

Example



Biomentor Foundation

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Advice Example

The normal values that are given, are our interpretation of all the results that we have seen in relation to (subject) judgements. So there is no absolute standard for 'good' and 'bad' roughage

Visual

Texture good, nice smell, fibre, color light green – yellow, herbs, seed heads, flower heads

Moisture

Water %

DM, Dry Matter

100% - water %

Dry matter - represents everything in the sample other than water including protein, fiber, fat, minerals, etc.. Animals consume feeds to meet their dry matter needs, because it is the dry matter that contains all of 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.

Too high dry matter: brittle, stinky, dust, falls through the rake

Too low dry matter: sensitive for mould and heating

The DM content makes food stuffs comparable

Digestible Energy (DE), the energy that is apparently digested and absorbed by the animal. It is determined by subtracting the energy contained in the feces from the gross energy. In horses, the fecal energy loss is typically 35 - 40% of the gross energy. The DE is used to balance the energy portion of the equine diet. Energy requirements are expressed as megacalories (Mcal) in the nutrient requirement tables.

A DE figure of 2,13 is good

Crude Protein (CP) - the total protein in the sample including true protein and non-protein nitrogen. Proteins are organic compounds composed of amino acids. They are a major component of vital organs, tissue, muscle, hair, skin, milk and enzymes. Protein is required on a daily basis for maintenance, lactation, growth and reproduction.

We also test on nitrates, to get an impression of the NPN component of the crude protein.

Often we see a high or very high CP. This leads to taxing situations for the body. The proteins have to be broken down to ureum by the



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liver. In the stable this ureum is converted by bacteria to ammonia (this was you smell and makes your eyes sting)

Our value: < 80

The CP content is nice (73)

Lysin

This is a indispensable amino acid, for growth and maintaining body condition, among other things.

Lysin is a little bit short. In order to create a buffer for unfavourable circumstances we advise to add 3 g daily

Acid Detergent Fiber (ADF) - a measure of cellulose and lignin.

Cellulose varies in digestibility and is negatively influenced by the lignin content. As lignin content increases, digestibility of the cellulose decreases.

But, it also means that roughage with a higher ADF will release sugars at a slower rate. The optimum level is between 380 and 420. If the level of ADF is too high, overall digestibility will be too low ('straw like')

With 377 a bit low, but not serious

Lignin - indigestible plant component. As lignin content increases, digestibility of cellulose decreases thereby lowering the amount of energy potentially available to the animal.

We think a value between 48 and 52 is appropriate.

With 39 low, but not a problem

Neutral Detergent Fiber (NDF) - a measure of hemicellulose, cellulose and lignin representing the fibrous bulk of the forage. These three components are classified as cell wall or structural carbohydrates. They give the plant rigidity enabling it to support itself as it grows, much like the skeleton in animals.

We like to see values between 580 and 620.

Met 626 high 'normal'

The fibrous content of silages is most of the times low, because fermentative micro-organisms have digested them partly.



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Water Soluble Carbohydrates (WSC) - carbohydrates solubilized and extracted in water. Includes monosaccharides, disaccharides and some polysaccharides (mainly fructan). Fructan is a major storage carbohydrate in grasses.

With 155 high

Ethanol Soluble Carbohydrates (ESC) - carbohydrates solubilized and extracted in 80% ethanol. Includes primarily monosaccharides and disaccharides. These simple sugars are accountable for insulin resistance and related problems like laminitis. Maximum level 100, dependent on type horse and exercise

ESC plus starch should be under 10% for sugar sensitive horses.

With 73 low

Fructan

The fructan content = WSC-ESC. Storage carbohydrate of production grasses. These sugars are not digested by pancreatic enzymes, but fermented by micro-organisms in the hind gut. Too many fructan would be responsible for acidification and toxin release in the hind gut, causing laminitis. However this causative relation is under discussion, because the scientific data were derived from very artificial practices and circumstances ('not grass' fructan, enormous quantities by nose tubing etc.), For the moment we like to see the fructan content low

A fructan content of 82 is considered high.

Starch - a polysaccharide found primarily in the grain or seed and/or root portions of plants. In natural grasses starch is the storage carbohydrate, not fructan. Starches in grasses cannot be compared with cereals like corn and wheat. Because of the fibre package the starch in grass is digested/fermented slower.

Low starch comes from vegetative plants in roughage (no seeds yet) or very generative (old) grass. Seeds fall out through wind or handling.

Moderate starch content in this hay (19)

The Sugar Index (S.I.) – The damage caused by the sugars is dependent on the rate at which they are released. If we assume that the total fiber content is approximately 600 g per kg DM (NDF) and of this 400 g is poorly digestible / fermentable (ADF), then in this case one third of the sugars are released quickly and the rest slowly. We will express this in



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the Sugar Index (NDF - ADF / NDF) x WSC. For now, we keep a target <55

The S.I. is a little bit too high 62

Fat - typically determined by ether extraction. In addition to fat, ether extraction may solubilize plant pigments, esters and aldehydes. This is why the measurement is called crude fat. A lower fat content (< 20) will indicate riper forage.

Crude fat is low normal (21)

Ash - a measure of the total mineral content. Samples are weighed and incinerated at 600°C for two hours. This burns off all of the organic material (protein, fiber, fat, etc.) leaving behind the minerals. Contamination with dirt also increase ash content, especially the iron will be part of this.

The very high potassium content will also increase ashes.
We want a value of < 60

Ash content of 60 is good

Calcium (Ca), Phosphor (P), Magnesium (Mg) and Potassium (K) are important for all sorts of bodily functions. But it is of utmost importance that their presence is in relationship with each other. In Dutch soils we find often high phosphor and potassium and low magnesium. This is caused by one sided application with slurry and fertilizers. This reflects the values in the plant and discloses itself in disease or health in the animal that eats that forage.

The optimum relation that we work with is Ca:P:Mg is 2:1:1, but because of the high potassium we will calculate extra magnesium.

Calcium very good, phosphorus a bit high, magnesium relative good, potassium good and sodium low normal. We need some extra calcium and therefore magnesium. Also extra salt needed.

Trace elements

Iron (Fe), zinc (Zn), copper (Cu), manganese (Mn), and molybdenum (Mo) can be determined. Again: exhaustion and acidification of the soil has led to severe shortages or poor relationships among trace elements in forages.

Iron and manganese are often in excess, while copper and zinc are short.

Contamination of rivers, canals and springs can also contribute to the imbalance of trace elements, especially high iron (here in Holland).



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Fe, Zn, Cu are reasonably good, manganese is high. Extra copper and Zinc is needed to balance Mn

Selene and Vit E

Important ! Due to the high cost Selenium is not included in the analysis. Often the soils and grasses have a very low content of selenium. To be sure have your vet test blood on selenium.

When feeding roughage, it is advisable to give 200 IU Vit E/100 kg horse. For a 500 kg horse is 1000 IU. IR/Cushing horses need 2000 IU. Forages are often short in Vit E due to oxidation during curing and storage.

Vitamin A

Shortages not often occur, but are still common in old / bleached hay.

Vitamin D

Shortages are not common. During sun radiation after cutting the amount of usable vitamin D will rise.