



Limerick Park Hay Test Results for 2018-2019 Season

| Hay Samples for 2018-2019 | WSC% | Starch % | NSC% | ESC% | Fructan=(WSC%-ESC%) | ESC% + Starch% |
|---------------------------|------|----------|------|------|---------------------|----------------|
| Bob's Paddock Waterloo | 11.4 | 1 | 12.4 | 5.6 | 5.8 | 6.6 |
| Gelmi Paddock Brunswick | 11.8 | 0.8 | 12.6 | 6.2 | 5.6 | 7.0 |
| Melville Road Paddock | 16.3 | 0.8 | 17.1 | 6.0 | 10.3 | 6.8 |

| Hay Samples for 2018-2019 | DE Mcal/kg | ADF % | NDF % | Crude Protein% |
|---------------------------|------------|-------|-------|----------------|
| Bob's Paddock Waterloo | 1.94 | 33.5 | 51.1 | 10.8 |
| Gelmi Paddock Brunswick | 1.96 | 34.5 | 50.2 | 11.9 |
| Melville Road Paddock | 1.91 | 34.3 | 53.9 | 8.2 |

Common terms and what they mean for your horse from hay test results:

Moisture %- the optimum horse hay moisture ranges from 10 to 15%.

- Hay under 10% may be too dry, leading to brittle and dusty hay.
- Hays above 16% moisture have a high probability of moulding.
- Hays over 25% moisture poses the threat of severe heat damage and serves as a potential fire hazard.
- Ideal - Horse hay should be 10-15% moisture.

Dry Matter % (DM) - is defined as the non- moisture portion of a feed ingredient or diet.

- The sum of moisture and dry matter content of a feed on a percent of total will always equal 100.
- Dry matter contains the essential nutrients within a given feed ingredient or forage. Feeds, and thereby diets, vary widely in their moisture content.
- Pastures have moisture content between 75 and 90% (10-25% DM).
- Dried feeds usually have less than 15% moisture (>85% DM).

Crude Protein % (CP) - a measure of the protein concentration of the hay.

- CP can range from 8 to 14% in grass hays (depending on nitrogen fertilization), 14 to 17% in mixed hays, and 15 to >20% in legume hays.



- Since most horses require approximately 10% crude protein, CP not likely to be limiting, except in lactating mares and foals or performance horses, which would require higher levels.
- Good quality horse hay contains approx. 10 to 20% crude protein, with grass hays at the lower end of the range and legume hays at the upper end.
- Poor quality grass hay may contain 6% crude protein or less. Use for Donkey Hay

Acid Detergent Fibre % (ADF) - ADF is composed of cellulose, lignin & other poorly digested components.

- Lower the ADF value, more digestible the nutrients in the hay.
- Values of 30 to 35% are good for horses & values over 45% are of little nutritional value.
- Acid Detergent Fibre (ADF) - ADF is a sub-fraction of NDF, consisting primarily of lignin and cellulose.
- The ADF represents the portion of the hay that doesn't dissolve in an acid detergent solution.
- It has a strong (negative) relationship with total forage digestibility.
- As ADF increases, forage quality declines.

Neutral Detergent Fibre % (NDF) - NDF is a measurement of the insoluble fibre.

- In theory, higher the NDF, the less a horse will eat.
- NDF levels around 40 and 50 are good
- Those over 65% are likely not be consumed by most horses.
- Neutral Detergent Fibre consists of the slowly digested fibrous portion of the plant: hemicellulose, cellulose and lignin, which is most of the cell wall material.
- As the total dietary NDF level increases, *voluntary feed intake* tends to decline.
- However, if NDF is too low, stomach upsets e.g., acidosis may occur.
- NDF is being increasingly used by nutritionists for ration balancing.

Digestible energy (DE) - Measure of the digestible energy in the hay & used to balance the energy portion of the equine diet.

- DE is the energy in forage that is not lost in faeces.
- Most hays range from 1.67 to 2.07 Mcal/kg of DE.
- Can be expressed as Mcal/ kg DM or MJ/kg DM.

Non Structural Carbohydrates % (NSC): an analysis of the non-structural carbohydrates (starches and sugars) in the forage.

- Fibre contributes to a plant's structure; non-structural carbohydrates (NSC%) do not.
- Sugars, starches, and fructans make up NSC.
- NSC% is generally not listed as such on hay analysis reports or feed labels.
- NSC% was used as the measurement of sugars in a sample.

Equine Diets Based on Science



- Now used to describe the carbohydrate content of the plant.
- Whereas, water-soluble carbohydrates (WSC), starch, and ethanol-soluble carbohydrates (ESC) are.
- $WSC\% + starch\% = NSC\%$.

Water Soluble Carbohydrates % (WSC) - Extracted from the feed using water.

- Include simple sugars, disaccharides, oligosaccharides, & some polysaccharides, subject to the type of feed.
- Please note: Fructans are included in WSC%.
 - The use of fructans in horse diets is as yet not fully understood.
 - Research is under way in the UK & USA so we should have a clearer idea what is happening the equine biome in the next few years as the research is published.
- Understanding WSC% depends on the proportions of sugars & fructans in the sample
- Simple sugars are digested & absorbed in the small intestine & have a significant impact on blood sugar (glycaemic response)
 - Whilst fructans in the sample go on to ferment in the large intestine & induce a much smaller response.
 - But some fructans, when eaten in large amounts have been known to cause metabolic issues to some horses due to the disruption of the bacterial population in the large intestine.

Ethanol Soluble Carbohydrates % (ESC) - carbohydrates solubilized and extracted in 80% ethanol.

- Includes; primarily monosaccharides (glucose & fructose) & disaccharide.
- Please note some forage labs in Australia will refer to ESC simply as "Sugars".
- Horses with PPID, laminitis & metabolic issues ESC% + Starch% are important
- For the horse with PPID/IR/PSSM/EMS/laminitis it is the simple sugars (ESC extracted through feed analysis) and starch levels which we are concerned with.
- These are the components which can cause a blood sugar rise.
- If not enough hay can be purchased at one time to justify feed analysis, or the ESC + starches are above 10% the hay can be soaked in water to lower the sugar content before feeding.
- Sugar & starch levels may decrease by up to 30-50%, based on studies.
- Soaking hay for 30 (hot water) to 60 minutes (cold water) to remove some of the sugars.
- Then drain the water.
- Do not pour it into your horse's water supply since it is concentrated in sugars.

Starch% - is starch. Digested to glucose.

- Defined as an alpha-linked glucose carbohydrate
- Preferentially starch is digested in the small intestine of the horse.
 - If starch escapes digestion in the small intestine & passes through to the hind gut, it will be fermented.



- This can lead to lactic acid production & negative problems associated with it.

Comparison Chart for Hay from WA to Limerick Park Hay

| Av. Sugars & Starches WA Hay Varieties | Limerick Park Hay | Meadow Hay | Rhodes Hay | Lucerne Hay | Oaten Hay | Wheaten Hay |
|---|--------------------------|-------------------|-------------------|--------------------|------------------|--------------------|
| WSC% | 13.16 | 16.3 | 8.75 | 8.7 | 26.4 | 20.8 |
| ESC% | 5.93 | 10.6 | 4.85 | 5.1 | 15.2 | 12.9 |
| Starch% | 0.86 | 0.4 | 1.8 | 1 | 4.03 | 8 |
| NSC% (WSC% + Starch%) | 14.03 | 16.7 | 10.55 | 9.7 | 30.48 | 28.8 |
| ESC % + Starch % | 6.8 | 11 | 6.65 | 6.1 | 19.23 | 20.9 |
| Fructans (WSC% - ESC %) | 7.23 | 5.7 | 3.9 | 3.6 | 11.2 | 7.9 |