Forage Analysis Report - Timothy

2024 Timothy Hay

Contact

[redacted]

Analysis by Forageplus Ltd

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Sample Details

Lab Reference:	30558490
Sample Type:	Nutritional Hay - Timothy
Sample Received:	20/01/2025
Order Number:	115056

Dietary Nutritional Report (values are based on 100% dry matter basis)

Nutritional Analysis

Dry Matter	Analysis	Units
Dry Matter	84.40	%

Digestible Energy	Mcal/kg	MJ/kg
Digestible Energy	2.39	10.01

Nutritional Analysis	%	g/kg
Crude Protein	4.90	49.0
Estimated Lysine	0.17	1.7
Acid Detergent Fibre (ADF)	33.0	330.0
Neutral Detergent Fibre (NDF)	53.7	537.0
Water Soluble carbohydrates (WSC)	23.7	237.0
Ethanol Soluble Carbohydrates (ESC)	7.60	76.0
Starch	1.30	13.0
Non-Fibre Carbohydrates (NFC)	32.2	322.0

Nitrate Analysis		Units
%Nitrate (below)	Not Tested	%
PPM Nitrate-Nitrogen (below)	Not Tested	ppm

Nitrogen / Sulphur Ratio
Nitrogen / Sulphur Ratio

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Please find attached your forage analysis reports which detail the nutritional levels in your hay.

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Timothy

This hay has a **combined ESC and starch of 8.9%**. When we take the dry matter into account (moisture content) then this figure becomes **7.5%.**

This would be considered suitable for a laminitis prone horse, however, if you had a very sensitive horse then you may want to soak this hay [redacted] for approximately 15 minutes, to lower this level towards the 7% mark.

	Dry Matter %	As Fed %
ESC %	7.6%	6.4%
Starch %	1.3%	1.1%
Combined %	8.9%	7.5%

This hay has a protein level of **4.9%**. This would be considered very low and additional protein supplementation would be crucial.

You can use the below table for reference, which is based on the **minimum requirements** for an average 500kg horse eating this hay:

Work level/ Category	DE (MJ)	Forage (kg)	Minimum Protein (g)	Protein Supplied (g)
Optimal Weight Loss	63.3	7.5	630	310.2
Maintenance Level	69.9	8.3	630	343.3
Light Level	83.7	9.9	699	409.4
Moderate Level	97.6	11.6	768	479.7
Heavy Level	111.4	13.2	862	545.9

Dry Matter: equals (100% – Moisture) and represents everything in the sample other than water including protein, fibre, fat, minerals, etc. Animals consume feeds to meet their dry matter needs, because it is the dry matter that contains all the nutrients. Therefore, animals will have to consume more of a wetter feed to receive the same amount of dry matter as they would from a drier feed. For example, if an animal consumes 10 kg of hay at 90% dry matter, it consumes 9 kg of dry matter (10 x .90). If pasture at 20% dry matter is substituted for the hay, the animal would have to consume 45 kg. of pasture (9/.20) to receive the same amount of dry matter.

Hay has the highest dry matter content of the forage fed to horses and ponies. Haylage can have a dry matter content some 30% lower than hay so a greater weight of haylage often needs to be fed in comparison to hay because there is more water in haylage. Thus, it is very important to know the dry matter content of a feed to establish feeding rates and ensure that livestock receive the proper amount of feed to meet their daily needs.

As Sampled Basis: nutrient results for a sample in its natural state including the water. Also known as 'as fed' or 'as received'. This is equivalent to what your horse will receive in one mouthful of food and were the numbers reported on your analysis report. As fed figures will always report with a lower amount of nutrient than dry matter figures.

Digestible Energy This is a measure of the energy available in your forage. In the UK this is measured in MJ/kg. A digestible energy content of around 8MJ/kg is average in the UK. Lower than this level and you will have to feed more forage to maintain weight, higher than this level and you will need to feed less.

Crude Protein –This is a measure of the total protein in the sample including true protein and nonprotein nitrogen. A protein level of around 8% is adequate; however, protein levels in the UK are usually much lower than this. Where your report shows a poor protein level, below 8%, you should check the amount of forage fed is covering the protein requirements of your horse. The report does not inform about the individual amino acids that make up the protein in your hay. We have included a nitrogen/sulphur ratio which is an indication of protein quality; however, this will only be calculated if you have also carried out a full mineral analysis of the forage as well as a nutritional analysis. When the ratio of nitrogen /sulphur is above 10 then this indicates poor protein quality, so supplementation with methionine and other essential amino acids is recommended along with feeding other high protein sources such as copra, linseed or alfalfa. Many forages in the UK report above this 10:1 figure so many horses need supplementing with extra individual amino acids.

Lysine – this is an estimated level and in the UK the average is usually lower than needed for maintenance of horses even on adlib forage. An average 500 kg horse needs around 25 grams of lysine for maintenance, if working this level will need to be higher. For this reason, we recommend

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10 grams of supplementation per day for an adult horse. Performance horses will need at least 20 grams extra, pregnant, lactating mares and young horses 30 grams extra.

Acid Detergent Fibre and Neutral Detergent Fibre - These figures measure fibres (there are 5 types). The higher the ADF and NDF values are, the more lignin the hay contains and the more of this type of hay your horse will have to eat to maintain their weight. The ideal ADF value is less than 35% and the ideal NDF value is less than 45%. However, most hays have values that are 10% higher than these ideal levels. Levels 10% or more than the ideal level is not a problem but to compensate your horse will need to consume more of this type of hay.

Water-Soluble Carbohydrates (WSC) - This is a measure of the simple sugar *and* fructan levels in the forage. It has been thought in the past that fructan can contribute to laminitis; however, the amount of fructan contained in forage has not been shown to be a problem so it is now thought the levels of simple sugar and starch are the values to be aware of when trying to control laminitis in horses.

Ethanol-Soluble Carbohydrates (ESC) - This is a subset of WSC *without* the fructan fraction and includes primarily monosaccharides and disaccharides. These simple sugars are digested in the foregut and raise insulin levels. Too much can lead to laminitis because of elevated blood insulin.

The ESC measure gives you a much better idea of the simple sugar level. This combined with the starch level is the figure that you should be interested in when controlling laminitis in horses. Dr Kellon and the ECIR Crushing's Group have found the ideal level for managing Laminitic horses is an ESC and Starch combination of below 10%. Rinsing hay will reduce the sugar but you need to rinse in a specific way that is like washing detergent out of clothes.

Starch - This compound is normally digested in the foregut into individual glucose (blood sugar) molecules; therefore, it has a strong elevating effect on blood insulin levels. You cannot lower starch levels by soaking or rinsing hay or haylage. It is therefore wise to feed hay or haylage which is low in starch. As stated above it is wise to feed hay to IR/Laminitic horses which has a *combined ESC and Starch amount of less than 10%*. Some horses will do better on an even lower percentage so experimenting with rinsing hay below the 10% level is also sometimes necessary.

Non-Fiber Carbohydrates (NFC)
This is a mathematical estimate of non-cell wall (non-fiber) carbohydrates consisting of starch, sugar, pectin and fermentation acids that can serve as energy sources for the animal. NFC is calculated as 100% – (CP% + NDF% + Fat% +Ash%).

Nitrates - Excessive intake of nitrates decreases the blood's oxygen carrying ability, which causes anxiety, increased respiration rate, and breathing difficulty. Severe cases result in loss of

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coordination, muscle twitching and death. Less severe cases can be evidenced by more vague symptoms including depression, inappetence and tripping.

Excess levels of nitrates can occur where more fertilizer nitrogen is applied than needed or soil sulphur supplies allow and from drought stress on plants. A higher-than-expected protein level in grass is sometimes the first indication we have that hay might have high nitrate levels.

A higher-than-expected protein level in the UK would be over 12% but another indication of excessive nitrates is the nitrogen to sulphur ratio which should be no more than 10:1. The nitrogen sulphur ratio is calculated from the protein level and sulphur level of the forage. A ratio above 10:1 indicates that the quality of the protein is poor and that high levels are incompletely formed and perhaps high in nitrates.

The maximum acceptable nitrate level in forage for all adult horses is 0.5% (5000ppm). Higher levels may be "diluted" with very low nitrate hay to bring the nitrate levels for total forage fed below 0.5% (5000ppm). Hay for breeding mares and growing horses should not exceed 0.20% (2000ppm) nitrate.

The nitrate test should be requested for:

- any grass with protein >12%
- mixed hay with protein levels above 12% and calcium <0.9% • "known" nitrate accumulators (small grain hays)
- any hay grown in drought conditions.
- any hay that may be fed to pregnant mares.

Nitrogen/Sulphur Ratio – See Crude Protein section on page 2, this will only be reported if you have also carried out a full mineral analysis of your forage. Ideal ratio is no greater than 10:1.

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