Good Growth in Cold Weather: Part 1

When the temperature drops below zero it provides good calf growing conditions. Heat stress is absent. Pathogen survival and growth in freezing conditions is poor. In cold weather conditions calves have a great opportunity to grow without these stresses. And, they are eager to eat every day. Year after year I had my best growth rates in winter weather.

Calves are basically cold weather creatures. The temperature at which they use no energy either to warm or to cool themselves is called "thermoneutral."

For newborns the lower threshold temperature is about 16°C. At one month of age this thermoneutral value drops to between -1°C and 4°C. Thus, as they mature in the weeks up to weaning they become more comfortable with freezing weather.

The Need for Energy

The limiting conditions for wintertime growth are enough water and energy. As she begins to eat concentrate in addition to milk or milk replacer, providing ad lib warm water that goes into the rumen is essential for efficient growth.

Energy is the other major limiting factor. Energy used for keeping the calf alive increases as body size increases and as temperatures go down. In the chart below, the yellow part of the bars at the bottom show the amount of maintenance energy needed for a small calf (36kg on the left) and a large calf (45kg on the right).

Small 36kg calf

The reason for three bars in the chart below for each size calf is to show the influence of temperature on the amount of energy needed for maintenance. Looking at the **small calf** on the left, note how the yellow bar (amount of feed needed for maintenance) goes up as the housing temperature goes down from 16°C to -1°C to -12°C.

The milk replacer used in the calculations has 20 percent protein and 20 percent fat (20-20). Find the solid black line that runs from left to right at 4 litres of milk replacer daily. This line shows the energy available from that feeding rate. Only when we go below freezing does the yellow bar (maintenance needs) go above this solid black line for the 36kg calf. The weather has to get quite cold to put a 36kg calf into a negative energy balance for maintenance. Of course, this assumes that this size calf drinks all 4 litres daily.

But, notice that when we combine both the blue and yellow parts, the tops of all bars are above the 4 litres per day line. If we want these calves to gain 450g to 500g per day, they will have to eat more than the amount provided in 4 litres of 20-20 milk replacer a day. The 450g/day goal is significant because at rates of growth below this calves do not achieve rapid enough immune system maturity to provide protection from infections as their passive immunity declines.

Large 45kg calf

Look at the bars for the **45kg calf** at the right in the chart. As soon as near freezing temperature arrives, she lacks enough energy from the 4 litres a day feeding to even meet maintenance needs.

That means she will start losing weight as she uses energy from her body tissues to keep warm. And, note that this assumes that she is dry and housed in a draft free place.

The amount needed for this larger calf to grow 450g a day in addition to maintenance is shown in the blue part of the three bars on the right. Even at 16°C when fed just 4 litres of 20-20 milk replacer daily this 45kg calf isn't going to gain even close to 200g a day.

In rough winter weather, this is one of the calves that is likely to lose a lot of weight and have pneumonia. These calves respond poorly to antibiotic treatment for respiratory illness because they have no body reserves to combine with the medicine to mount a defense against the bacteria.

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The bars in the graph tell us the plain facts about cold weather feeding and gains.

Feed too little and calves not only will not gain, they will have trouble surviving.

Feed enough and calves will thrive like no other season of the year.

A second paper entitled, "Good Growth in Cold Weather – 2" presents five different ways to feed more energy in cold weather.

* 20-20 milk replacer contains on a dry matter basis 20 percent protein and 20 percent fat and for this graph was mixed at 125g per litre.

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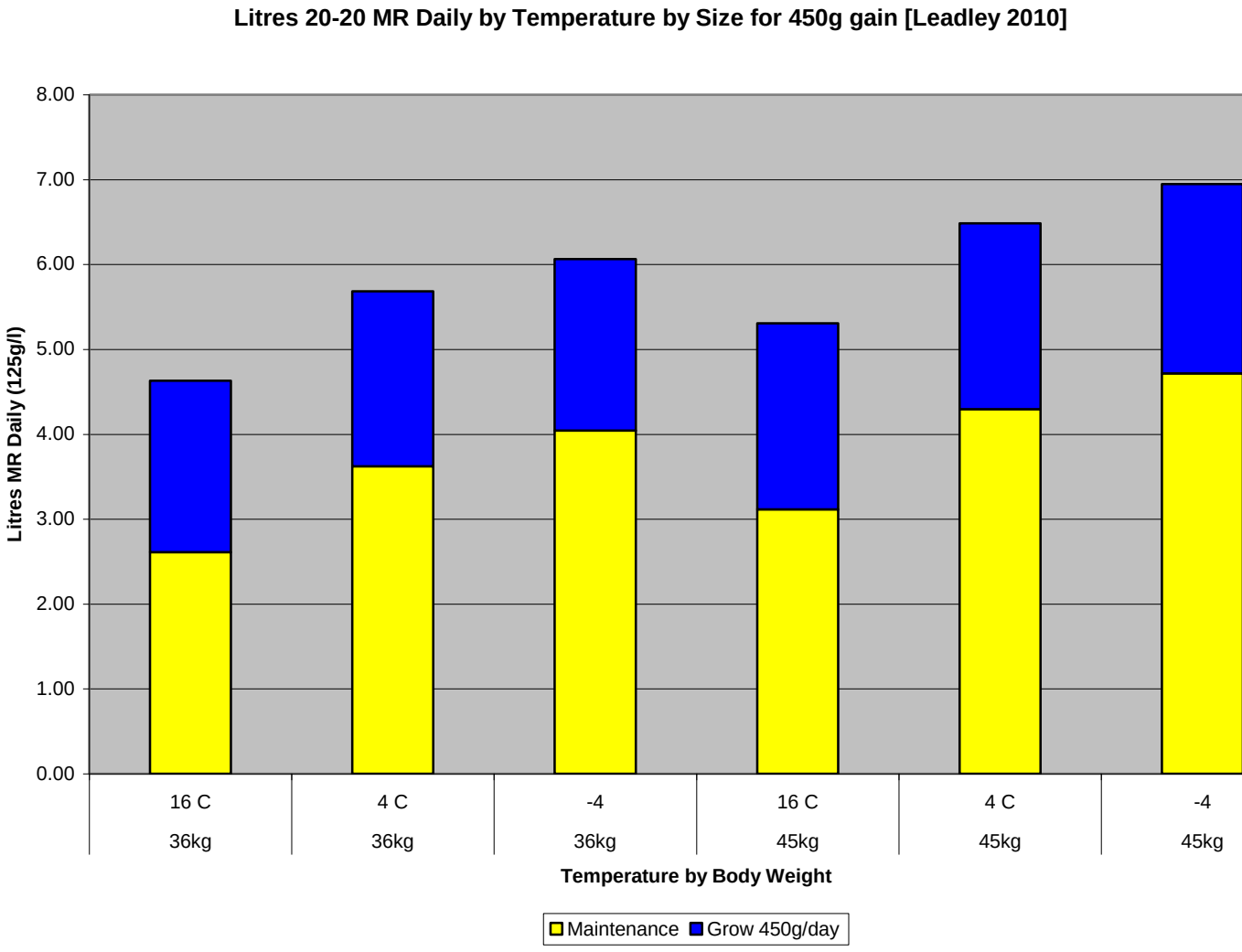

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