



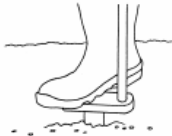
SAMPLING OPTIONS FOR PASTORAL FARMS

Soil and herbage analyses help pastoral farmers and their advisors choose the best fertiliser programme. They also highlight mineral imbalances that might be affecting the health of pasture or animals.

Available Nutrients in the Soil

Plants require an adequate supply of a wide range of nutrients if they are to grow vigorously. Some of the major nutrients required for healthy growth are nitrogen, phosphorus, potassium, sulphur, calcium and magnesium. Most of these nutrients are extracted by the plants' root system, from the solution of water and chemicals that surrounds the roots. Nutrients that have dissolved into this 'soil solution' represent only a small fraction (about 1%) of the total amount of chemical nutrients in the soil. Most of the remaining nutrients are either potentially available, but not yet dissolved (about 10%); or will never be available because they are too closely bound to various minerals and chemical compounds in the soil (about 90%).

Soil Testing



Soil analysis, or 'soil testing', measures the levels of nutrients that are potentially available to plants. As well, other soil characteristics are measured (e.g. the soil's acidity or alkalinity (pH), volume weight, cation exchange capacity, and base saturation). Unlike some other laboratories, we include these as part of our standard soil test because of their important role in the processes by which plant roots absorb nutrients, and their value in helping pastoral farmers and their advisors to appraise the soil's fertility.

Herbage Analysis



Herbage analysis provides a more accurate method of measuring the nutrient status of pasture plants, and important trace elements such as molybdenum, cobalt, and selenium can be reliably assessed using this technique. (Soil analysis can only provide an approximate indication of how well pasture plants are utilising the nutrients in the soil. Other factors may be affecting the pastures' ability to take advantage of these nutrients.)

Soil Testing versus Herbage Analysis

Often we are asked which of these techniques is the more appropriate to use. The answer is that they are complementary to one another. The two techniques – when used in conjunction - will provide a better overall picture of a farm's nutrient status than either used alone. For this reason we recommend that you provide yourself with the maximum information by submitting both soil and herbage samples for analysis.

Mixed Herbage Samples—Animal Health

Most herbage samples submitted to this laboratory for analysis are a mixture of all plant species present in the pasture. This 'mixed' herbage sample is essentially an animal feed sample, and as such, is most valuable in assessing the nutrients that are important for animal health (e.g. sodium, cobalt, selenium, magnesium, iodine and copper).

Clover only samples—Plant Health



If the principal reason for the analysis is to determine why pasture is not growing well, then collecting a sample of clover only is preferable to mixed herbage sampling.

Clover is important to the other plant species in the pasture, since it is the principal source of the key nutrient, nitrogen. Other species need healthy clover to avoid nitrogen deficiencies.

Clover is also likely to develop mineral deficiencies well before the problems appear in the other grass species, signalling potential problems for all pasture plants.

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Sampling protocols

The following guidelines are provided to assist in selecting sampling areas, taking samples and submitting samples to the laboratory. For detailed sampling instructions, refer to the appropriate **Crop Guide**.

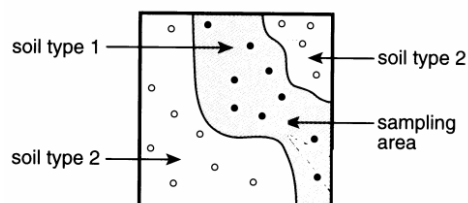
1. Do not sample within two months of applying fertiliser or lime.
2. For cost considerations, it is desirable to collect the minimum number of samples that will define the fertility status of the property. Ideally, however, divide up the area under consideration according to any of the following delineations:
 - Soil Type
 - Topography
 - Land use
 - Fertiliser history
 - Crop variety
 - Healthy/unhealthy areas
3. Take representative samples from each of these sites as described below, avoiding sampling areas that are atypical.

In the case of pasture, or crops at pre-planting, either:

- take 20 cores by walking in a random or zigzag pattern across the selected site.

or

- Select a straight sampling line, or **transect**, 100 - 200 metres long across each of the chosen areas. Permanently mark these transects, so that future samples can be taken from the same line. Collect a core sample every ~10 metres until 20 cores samples



have been obtained to create one sample bag for analysis from each transect. Avoid sampling near dung and urine patches, fences, hedges, tracks, gates and stock camps. In hill country, sample across slope rather than downwards and collect up to 30 core samples to minimise sample variation. More than one transect from a chosen area may be required if the terrain is such that a single line is not feasible. In this case, sample from the shorter transects in a chosen area and combine samples into one bag.

4. The most effective sampling tool is a soil auger. In its absence, a spade or trowel may be used to simulate the use of an auger. Because soil nutrients are not distributed evenly throughout the soil profile, it is important to avoid taking wedge shaped samples, as this will bias the results.

Collect tissue samples using clean shears, scissors, or plucking by hand.

5. The depths to which soil samples should be taken for various applications are:

Application	Sampling Depth (cm)
Pasture	7.5
Arable	15

6. Take care to avoid contaminating samples, especially with fertilisers. Use clean sampling equipment and new plastic sample bags.

Also avoid contaminating tissue samples with soil, dust and trace element sprays and drenches, as the presence of these will affect the result.

Combine the soil cores (approximately 500g) into one plastic sample bag. For plant tissue samples use plastic bags with breather holes. Label the bag with an appropriate name or number that can be understood later when the report comes back from the laboratory.

7. Send all samples to the laboratory as quickly as possible. Do not allow samples to sit in moist or warm conditions prior to submission. Fresh plant tissue deteriorates rapidly when stored in these conditions, and soil samples can incubate, altering the levels of some plant available nutrients. Bear in mind the transport time of the samples by post or courier, so that samples aren't delayed in transit over weekends and holidays.
8. Sample kits are available upon request to the laboratory or can be ordered online at www.hill-laboratories.com.

Fertiliser Recommendations

Soil and herbage test results are only one of a number of considerations to be taken into account when formulating the best fertiliser programme for a farm.

For this reason we do not make fertiliser recommendations ourselves, believing that such advice is more properly provided by competent advisors, who know the farm and the farmer's objectives.

As an independent laboratory, we aim to serve you best by providing the most reliable and accurate analysis of your soil and herbage sample; and presenting the test results in an easily readable manner.

Contact Details

For further information about any of the above tests please contact our Agriculture client service managers.

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