Hay: The Good, the Bad and the Mouldy

Frank Mickan
DEDJTR
Ellinbank Centre

Many farmers feed hay to milking cows and wonder why they do not produce as much milk as they think they should. Why not? We need to look at The Good, the Bad and the Mouldy. The Good: Hay for milking cows must be high in metabolisable energy (ME) and crude protein (CP) and low in neutral detergent fibre (NDF). The Bad: Hay very low in nutritive value may maintain cattle but so often needs a higher quality feed to supplement it for a modicum of production. The Mouldy: Hay often contains mould, sometimes not easily seen, resulting in lost material, reduced quality and can cause health problems.

Table 1 shows the suggested nutritive values for hays required to enable cows to produce high milk yields and put on condition (A) and minimal values to just maintain a dry cow (B). Hays of very high nutritive values would most likely be legumes such as clovers, vetches and vegetative to early flowering lucerne. For pasture hay to be this high in quality, the plants must be leafy, have lush stalks and with minimal seed head at mowing, a rare sight unfortunately. However, this is where silage fits in,.

Table 1. Nutritive values of various hay species needed for high milk production or for dry cow maintenance

HAY Descriptions	Metabolisable Energy ME (MJ ME/kg DM)	Crude Protein CP (%)	Neutral Detergent Fibre NDF (%)
Quality required for high milk production (A)	**Over 10.5**	**Over 16**	**Less than 50**
As quality gets worse from levels at A, animal production decreases to levels at B.		**Do in excel with increasing shading?**	
Minimal quality for dry cow maintenance (B)	**~8**	**~9**	**~65**
AS quality gets worse from levels at B, animals will lose weight more rapidly, eventually dying			

The minimal quality values (Table 1, B) are those necessary to allow the cow to eat enough to meet its energy needs. Low quality feeds are slow to digest and a poor source of nutrients for rumen bugs. This can result in cows not being able to digest enough feed in a day to keep up with energy demands. In these circumstances, body tissue breakdown (weight loss) will occur.

Some hays could be so low in quality that cows could not survive on them if it was the only source of feed for a long enough period of time..

However, many hays of about eight megajoules of metabolisable energy per kilogram dry matter (MJ ME/kg DM) will have crude protein values well below the critical level of about nine per cent crude protein (% CP). Exceptions to this may be severely rain-damaged legumes which may have crude proteins of 10 – 14% CP.

Obviously if the animals are receiving other feeds in the diet such as grain, dry pasture or silage, this will impact on animal production.

Table 2 shows the mean and range of nutritive values of hay samples sent for feed analysis to a Victorian laboratory between July 2013 and June 2014.

Note these are not representative of all hays made and it is highly probable that many samples of very poor hay are never submitted for obvious reasons, but, if analysed, would drag the mean figure down.

Look carefully at the mean of each analysis and for the various species of hay. What do you notice? The ME means do not vary much between species although the legumes ME's are higher, as expected.

However, there is a wide spread between the means of species in their proteins contents so go for these if needing extra protein in the diet unless other sources of protein are cheaper per delivered and fed tonne DM. The NDF mean is reasonable for the legume hays and a smudging higher for the legume dominant mixed hay but much higher for the other species and mixes.

Table 2. Mean and Range (in brackets) of Nutritive Values of Hay Samples: 2013/2014 season

HAY Descriptions	No. of Samples	Metabolisable Energy ME (MJ/kg DM)	Crude Protein CP (%)	Neutral Detergent Fibre NDF (%)
Legume	**91**	**9.4 (7.2 – 11.8)**	**17.2 (4.9 – 25.8)**	**46.6 (31.6 – 67.5)**
Legume/Grass (Legume dominant)	**116**	**9.4 (6.5 – 11.7)**	**14.3 (5.6 – 24.9)**	**50.5 (37.1 – 72.4)**
Grass/Legume (Grass dominant)	**115**	**8.8 (5.1 – 11.3)**	**10.2 (1.8 – 21.0)**	**57.7 (39.9 – 89.1)**
Grass	**515**	**9.1 (5.1 – 14.0)**	**11.1 (1.8 – 23.4)**	**56.8 (24.6 – 83.8)**
Cereal	**1812**	**8.9 (4.0 – 12.4)**	**7.2 (1.2 – 18.7)**	**56.3 (27.5 – 81.4)**
Cereal/Legume	**135**	**9.2 (6.6 – 11.8)**	**11.0 (3.8 – 22.5)**	**54.2 (37.9 – 69.2)**

Source: FEEDTEST 01 July 13 – 30 June 14

PLEASE NOTE: This information is produced using data from FEEDTEST records, derived from samples as submitted by clients. FEEDTEST produces these tables for the information of clients merely to demonstrate the range in quality which can occur for a given type of feed.

Now that you have digested all that, forget it! The means mean nothing. What is crucial is the quality of YOUR hay?

Look at Table 2 again and now, look carefully at the ranges within all the species and ME, CP and NDF columns. Look back at Table 1 and at what is needed for high animal production (Table 1, A) and the bottom line (Table 1, B) to maintain a dry cow.

There are hays in all species with nutritive values which can sustain high animal production BUT, also in each are hays which contain ME's, CP's and NDF's well below animal survival levels. The worst figures almost equate to cardboard. Even if fed ad lib with this, the cattle could never eat enough to get the

amount of ME and CP they need.

I lie! They can and do from their own bodies, resulting in skinny cows, weak or dead calves and poor in-calf rates and/or very late in calf rates.

I hear so often that " I've got to feed it anyway and/or I am only going to feed it to my dry stock which doesn't need high quality hay."

A few things spring to mind here. The hay may be so poor as not to even support maintenance or only very poor production levels. Too late to do anything if fed for too long before it becomes obvious and then too late to do much about it. We also now know the average dry cow should still be receiving about 90 MJ ME/day in the early dry period and rapidly increases to become 120 ME in the 9$^{th.}$ month of pregnancy.

Mouldy hay (Figure 1) is generally less palatable to cattle, usually less nutritious and can cause animal and occasionally human health problems. Unfortunately standard chemical and near-infrared spectroscopy (NIR) measurements of forage quality provide little indication of mouldiness of hay.

Two lots of hay can have almost the same feed test analyses but one lot may be mouldy and the other isn't. Until better measuring techniques are developed for identifying and quantifying mould levels, visual descriptions of mouldiness of hay is the best we currently have.

Research in the USA has shown that even hay baled under the best of conditions may contain one to two percent of total fungal biomass, but in poor hay making weather, total fungal biomass in severely moulded hay may contain up to 10 to 12 per cent.

Moulds live on the energy component (reported as ME) and protein in feeds so, greater the level of mould greater the reduction of nutrients and DM, not to mention animals don't like to eat mouldy hay. All these result in reduced animal production.

Figure 1. Mouldy hay