

Maximising Forage Quality while Minimising Environmental Impact at Glensaugh



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The hill farm of Glensaugh, part of the James Hutton Institute, is situated in the Grampian foothills in the North East of Scotland and is run by Farm Manager Donald Barrie.



At a little over 1000 hectares, Glensaugh is the home of the Institute's Climate-Positive Farming Initiative which is fully committed to becoming carbon net-zero through its approach to novel farming practices and diversification into forestry. The farm has 68 hectares of improved grass, a further 52 hectares of permanent pasture, 70 hectares of woodland while the majority of the remainder is heather hill.

The farm supports a herd of 90 red deer hinds, along with 50 Luing suckler cows and 720 ewes (320 Scottish Blackface and 400 crossbred mule ewes). Calves are sold store at around five weeks post-weaning, with an average weaning weight of 320kg for bullocks. Blackface lambs are sold store and lambs from the mule ewes are finished off grass in August/September.

When it comes to making conserved forage, Donald is passionate about the need to produce forage of the highest possible quality, while minimising the environmental impact and use of plastic wrap for bales.



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Silage/Haylage Making Practices

Both pit silage and haylage bales are made at Glensaugh from a single cut. Around 100 bales of haylage are fed to weaned calves (bovines and deer) and hill Blackface ewes in wintry weather. Pit silage (around 400T) is fed to the crossbred ewes, mature hinds and suckler cows.

In an “early” season fields for haylage are grazed by sheep until late April and then closed off with the aim of cutting in mid-June. Grass is cut in dry sunny weather in the afternoon when sugar levels are high. Depending on the weather and the yield of grass it can take up to four days to wilt to the target dry matter of over 50% and the crop may be tedded up to three times.

Pit silage is usually made within a week of making haylage, with a target dry matter of 30% requiring a wilting period of 24 hours in good conditions. At dry matters over 28% there should be no effluent produced, minimising nutritional losses.

Forage Quality

Donald also pays close attention to soil chemistry, with annual testing revealing trends in pH which are corrected by occasional lime application (roughly every five years). P and K levels usually require no correction because offtake is replaced by summer applications of farmyard manure. These conditions support leys containing ryegrasses, timothy, fescues and white clover and are not as regularly reseeded as they used to be, as focus has shifted towards managing soil health and grazing. Some leys are now over ten years old but their productivity has improved since rotational grazing became the norm in 2018. Avoiding cultivation removes the risk of erosion and prevents significant carbon loss to the atmosphere.

Pit silage often analyses better than haylage (Table 1), despite being cut up to two weeks later. The likely reason: the longer wilt for the haylage leads to higher nutritional losses in the field.

Table 1. Forage quality at Glensaugh in 2020 compared to the previous 5-year average.

Nutritional parameter	Pit silage 2020	Haylage 2020	Pit silage average 2014-2019	Haylage average 2014-2019
Dry matter %	41.0	56.5	31.2	51.8
ME MJ/kg DM	11.0	10.2	11.1	10.8
D value %	69.0	63.8	69.7	67.3
Crude protein % DM	10.9	11.6	11.2	11.2

A food grade preservative is used on both bales and pit silage to ensure a long shelf life, as unused pit silage and bales are often carried over for feeding in a subsequent season.



Environmental Considerations

Six layers of green plastic are used to wrap the bales. Green wrap is preferred due to its heat reflecting properties and the fact that it is easier to recycle into other products than black plastic. The bales are stacked on clean hardstanding in the farmyard, where bird damage can be easily observed and either quickly patched, or the bale fed out.

Donald says, *“The end product has a shelf life of two years and once open it will keep for at least two weeks. There are no effluent losses and the haylage smells sweet; animals like it. We are making the best possible use of our plastic and it comes off the bale clean and ready to recycle”.*



Top Tips

Donald suggests the following:

- **Budget ahead and calculate your forage requirements for the number of livestock. Add a safety margin in case of a longer winter but ensure that excess forage is not made, increasing plastic use and potential future wastage. Further information on forage budgeting can be found here: <https://www.fas.scot/downloads/feed-budgeting/>**
- **Strive to achieve a target dry matter of 30% for pit silage and slightly more for bale silage (35-45% and higher for haylage, 50-70%). Avoid making wet silage to reduce effluent production and nutritional losses, while packing more grass (and less water) into each bale, thereby saving on plastic wrap.**
- **Do not over-wilt as this will lead to lower quality forage with less protein and energy. Very high dry matter pit silage can increase the risk of spoilage (especially if untreated) because it is more difficult to consolidate, affecting the efficiency of fermentation.**
- **Use an additive: this is proven to improve fermentation characteristics, reduce dry matter and nutritional losses and extend the shelf life of conserved forage. Improvements in animal performance are also evident, giving a return on investment.**

