



# Equi-Analytical Laboratories

## Winter 2015 Newsletter

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[Survey Winners](#)



### Survey Winners

The winner of our **Facebook Survey Drawing** is: Catherine Hall - Please contact [sally.flis@dairyone.com](mailto:sally.flis@dairyone.com) with your mailing information!

The correct answer to the **survey in the Fall Newsletter** was Mixed Mostly Grass, there is just a bit of alfalfa in the hay. Congratulations to [sassypam@me.com](mailto:sassypam@me.com) for picking the correct answer and being randomly drawn to win a prize pack from Equi-Analytical! Please contact [sally.flis@dairyone.com](mailto:sally.flis@dairyone.com) with your mailing information!

[Click here to take our Winter 2015 survey!](#)

### How well do you know your hay?

By: *Sally Flis, Ph.D. - Feed and Crop Support Specialist, Dairy One and Equi-Analytical* - [sally.flis@dairyone.com](mailto:sally.flis@dairyone.com)

In the Fall 2014 newsletter, I covered information about some of the characteristics of grass hays and how to examine hay to make sure that the hay you purchase is really grass hay. After that newsletter, we had some questions about how grass hay compares with other hay types, and what do some of the terms like WSC and ESC mean. So in this newsletter, I will cover a few of these topics.

In the Equi-Analytical Lab, we classify hay into 1 of 4 groups: legume, mixed mostly legume (MML), mixed mostly grass (MMG), and grass hay. As I mentioned in the last newsletter, there are a few of the species that we give a separate category to: Bermudagrass hay and Wheat Hay. The other grass species are not separated into their own categories because of the difficulty of confirming the species, and because most forage grasses are grown in a mixture with 2 or more other species.

In the Fall newsletter, I compared the CP, ADF, NDF, WSC, and ESC for the grass hays. I have included here a description of these nutrient measures, what the horse uses them for, and how harvest management can change them.

#### *Crude Protein (CP)*

Crude protein is actually a measure of the nitrogen in the sample multiplied by 6.25. This is based on the fact that all protein contains about 16% nitrogen. Protein is necessary for the growth and maintenance of the many components of the body. In horses, when protein is consumed, it is broken down into amino acids in the small intestine. Cells then use the amino acids to make proteins to rebuild muscle, hair, and hoof. A horse's protein requirement is based on age and workload. As the maturity of a grass or legume increases, especially past the heading or flower stage, the CP concentration decreases.

#### *Acid Detergent Fiber (ADF)*

Acid detergent fiber is a measure of the least digestible plant components, including cellulose and lignin. These parts are generally not broken down in the guts of horses. The 3 reasons that they are not broken down are because horses are hind-gut fermenters, the material is not in the gut long enough to be broken down by bacteria, and lignin cannot be broken down by digestive bacteria. Any ADF that is broken down in the gut of the horse is used for energy production.

The ADF values are inversely related to digestibility, so forages with low ADF concentrations are usually higher in energy. Hay and pasture ADF values increase as maturity increases.

#### *Neutral Detergent Fiber (NDF)*

Neutral detergent fiber is the measure of all the fiber in the plant: hemicellulose, cellulose, and lignin. The measure of NDF is directly related to the amount of forage that the horse can consume. When hemicellulose is broken down in the gut of the horse, it is used for energy production. As NDF increases, intake decreases. Increased maturity increases NDF. Higher NDF forages are usually lower in energy.

#### *Water Soluble Carbohydrates (WSC)*

These are extracted from the feed with water and can include simple sugars, disaccharides, oligosaccharides, and some polysaccharides depending on the feed. Fructans are included in WSC. The role of fructans in horse diets is not fully understood, and WSC should be considered when looking at sample analysis. Interpreting and using this value depends on the proportions of sugars and fructans in the sample; simple sugars are digested and absorbed in the small intestine and have a significant impact on blood sugar (glycemic response), while fructans are fermented in the large intestine and induce a much smaller response. However, when eaten in large amounts, some fructans have been shown to cause laminitis due to the production of lactic acid and the disruption of the bacterial population in the large intestine.

#### *Ethanol-Soluble Carbohydrates (ESC)*

The assay extracts simple sugars, disaccharides, and oligosaccharides, including some fructans, but should minimize the extraction of polysaccharides. It is a subset of WSC. This fraction is generally used to evaluate one set of carbohydrates in a feed that will induce a high glycemic response.

Lastly, I have included a summary of the 4 major categories of hay that we analyze in the lab. These numbers are useful to get an idea if your hay (or hay you are looking to purchase) is in a normal range.

**Table 1.** Summary of Grass Hay submitted to Dairy One from 5/1/2000 to 4/30/2014

Item	Number of Samples	Average	Normal Average		Standard Deviation (±)
Crude Protein, % DM	72,753	10.8	7.0	14.6	3.8
NDF, % DM	72,276	62.7	55.6	69.8	7.1
ADF, % DM	71,906	39.0	34.2	43.9	4.9
WSC, % DM	54,983	11.6	7.0	16.1	4.6
ESC, % DM	38,196	7.3	4.6	9.9	2.6

**Table 2.** Summary of MMG Hay submitted to Dairy One from 5/1/2000 to 4/30/2014

Item	Number of Samples	Average	Normal Average		Standard Deviation (±)
Crude Protein, % DM	52,650	12.3	8.3	16.2	4.0
NDF, % DM	52,105	60.0	52.4	67.6	7.6
ADF, % DM	51,894	38.5	33.6	43.3	4.8
WSC, % DM	37,139	10.8	6.8	14.8	4.0
ESC, % DM	26,470	7.1	4.6	9.6	2.5

**Table 3.** Summary of MML Hay submitted to Dairy One from 5/1/2000 to 4/30/2014

Item	Number of Samples	Average	Normal Average		Standard Deviation (±)
Crude Protein, % DM	24,914	17.6	14.0	21.1	3.5
NDF, % DM	24,572	48.6	40.9	56.2	7.6
ADF, % DM	24,543	35.1	30.3	39.9	4.8
WSC, % DM	15,912	9.1	6.6	11.5	2.5
ESC, % DM	9,330	6.8	4.9	8.7	1.9

**Table 4.** Summary of Legume Hay submitted to Dairy One from 5/1/2000 to 4/30/2014

Item	Number of Samples	Average	Normal Average		Standard Deviation (±)
Crude Protein, % DM	188,192	21.3	18.6	23.9	2.7
NDF, % DM	187,550	38.8	33.7	44.0	5.2
ADF, % DM	187,404	30.6	26.7	34.5	3.9
WSC, % DM	124,625	9.3	7.5	11.2	1.9
ESC, % DM	83,472	7.2	5.7	8.7	1.5

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