Grass Silage Analysis Explanation

Assessing a silage report:
There are 3 main components on the report:

1. Fermentation quality e.g. pH, Volatile Fatty Acids, Lactic Acid, Ammonia, WSC
2. Chemical composition: e.g. Crude protein, Ash, NDF, ADF
3. Nutritive value: e.g. DMD, ME

Dry Matter: Target 20 to 30% DM.
When calculating energy intakes, total dry matter intake (DMI) is the first point to consider.
If silage is very wet then DMI will be reduced & fermentation will be poorer

Ash: Lower the Better
High ash values would suggest that there has been soil contamination while making the silage.
Soil is high in iron, that reduces copper availability, and also of aluminium, that reduces phosphorus uptake.

Intake factors:

pH: Normal is best range 3.8 to 4.2
Low values indicate very acidic silages that may result in impaired rumen function, leading to acidosis.
Rumen buffers would be advisable in such cases. High pH values are indicative of poor, or secondary, fermentation resulting in high levels of acetic or butyric acid in the clamp that may be detrimental to production.

Lactic Acid: Normal is best
Normally the main acid in the well preserved clamp.
A low lactic result combined with a high VFA value would indicate that the clamp may not be very stable, especially when the pit face is exposed to air and deterioration would occur.
Lactic acid is a powerful acid and so very high levels (greater than 100g/kg DM) could give rise to acidosis type problems. In these situations, buffering is advised. These very high levels are often seen with very wet silages, since it takes more acid to preserve the clamp.

VFA:
Volatile Fatty Acids. These comprise of acetic, propionic and butyric acids. Butyric acid is normally present only in trace amounts but can increase significantly in cases of poor clamp consolidation. Silages of this type often have a high pH and strong ammonia smell. High VFAs may lead to secondary fermentation. Figure should **be half that of lactic acid.**

PAL: Target 700 - 1000
Potential Acid Load of the silage. Depends on initial acidity and on the amount of acid produced by fermentation of the silage in the rumen. Values over 1100 indicate that rumen pH could be a problem and that the diet may need special formulation to minimise the potential problem

Crude Protein: Target 11-16%
If low, there will be a shortage of protein in the overall diet unless concentrates are used to balance the diet.
If high, the extra protein tends to be in the form of rapidly degradable protein and may not be utilised properly by the rumen microbes.

NH3 of Total N or Ammonia: Target less than 10%
Ammonia is product of protein decomposition from poor fermentation. High ammonia is generally accompanied with high pH and poor preservation of the silage

PDI N, E and A:
PDI = Protein created by rumen microbes through digestion in the rumen that is digestible in Intestine from Nitrogen (N) and Energy (E) sources. PDIA is protein that bypasses the rumen to be digested in the intestine. PDIN and PDIE should be balanced in the overall diet

UFL, DMD & ME: Higher the better
Low values need careful balancing in the final ration to avoid performance losses. 1 UFL is equivalent of 1 Kg of air dried barley. As a general guide, every 2.5% drop in DMD is equivalent to requiring an additional 1kg of feed.

NDF: Normal is Best (50- 55%)
Neutral Detergent Fibre. Dietary fibre is required to promote rumen function and development. Too much fibre can slow fermentation leading to a reduction in intakes; too little can allow fermentation to occur too rapidly, leading to acidosis. However, the physical nature of the silage is also important and chop length will affect fermentation more than the actual level of NDF.

A**DF:** (acid-detergent fibre). A measurement of the cellulose, lignin, and pectin fibre fractions of forages. ADF is commonly used to predict energy content of corn silage and other forages. Corn silage ADF concentration ranges from 18 to 26%. Corn silages with lower ADF values have a higher energy content and are desirable. As the acid detergent fibre content of silage decreases, the digestibility and therefore the energy content increases.

Sugar: Higher the better

The sugar remaining after fermentation is what has been left over after fermentation. If low and silage pH is correct and has been well fermented it just mean most sugars were used to ferment silage. High levels (>1%) are generally desirable resulting from a restricted fermentation (caused by wilting or use of some additives) of a high-sugar crop. Low levels may indicate an extensive fermentation and should not be considered bad unless associated with poor ratings for pH, NH3, and VFA (range 0-250).

The Ideal Silage
Dry matter 25%+
DMD 70%+
ME >11.0 MJ/kg DM
FME >70% of ME
CP 15%+
pH 3.8 – 4.2
NDF 50 – 55% (500 – 550 g/kg DM)
Ammonia < 10%
Lactic acid 8 – 12 % (80 – 120 g/kg DM)
Lactic acid % of total acid >65%
Ash 5%

In order to get good fermentation farmers need to:

Cut in right conditions (DM between 25-30%)
Fill pit quickly
Pack tightly
Avoid air pockets
Aim to cut mid-day sugars are at their peak (sugars or water soluble carbohydrates are necessary for fermentation and excretion of lactic acid to lower grass pH and stabilise pit)

Wilting:
Research has shown wilting is only effective if is done rapidly and over a short period. If left for multiple days, there is an increased chance of nutrient loss to rainfall and nutritional benefits are limiting. Therefore tossing grass out flat and wilting fast (24hr) is the best for nutrition along with increasing DM % and reducing effluent.

Additives:
Additives or innoculants are useful in increasing silage fermentation and stability. This may be the case if farmers are struggling to get results or wish to improve their silage and have poor fermentation parameters (e.g. low sugars). In many cases the right advice around silage harvesting will over ride some additives and a good understanding with silage contractor is essential.

Chop length:
Chopping or wounding increases plant respiration which uses up oxygen therefore improving fermentation in the silage pit. In general there has been limited evidence that chop length effects mature cow intake. It has been shown to improve digestibility for small ruminants (e.g. sheep & young cattle).

Aurivo Animal Feeds is a member of the Forage Analytical Assurance (FAA) Group which analyses approx.60,000 samples annually