North Wyke Farm Platform

Case study no. 38

Aerobic spoilage of silage

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Introduction: This project focused on the ensiling of grass, a fermentation technique commonly used in agriculture to preserve crops. In the UK, around 34 million tonnes of silage are produced every year. This is to feed livestock while they are housed, predominantly over winter.

To produce high quality silage an anaerobic environment must be maintained to preserve the nutrients in the grass and avoid loss through spoilage. Despite measures to mitigate losses, aerobic spoilage of silage causes significant losses. This is due to the rapid growth of unintended microorganisms, resulting in a decrease of nutritional quality and poor palatability of the silage to livestock. Our project focused on monitoring silage health and aerobic stability through tracking the presence of microbial populations and associated markers.

Method: Bales of silage were selected from the same batch, originating from the North Wyke Farm Platform. Bales consisted of perennial ryegrass, cut to a chop length of 7 cm and wilted for 24 h before baling. Bales were wrapped in 4 layers of plastic (750 Green 25 µm, Silolite, RPC bpi agriculture, Zele, Belgium). Sampling was undertaken using a mechanical silage corer (Dairy One Forage Lab Ithaca USA, O'Brien et al., 2006).

Figure 1. Silage bales; composite samples were taken using a silage corer.

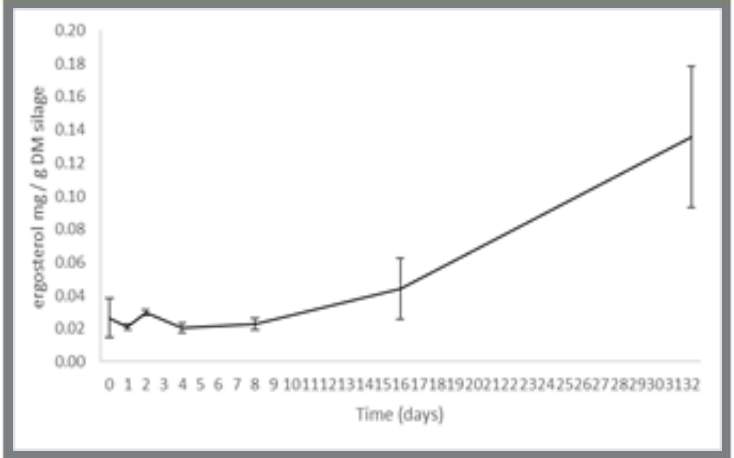

Figure 2. Average (n= 6) values of ergosterol representing fungal biomass, in silage undergoing aerobic deterioration over 32 days.

Seven kg of silage were taken from each bale (Figure 1), and mixed thoroughly to give a representative sample of the entire bale. Thirty-six aerobic storage vessels (ASVs) were set up, packed with 750 g of silage and a temperature datalogger located in the centre of each vessel. Seven ASVs were set up for each bale, for destructive sampling timepoints at 0, 1, 2 ,4, 8, 16 and 32 days. At each sample point samples were taken for chemical and microbiological analysis (Figure 2).

Results: The results indicate aerobic exposure as the driving factor of differences, resulting in silage of reduced nutritional and hygienic quality.

Conclusions: Ensuring initial anaerobicity and maintaining this throughout storage should be reviewed as a production priority.

References

O Brien, M., O Kiely, P., Forristal, P.D. and Fuller, H.T., 2006. A note on sampling baled grass silage for fungal propagules.Journal of Animal and Feed Sciences, 15(2), p.305.

Acknowledgements:

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