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Calf Note #139 – An updated calculator (Version 1.0)

Introduction

As the weather gets cold, there's lots of interest in how much energy that calves should be fed. Well, the 2001 NRC guide "Nutrient Requirements for Dairy Cattle" has a series of calculations intended to guide producers as to the amount

I've put together an Excel spreadsheet (http://www.calfnotes.com/downloads/MEtoFeed.xls) that uses the NRC calculations and expands them to allow users to enter different scenarios regarding composition of CMR, feeding whole milk, starter, etc.

NOTE: This spreadsheet is an updated version of the sheet available in Calf Note #121 (Added CMR feeding in cold weather). That spreadsheet can be found at (http://www.calfnotes.com/downloads/AddedCMR.xls). It is a simple calculator, so if you find the current spreadsheet to confusion, please use the calculator in Calf Note #121.

Please note that although I have checked the results provided by the spreadsheet against data in the NRC guide, I cannot guarantee that these results will be correct under every condition. Please contact me at Calf Notes.com to report discrepancies or errors.

General comments about the spreadsheet

1. The spreadsheet is intended to calculate the amount of CMR powder and liquid (or whole milk) to be fed to calves in cold weather. This is version 1 – I plan to make further improvements as time permits.
2. As outside temperature goes down, the calf's need for nutrients goes up. The rate at which the need goes up depends on whether the calf is less than or greater than 3 weeks of age. Younger calves need more energy because their rumens are not functioning and producing heat of fermentation. Older calves, with functioning rumens, are somewhat more resistant to the effects of cold, but do need extra energy nonetheless.
3. Because of the different calculations in calves <3 weeks or >3 weeks, there are two separate tabs (CMR Only) and (CMR + Starter) to reflect these different calculations. If you're feeding mainly very young calves, use the "CMR Only" calculations. If you have older calves, use the "CMR + Starter" calculations.
4. Within each tab, you should only change the values in BLUE – all other cells are calculations that shouldn't be changed by the user.
5. I provide this spreadsheet on an "as is" basis – the results are based on NRC calculations and must be interpreted properly by the user and nutritionist!

Application of the data

1. Increasing cold means that calves need additional energy – this spreadsheet provides the calculations needed to determine the amount of added CMR or milk to feed.
2. Temperatures are assumed to be "effective ambient temperatures" – that is, the temperature that the calf experiences. This is not necessarily the outside temperature. Calves in hutches bedded with straw may be able to form a "bed" of straw, which would provide insulation and help keep the calves warmer than the outside temperature. It is this effective temperature that is assumed.
3. Rapid changes in amount or concentration of CMR or amount of milk may predispose the calf to scours. It's important, therefore, to make changes to volume or concentration slowly. It's better to change amounts slowly – perhaps only ¼ lb (~110 grams) at a time – to allow the calf to adjust to differences in amount and concentrate available. Using the weekly average temperature may be more useful than changing the amount of powder every day as the temperature changes. Your own results may vary!

How to use the spreadsheet

Below are several steps that will guide you through the spreadsheet calculations.

Step 1. Calculate the ME in milk or milk replacer (CMR). This is the first tab on the spreadsheet that says "ME in CMR". You need to enter the following information:

1. **Moisture**: if you're using whole milk, enter 87.5% (or other, if you have a refractometer). For CMR, this number may or may not be on the CMR label. If not, enter 5%.
2. **Ash:** for whole milk, use 0.79%; for CMR, you'll need to ask your CMR supplier for the actual ash content of the CMR you use on your farm. A "default" average is 7%.
3. **Crude protein:** For whole milk, use 3.2%; for CMR, take the number from the product label. NOTE: the amount of protein in waste milk can vary significantly from the an average of 3.1 to 3.2% that is typically found in whole milk.
4. **Crude fat:** For whole milk, use 3.8% unless you have specific values from a fat test on the milk. If you're using CMR, enter the number from the feed label.
5. **Crude fiber**: For whole milk, enter 0%; for CMR, enter the amount (usually expressed as a maximum) from the feed tag. If the CMR formula does not contain vegetable protein, you can enter 0.05%.

Step 2. Calculate the ME in starter (if you're calculating the ME required for calves over 3 weeks of age). This is the second tab on the spreadsheet that says "ME in Starter". Since this is an early version of this calculator, I have not included a method to calculate the ME of calf starter. You'll need to contact your feed supplier to get this number. An average value (found in the NRC) is 3.28 Mcal/kg of DM. The number you should use (if you don't have a better value) is 2.9 Mcal/kg on an air-dry basis.

Step 3. Go to the tab that says "CMR Only". This is the worksheet to calculate the amount of powder and water (or milk) to be fed to calves less than 3 weeks of age. The NRC assumes that these calves are eating little calf starter; therefore, we don't need to consider the starter quality or amount fed in this worksheet. You need to enter the following information:

1. Calf body weight in kilograms. (Default: 50 kg)

2. Target body weight gain (in kilograms) that you expect from your calves during the milk feeding period. Typically, this number should range from 0.2 to 0.4 kg/day. (Default: 0.2 kg/day)
3. The target % solids in the CMR mix that you'll feed. (Default: 13%)

After you enter these three numbers, you'll see a range of grams of CMR powder to feed, depending on the outside temperature, in cells C8 to H18. The liters of liquid (to make the appropriate % solids) is found in cells I8 to N18.

If you're more comfortable with U.S. measures, these are found in cells C22 to H32 (pounds of powder) and I22 to N32 (quarts of liquid).

NOTE: If you use the calculator for **whole or waste milk**, the amount to feed will be found in cells C8 to H18 (grams) or C22 to H32 (pounds). You don't need to look at the quarts or pounds of liquid sections.

Step 4. Go to the tab that says "CMR + Starter". This is a worksheet similar to "CMR Only", but includes calculations of starter intake. Here, you enter the same information as in Step 3, except that you also need to include a predicted amount of calf starter intake. If you don't measure (or estimate starter intake), you'll need to estimate amounts. Voluntary intake at this age is very difficult to estimate; therefore, it's usually best to obtain an estimate on the farm.

Step 5. The last tab in the spreadsheet is named "Feed Sheet". This allows the user to determine the amount (only in pounds right now!) of powder and liquid for multiple numbers of calves for batch mixing. NOTE: for whole or waste milk, the "pounds of Powder" column provides the correct amounts of milk to feed.

Summary

The spreadsheet allows producers and feed professionals better understand the energy needs of calves in cold weather. Hopefully, this information will allow producers to adjust their feeding programs to minimize the loss of body weight associated with cold weather if insufficient ME is provided to calves.

Written by Dr. Jim Quigley (18 January 2009)
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