Alberta Dairy Management
PREPARED FOR AND DISTRIBUTED BY THE DAIRY EXTENSION ADVISORY GROUP

Monitor Silage Dry Matter Content

Silage dry matter (DM) levels often change by 5-10 percentage points as you progress through your bags, bunk or tower. This is of little importance if you're feeding your silage to appetite, separately from other ration ingredients. But if you are feeding a total mixed ration (TMR) or otherwise mixing ingredients, it will pay you to routinely monitor silage DM content and adjust the amount you mix.

Effect of silage DM on TMR mix

Table 1 shows part of a TMR group feeding sheet from the widely-used Spartan Dairy Ration Evaluator®. The upper part of the sheet shows the amount of each ingredient to feed for a given number of cows in the group. Notice, for example, that for 75 cows the mix contains 2530 lbs of barley silage at 30% dry matter.

The lower part of the sheet allows you to adjust the proportions of wet forages in the mix when their DM contents change. For example, if barley silage dry matter increased to 40%, you would add only 1895 lbs to the mix for 75 cows. The amount of barley silage dry matter you would be using would not change - 30% of 2530 lbs is equal to 40% of 1895 lbs. If you had continued to add the same 2530 lbs of 40% DM silage, the TMR would contain more silage DM than the formulation called for, resulting in a ration than was no longer balanced.

GROUP FEEDING SHEET
ONE GROUP TOTAL MIXED RATION

100 % of Daily Amount Fed in lbs Fed together	%DM	Number of cows in group 67	69	71	73	75
Barley Silage	30.00	2260	2325	2395	2460	2530
Alfalfa Haylage	47.00	2010	2070	2130	2190	2250
Rolled Barley	89.00	760	785	805	830	850
Wheat Millrun	90.00	320	330	340	350	360
Corn Distillers	93.80	435	450	460	475	485
Canola Pellets	91.50	185	190	195	200	210
Beef Tallow	95.00	75	80	80	80	85
TMR Supplement	93.14	215	220	230	235	240
Totals		6260	6450	6635	6820	7010
-Varying %DM of Wet Feeds (<= 80 %DM)-						
Barley Silage	20.00	3390	3490	3590	3695	3795
Barley Silage	25.00	2710	2795	2875	2955	3035
Barley Silage	30.00	2260	2325	2395	2460	2530
Barley Silage	35.00	1935	1995	2055	2110	2170
Barley Silage	40.00	1695	1745	1795	1845	1895
Alfalfa Haylage	37.00	2555	2630	2705	2780	2860
Alfalfa Haylage	42.00	2250	2315	2385	2450	2520
Alfalfa Haylage	47.00	2010	2070	2130	2190	2250
Alfalfa Haylage	52.00	1815	1870	1925	1980	2035
Alfalfa Haylage	57.00	1655	1705	1755	1805	1855

Table 1 : Group feeding sheet from the Spartan Dairy Ration Evaluator®.

To be able to adjust your rations as silage DM levels change, you need a way to routinely measure DM on-farm. Here are two methods that work :

Koster Crop Tester®

The Koster Crop Tester is shown in figure 1 on the next page. It consists of a heater/fan drying unit, a screen-bottomed sample container and a simple spring scale. Silage DM content is determined by filling the sample container with a fixed amount of wet forage, then drying to a constant dry matter percentage. No calculation is required since the scale is calibrated in percentage units for both dry matter and moisture content.

The Prairie Agricultural Machinery Institute rates the performance of the Koster as excellent, with an accuracy within 3% of the value determined by oven drying. In their hands, it took 25 minutes to determine the DM content of hay; 35 minutes for 35% DM silage.

In Alberta, the Koster Crop Tester is available from Lethbridge Dairy Mart : (403)329-6234. The price at the time of writing was $325.

Microwave oven

Forage dry matter levels can also be accurately esimated using an inexpensive ($100 range) microwave oven and a $70-80 electronic postal scale. Mechanical postal scales are generally not accurate enough to indicate gram differences in dry weights.

Here's how it's done :

1 Weigh a microwave-safe container large enough to hold 100-200 grams of wet forage (a paper bag is a good choice). Record the weight of the container (WC) or, if your scale has a *tare* adjustment, set the scale at zero (WC = 0).

2 Weigh 100-200 grams of forage into the container (WW). The larger the sample, the more accurate your determination can be.

3 Place a drinking glass or glass jar containing 8 oz of water in the back corner of the oven. The water serves as a 'ballast' to absorb excess energy and prevent ignition of the sample.

4 Heat the forage sample at 80-90% of maximum power for 5 minutes. Reweigh and record the weight.

5 Repeat step **4** until the weight is less than 5 grams lower than the previous weight.

6 Heat the sample at 30-40% of maximum power for 1 minute. Reweigh and record the weight.

7 Repeat step **6** until the weight is less than 1 gram lower than the previous weight. This is the dry weight (WD).

8 Calculate dry matter (DM) % as follows :

$$DM\% = \frac{WD - WC}{WW - WC} \times 100$$

CAUTION! If your sample does ignite, turn off the oven, unplug the power but don't open the door until the sample has burned completely.

If you want to use your household microwave oven, take it out of the house to dry forages.

Representative samples

These two methods will give you an accurate estimate of the DM content of your silage only if you test a representative sample. If you are feeding from a bag or bunk, take 6 to 10 grab samples from the face of the silage immediately after removing feed for your ration. Depending on weather conditions, silage on the face can lose a significant amout of water to evaporation in a few hours. If your silage is stored in a tower, take your 6-10 grab samples from the belt as the silage unloads. Mix the grab samples in a clean five gallon pail and subsample this mixed material for your dry matter determination.

Moisture probes

The Prairie Agricultural Machinery Institute (PAMI) has tested three electronic moisture probes (PAMI Evaluation Report 700, June 1993). These probes are useful for estimating moisture levels in baled hay, but they are not intended to be used in wetter, unbaled material and are very inaccurate when used for this purpose.

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Figure 1 : Koster crop tester. Photograph courtesy of Damkar Brothers, Calgary.