

Forage Analysis Report



Intelligent Horse Nutrition

SAMPLE / FIELD REFERENCE

Welsh Meadow Hay - 2026

Contact

Forageplus

10 Broncoed Business Park
Wrexham Road
Mold
CH7 1HP

Sample Details

Sample Name: Welsh Meadow Hay - 2026
Lab Reference: 4404171 – UKAS Accredited
Sample Type: Mineral & Nutritional Hay
Sample Received: 10/08/2026
Order Number: 142994

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

Dry Matter	Analysis	Units
Dry Matter	87.8	%
Major Minerals	Analysis	Units
Phosphorus	0.21	%
Magnesium	0.12	%
Calcium	0.46	%
Sodium	0.04	%
Potassium	1.29	%
Chloride	0.45	%
Trace Minerals	Analysis	Units
Manganese	60.30	mg/kg
Copper	3.10	mg/kg
Zinc	14.40	mg/kg
Selenium	0.07	mg/kg
Cobalt	0.06	mg/kg
Iodine	0.23	mg/kg
Antagonists	Analysis	Units
Lead	0.10	mg/kg
Iron	56.00	mg/kg
Aluminium	19.00	mg/kg
Molybdenum	2.07	mg/kg
Sulphur	0.15	%
Soil Contamination Index	Analysis	
SCI	4.00	

Please note we cannot give you high or low figures for each individual mineral. This is because a complicated relationship exists between certain minerals where an excess of one will block another. Please refer to the mineral charts to understand the imbalances in your forage, where figures are based on 10 kg of forage fed.

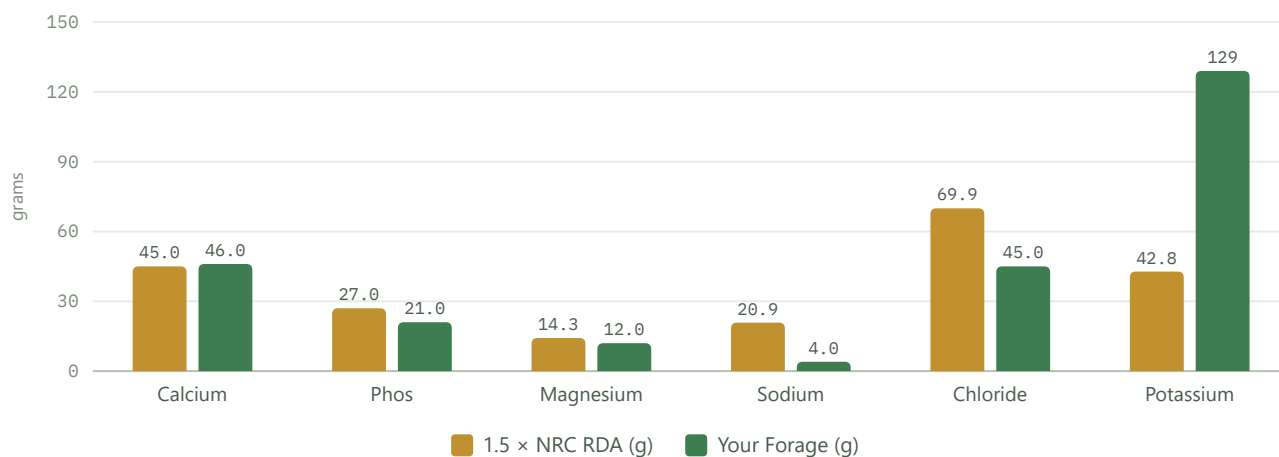
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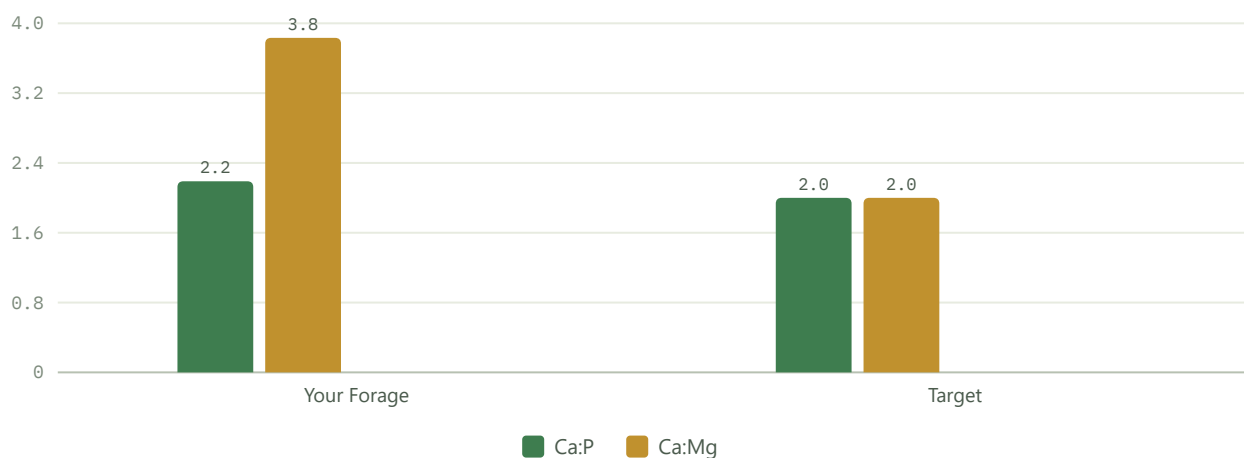
Major Mineral Charts (charts are based on 10kg of forage fed)

Major Minerals in Your Forage



	Calcium	Phos	Magnesium	Sodium	Chloride	Potassium
1.5 x NRC RDA (g)	45.0	27.0	14.3	20.9	69.9	42.8
Your Forage (g)	46.0	21.0	12.0	4.0	45.0	129

Major Mineral Ratios

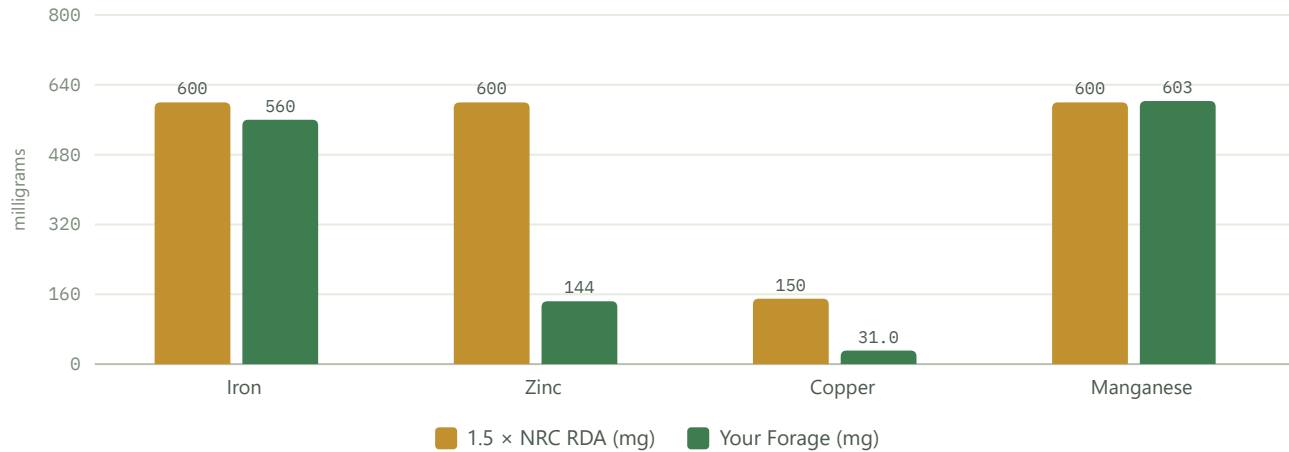


	Your Forage	Target
Ca:P	2.2	2.0
Ca:Mg	3.8	2.0

Target mineral ratios for healthy adult horses are shown above. For a young, laminitic, performance, pregnant or lactating horse, ratios of calcium with magnesium and phosphorus would need to be lower. The target Ca:P ratio is 1.5–2.0 parts Ca to 1 part P, though horses can tolerate as high as 6:1. The target Ca:Mg ratio is 1.5–2.0 parts Ca to 1 part Mg. The Na:K target is 3–10 parts K to 1 part Na, and K:Na should be no higher than 10:1. Feeding the appropriate Forageplus balancer or a bespoke feed plan would achieve improved ratios for maintenance and support of health.

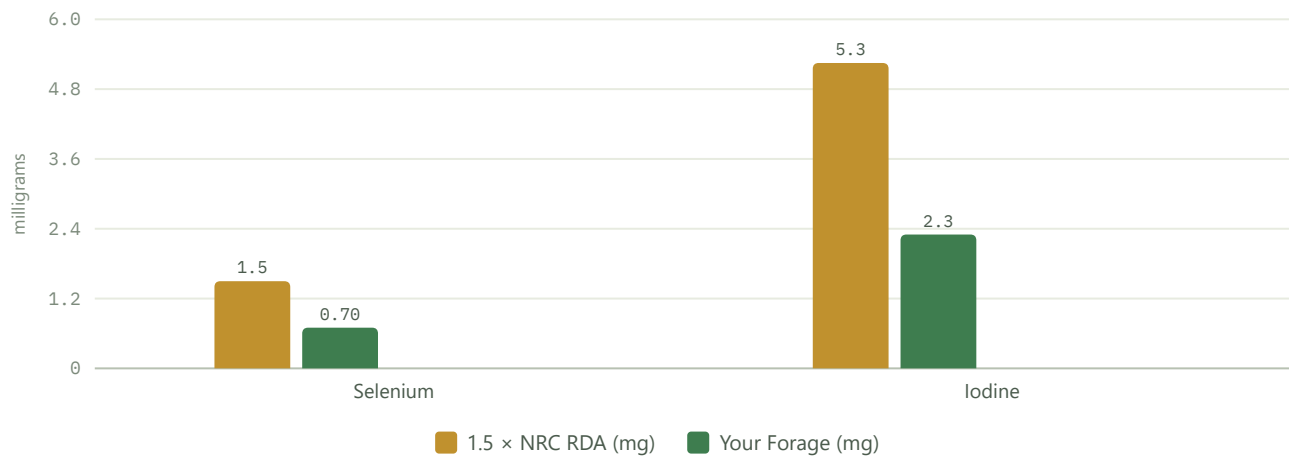
Trace Mineral Charts

Trace Minerals in Your Forage



	Iron	Zinc	Copper	Manganese
1.5 x NRC RDA (mg)	600	600	150	600
Your Forage (mg)	560	144	31.0	603

Trace Minerals in Your Forage (selenium & iodine)



	Selenium	Iodine
1.5 x NRC RDA (mg)	1.5	5.3
Your Forage (mg)	0.70	2.3

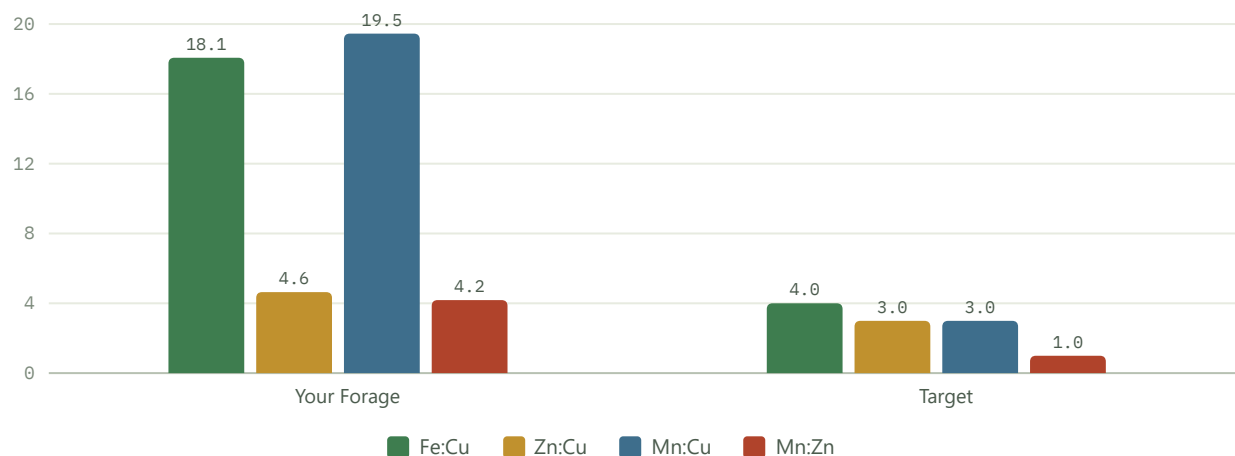
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Trace Mineral Ratios

Trace Mineral Ratios



	Your Forage	Target
Fe:Cu	18.1	4.0
Zn:Cu	4.6	3.0
Mn:Cu	19.5	3.0
Mn:Zn	4.2	1.0

Additional Notes

Levels of selenium are commonly low in forage. The level in your forage is **low** and extra supplementation would be recommended.

Levels of iodine are commonly low in forage. The level in your forage is **low** and extra supplementation would be recommended.

Target mineral ratios for healthy adult horses can range between 10:1 and 4:1 for iron:copper, with 4:1 being ideal — especially important in a young horse or one in heavy work. High ratios of iron and manganese are problematic because these antagonist minerals "block" the uptake of copper and zinc. The ideal manganese:zinc ratio is 1:1. Copper uptake can be further compromised when molybdenum is more than 50% of copper. It is extremely common to have iron:copper and manganese:zinc ratios above 20:1, which indicates that feeding a Forage Focused Balancer or a bespoke feeding plan is necessary to correct relative deficiencies as matched to forage.

The soil contamination index refers to heavy metals, which are natural constituents of soils whose concentration varies with parent material and has increased through human activity such as fertilisers, pesticides, industry, waste disposal and air pollution. Toxic heavy metals such as cadmium, lead and mercury affect hormone systems and growth and accumulate in vital organs including the liver and kidney. A soil contamination index of 4 is low. The index runs up to 10:

2 Very Low | 4 Low | 6 Mean | 8 High | 10 Very High

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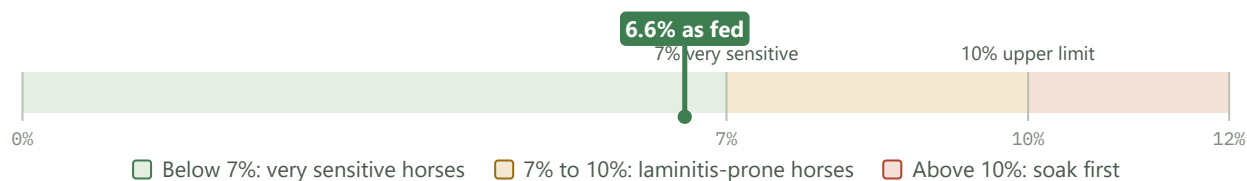
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Dietary Nutritional Report (values are based on 100% dry matter basis · wet chemistry analysis)

Dry Matter	Analysis	Units
Dry Matter	87.80	%
Digestible Energy	Mcal/kg	MJ/kg
Digestible Energy	2.17	9.09
Nutritional Analysis	%	g/kg
Crude Protein	7.50	75.0
Estimated Lysine	0.26	2.6
Acid Detergent Fibre (ADF)	36.8	368.0
Neutral Detergent Fibre (NDF)	60.7	607.0
Water Soluble Carbohydrates (WSC)	13.7	137.0
Ethanol Soluble Carbohydrates (ESC)	7.10	71.0
Starch	0.40	4.0
Non-Fibre Carbohydrates (NFC)	22.6	226.0
Nitrate Analysis		Units
%Nitrate (below)		0.03
PPM Nitrate-Nitrogen (below)		92
Nitrogen / Sulphur Ratio		
Nitrogen / Sulphur Ratio		8.00

Sugar and starch: suitability for a laminitic horse

Combined ESC and starch on an **as fed** basis. The 7% and 10% thresholds are an indication of whether soaking is needed.



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This guide explains the key measurements in your forage analysis and how they may influence your horse's diet. Understanding these results can help you make informed feeding decisions and identify where supplementation may be beneficial. They should always be considered alongside your horse's age, workload, body condition, health status and daily forage intake.

Sugars, starch, calories and laminitis

Current veterinary research shows that **endocrinopathic laminitis is driven by elevated insulin levels**, not simply by the total amount of carbohydrate in the forage. The carbohydrates that stimulate insulin are known as hydrolysable carbohydrates, and they consist of **ESC (simple sugars) and starch**.

Ethanol-Soluble Carbohydrates (ESC)

ESC measures the simple sugars in the forage, primarily glucose, fructose and sucrose. These are digested in the small intestine, absorbed as glucose and stimulate insulin release. As elevated insulin is now recognised as the primary cause of endocrinopathic laminitis, ESC is one of the most important carbohydrate measurements in forage analysis.

Starch

Starch is also digested into glucose within the small intestine and therefore contributes to insulin release. Unlike simple sugars, starch **cannot be significantly reduced by soaking**, which makes naturally low-starch forage particularly important for horses with insulin dysregulation.

Why ESC and starch, rather than WSC

Water-Soluble Carbohydrates (WSC) measure all water-soluble carbohydrates present, including both simple sugars and fructans. Historically WSC was widely used to assess forage for horses prone to laminitis, but because it includes fructans it does not accurately reflect the carbohydrates that stimulate insulin. Fructans are fermented in the hindgut rather than digested into glucose in the small intestine, and therefore produce little or no insulin response under normal feeding conditions.

Where fructan **does** need attention is in understanding how much hay to feed. Fructan still contributes to the overall energy content of the forage, so it influences the MJ/kg figure and therefore the quantity that should be fed for weight management.

For this reason, internationally recognised experts including **Dr Eleanor Kellon VMD** and the **ECIR Group** recommend assessing forage using the combined ESC and starch value rather than WSC alone, when selecting forage for horses with insulin dysregulation, Equine Metabolic Syndrome (EMS) or a history of endocrinopathic laminitis.

Using WSC alone may result in perfectly suitable hay being unnecessarily rejected simply because it contains fructans. This can reduce the range of forage available and may lead to feeding more mature forage with lower protein quality and digestibility.

Calories and energy density

Controlling insulin is only part of the picture. For many horses, **calorie control needs to be managed alongside low sugar and starch levels**, and the two are not the same thing. A forage can be genuinely low in ESC and starch while still being energy dense, and fed ad-lib may still cause weight gain.

Energy density is measured in **megajoules per kilogram (MJ/kg)**, and it determines how many calories each kilogram of forage delivers. The amount of forage fed therefore has to be matched to both your horse's bodyweight and the MJ/kg of this particular forage. Where weight loss is the goal, **MJ/kg is one of the most important figures in this report**, because it sets how much forage can be fed while still supplying enough fibre to maintain digestive health.

As a general guide, a combined **ESC and starch value below 10%** is considered suitable for most horses with insulin dysregulation, and particularly sensitive individuals may benefit from levels **below 7%**. The scale in this report applies these figures on an **as fed** basis, reflecting the forage as your horse actually eats it.

Protein

Crude Protein (CP) measures the total protein present within the forage. Protein supplies the amino acids needed for muscle maintenance, tissue repair, immune function and many essential metabolic processes.

According to the **MSD Veterinary Manual**, mature horses at maintenance require diets containing approximately **8 to 10% crude protein on a dry matter basis**. Young horses, broodmares, lactating mares and horses in work require considerably higher protein intakes.

Protein percentage alone does not determine whether your horse's requirements are being met, as this also depends on how much forage is consumed each day. For this reason the protein scale in this report also considers the level on an **as fed** basis, which reflects the forage as your horse actually eats it.

Protein quality: the Nitrogen to Sulphur ratio

Where a mineral analysis has also been carried out, your report includes the **Nitrogen to Sulphur (N:S) ratio**, which indicates protein quality. An ideal ratio is **10:1 or lower**. Higher ratios suggest that sulphur-containing amino acids, particularly methionine, may be limiting. In these cases, supplementing methionine and other essential amino acids will improve dietary protein quality.

Lysine

Lysine is the first limiting amino acid in most UK forages and is essential for muscle development, hoof quality, tissue repair and overall health. Although this is an estimated value, many UK forages contain insufficient lysine to fully meet the requirements of growing horses, breeding stock and horses in work. Where forage is low in lysine, supplementing essential amino acids can significantly improve protein quality.

The protein scale in this report applies the **8% minimum on an as fed basis**, which is the more cautious reading of the guideline above, with an optimal target of **10.4% as fed**.

THE REMAINING MEASUREMENTS

Dry Matter (DM)

Everything in the forage except water, including all the nutrients your horse requires. Because moisture varies greatly between hay, haylage and grass, dry matter is the most accurate way to compare forages and calculate feeding rates.

Digestible Energy (DE)

The energy your horse can obtain from the forage, in megajoules per kilogram. Higher energy forage provides more calories per kilogram; lower energy forage may suit good doers or horses needing weight management.

Neutral Detergent Fibre (NDF)

The total structural fibre, closely related to voluntary intake. As NDF increases horses generally eat less, because the forage remains in the digestive tract for longer.

Nitrates

Nitrates may accumulate following drought, heavy nitrogen fertilisation or other environmental stresses. Most forage contains safe levels, but testing is recommended where crude protein is unusually high, where drought occurred during growth, or where forage is intended for pregnant mares.

As Sampled (As Fed)

The forage exactly as your horse consumes it, including its moisture content. Useful for assessing the actual amount of sugars, starch and other nutrients received from each kilogram fed.

Acid Detergent Fibre (ADF)

The least digestible portion of the forage, primarily cellulose and lignin. Lower values generally indicate softer, more digestible forage; higher values usually reflect more mature forage.

Non-Fibre Carbohydrates (NFC)

A calculated value for the readily digestible carbohydrates, including sugars, starch and pectins. Useful for the overall nutritional profile, but less valuable than ESC and starch when assessing suitability for laminitis.

A forage analysis is one of the most valuable tools for assessing your horse's diet, but the results should always be interpreted alongside your horse's age, workload, body condition, health status and daily forage intake. If you would like help interpreting your results, or fully personalised feeding recommendations, our nutrition team will be happy to assist.