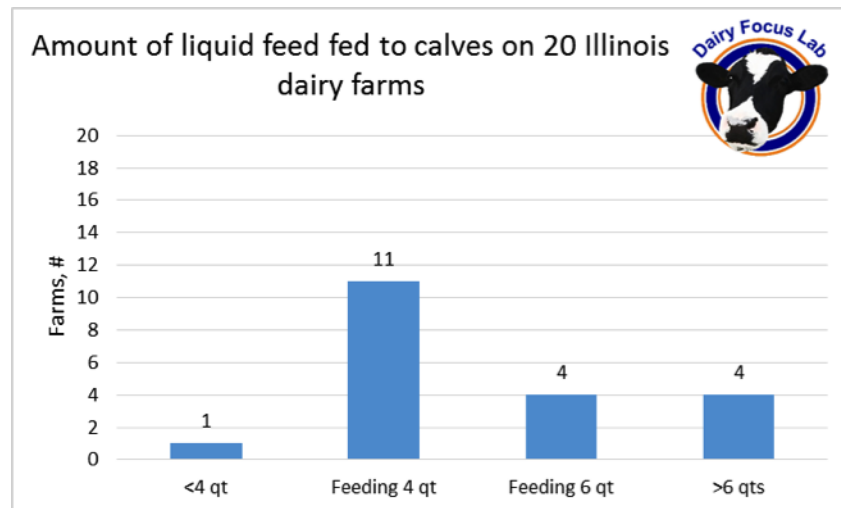
Feeding for calf growth, even in the winter

Winter sure seems to be creeping up fast around here! I am sure I am preaching to the choir, but as the seasons change, it is time to think about all the changes happening back on the farm and what we need to do in order to be prepared for the weather ahead. While we know what might be best practices, sometimes we get stuck in our normal routine and do not make those critical changes when they are needed. For example, it is important to be aware of the thermoneutral zone of calves and what we can do to avoid cold stress and keep our future producers growing throughout the coming cold weather. A calf's thermoneutral zone is between 59 – 77°F, which means that the heat produced by the calf is equal to the amount of heat lost. The lower critical temperature (below 59°F) is influenced by wind, humidity, hair coat (dry vs. wet), sunlight, bedding, rumination, age and size. At temperatures colder than 59°F calves need extra energy in order to maintain body temperature or else they will use their limited body reserves to meet maintenance requirements. Calves require energy and protein to support maintenance and growth. Maintenance includes basic functions of thermal regulation in hot and cold conditions, immune responses, and stress responses. A rule of thumb for energy needs is that for every 1° decrease from 50°F, a 1% increase in energy is required. Consequently, as the temperature decreases we need to provide enough energy to support calves' greater demand for maintenance, and then enough to ensure that they continue to grow.

This past summer the Dairy Focus Team visited 20 farms across Illinois and did a survey and evaluation of all aspects of the farms. We were not really focused on the colder temperature during our visits (the opposite, in fact!) but in our survey we asked if those farms increased the amount of milk or milk replacer that they fed in the winter. In the figure below, you can see the result of our survey. We found that 15 of the 20 farms said they did not change the amount of milk or milk replacer that they fed in the winter.



We also asked how much milk or milk replacer they fed to their calves. The results can be seen in the figure below. For simplicity of the figure, we only included the lowest amount that each farm said that they fed per day. There were three farms that fed four quarts to begin with and increased to either six or eight quarts as the calves got older, but they were included in the figure as four quarts.



Twelve of the farms that we visited fed four quarts of milk or milk replacer per day, and the majority of these farms do not increase the amount they fed during the winter months. As the temperature at these farms decreases the maintenance energy for the calves will increase. The table below shows the number of quarts of whole milk (WM) or milk replacer (MR; 20% CP, 20% fat) required to meet the maintenance requirements of different sized calves as the temperature decreases below the lower critical temperature. For the farms that only feed four quarts a day, the green cells indicate that the number of quarts fed meet the maintenance requirements for that calf at that temperature. If the cells are red, that indicates that the farms that feed only four quarts of milk are failing to meet the maintenance requirements.

Temp °F	59			50			41			32			23			14			5		
	Mcal /d	WM	MR	Mcal /d	WM	MR	Mcal /d	WM	MR	Mcal /d	WM	MR	Mcal /d	WM	MR	Mcal /d	WM	MR	Mcal /d	WM	MR
BW, lbs	# qt req. for maintenance			# qt req. for maintenance			# qt req. for maintenance			# qt req. for maintenance			# qt req. for maintenance			# qt req. for maintenance			# qt req. for maintenance		
66	1.3	1.74	2.17	1.7	2.33	2.90	1.9	2.62	3.26	2.2	2.91	3.62	2.3	3.10	3.86	2.6	3.49	4.34	2.8	3.75	4.67
88	1.7	2.23	2.78	2.0	2.74	3.42	2.3	3.04	3.78	2.5	3.33	4.14	2.7	3.62	4.50	2.9	3.91	4.87	3.1	4.17	5.19
110	1.9	2.55	3.18	2.3	3.13	3.90	2.5	3.42	4.26	2.8	3.71	4.63	3.0	4.00	4.99	3.2	4.29	5.35	3.4	4.59	5.71
132	2.2	2.94	3.66	2.6	3.49	4.34	2.8	3.78	4.71	3.0	4.07	5.07	3.22	4.36	5.43	3.4	4.65	5.79	3.7	4.94	6.15
154	2.4	3.29	4.10	2.9	3.88	4.83	3.1	4.13	5.15	3.3	4.42	5.51	3.5	4.71	5.87	3.7	5.01	6.23	3.9	5.30	6.60

Remember, the table above only addresses the amount of liquid feed in the diet that is required to meet maintenance. It does not address the amount of energy required to support additional growth over the calf's maintenance requirement.

There are several management strategies related to nutrition and housing that can minimize the effect of cold stress on calves. From a nutritional standpoint, calves' maintenance requirements will increase as the temperature decreases beneath the lower critical temperature, so it is important to provide more energy to calves when it gets colder. There are three main nutritional strategies that can be implemented on farm to ensure calves have energy over maintenance so that they continue growing in cold weather. The first is to feed higher amounts of milk or milk replacer. This may require a third feeding in order to successfully feed the higher volume. While this adds extra labor and more time spent with the calves, it will provide the extra energy that the calves need to grow. Another option is to change to a different milk replacer with a higher energy density. Many companies sell "Winter Blends" and these may be a good option for the youngest calves. These younger calves will only be on milk replacer and have no other source of energy. Additionally, younger calves have lower intake than the older calves so it might be an easier management strategy to give them a more energy dense formula instead of feeding a larger volume in order to feed over their maintenance requirements. The third option is to increase starter intake. While this will not work for your youngest calves, it has been shown that calves that were cold stressed ate more starter than calves that were not because their maintenance requirements were greater. If you are trying to increase starter intake, it is important to ensure that the calves have access to fresh water. In colder weather this becomes more challenging, but offering warm water (63 – 82°F) two to three times a day will help promote starter intake for your older calves and help stimulate them to eat over their maintenance requirements.

In addition to the nutritional management of young calves, good housing management practices are especially important in cold weather. Wind (drafts), humidity, hair coat (dry vs. wet), sunlight, and bedding will all influence the thermoneutral zone of a calf. If farms can minimize the effects of these factors, they will be able to reduce maintenance requirements so that the calves can direct energy towards growth. Bedding for calves is very important because they lie down for more than 18 hours a day! Bedding needs to be deep, clean and dry. Straw is the gold standard for calves. It allows them to nest and create stable air pockets free from drafts. If the bedding is deep enough, the calf's feet should not be able to be seen when they are lying down. Additionally, the bedding material should be free of soil, mold, and pathogens to avoid respiratory problems. Bedding should be dry – wet bedding results in a 60% greater heat loss than dry bedding. Clean, dry blankets can help insulate calves under 3 weeks of age. Finally, ventilation is all about moving polluted air outside and evenly distributing fresh air without creating drafts on the calves. Hutches must allow for steady air movement and solar heating while providing protection from winds and drafts.

Overall, there are two main things that should be addressed when preventing cold stress in dairy calves: 1) make sure the calves have adequate nutrition to support their maintenance needs and still be able to grow; and 2) make sure their housing conditions are not increasing their maintenance needs with drafts and wet bedding.

Of the farms that the Dairy Focus Team visited this past summer, only about a quarter of them (25%) increase the amount of milk that they feed to their calves in the winter. If more of these farms would be willing and able to feed more milk or milk replacer to their calves in the winter, then they will have better grown calves that will become more productive members of the herd. Many research studies have shown that for every pound of increased average daily gain in the preweaning period, there is an increase of 1,550 lb of milk in the first lactation. Keep your calves growing and healthy! Stay warm!

– Sarah Morrison and Phil Cardoso, DVM, PhD