Calculating Dry Matter

Importance of Dry Matter Content

Dry matter intake (DMI) is defined as the amount of feed a cow consumes after the water has been removed. While many farmers are used to dealing with feed in its 'As Fed' form (as it comes out of the silo, pasture, or bin, with the water in it), cows are consuming nutrients, not pounds of feed, and these nutrients must be calculated as DM, for an accurate estimate of nutrient intake. Comparison of feeds on a DM basis allows feeds to be compared on an equal moisture-free basis (for example, if comparing the nutritive value of grass silage vs. grass hay).

***NOTE:* <u>Forage analysis</u> results will always be more accurate than book values for DM content. If at all possible, use actual DM values, particularly for fresh and ensiled feeds, which can be quite variable. Use of incorrect book values could result in *overestimating pasture intake*, potentially not meeting the 30% minimum DMI requirement. Additionally, using incorrect DM values can result in other problems associated with imbalanced rations, including *decreased milk production* and *impaired cow health*.**

Calculating Dry Matter from 'As Fed' Values

To calculate the amount of DM from the known 'As Fed' amount and DM %:

Example: 20 lb. of hay 'As Fed' which is 90% DM (based on forage analysis) is fed to a cow.

How many lb. of DM did you feed?

20 lb. x 0.90 = 18.0 lb. of DM

NOTE: The DM percentage (in this example, 90%) must be divided by 100 (90 ÷ 100= 0.90)

NOTE: Always remember that the DM value will be *smaller* than the 'As Fed' value because the water content was removed.

Calculating 'As Fed' from DM Values

Example: Your ration calls for feeding 10 lb. DM of hay (with a known 90% DM content) to each cow. How many lb. is that on an 'As Fed' basis?

10 lb. ÷ 0.90 = 11.1 lb. of hay 'As Fed'

NOTE: Always remember that the 'As Fed' value will be *larger* than the DM value because the water content was "added" back in, as it would be weighed on a farm scale.

What if DM is Estimated Incorrectly? (Example)

We have 1000 lb. cows producing 45 lb. of milk that will consume approximately 35 lb. of total DM (from pasture and stored feeds) per cow per day.

We want to feed a very simplistic ration consisting of:

60% DMI from grass silage
10% DMI from grass hay
30% DMI from pasture.

Using book values, we estimate DM of the silage as 28% and the hay as 90% DM.

Silage

DM = 0.60 x 35 lb. total DMI = 21 lb. DMI from silage
'As Fed' = 21 lb. DM ÷ 0.28 = 75 lb. silage 'As Fed'

Hay

DM = 0.10 x 35 lb. total DMI = 3.5 lb. DMI from hay
'As Fed' = 3.5 lb. DM ÷ 0.90 = 3.9 lb. hay 'As Fed'

By difference, pasture DMI = (35 total DMI – 21 lb. DM silage– 3.5 lb. DM hay) = 10.5 lb.DMI from pasture

(10.5 lb. DM from pasture ÷ 35 lb. total DMI) x 100 = 30% total DMI from pasture.

We later obtain a *forage analysis*, where the silage DM is actually 35%.

If we're feeding 75 lb. 'As Fed' silage based on our previous calculations, how many lb. of actual DM are we feeding?

75 lb. x 0.35 = 26.3 lb. of DM *actually* consumed from silage. **(75% of total DMI)**

This means that the cows are obtaining 5.3 lb. more DM from silage (26.3 – 21.0) than we first estimated, or, 5.3 lb. ***less*** pasture DMI than first estimated. What does this do in relation to the pasture intake organic standard?

((Silage DMI + Hay DMI) ÷ Total DMI) x 100 = % DMI from stored feeds

((26.3lb. + 3.5 lb.) ÷ 35 lb.) x 100 = 85% total DMI from stored feeds

100% total DMI - 85% DMI from stored feeds = 15% DMI from pasture

Pasture DMI was *grossly overestimated* using book values, and, based on the proposed organic pasture standards, this farm would not be meeting the minimum 30% pasture DMI guidelines.

Table 1. Average book values for DM% of commonly fed dairy feeds (Adapted from NRC, 2001; Dairy Reference Manual, 1995).

Feed	DM (%)*
Cool-season grass pasture	18-28
Legume pasture	18-28
Silage (grass, corn)	28-40
Hay (grass, legume)	90
Barley, Wheat	89
Corn, dry	88
Corn, high moisture	74
Soybean meal, 48%	90

* Values will vary widely, particularly with ensiled and fresh feeds. Use forage analysis results when possible.