The Use of Molasses to Improve the Fermentation of Low-Dry Matter Kikuyu Grass Silages

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1. Introduction

Kikuyu grass (*Pennisetum clandestinum*) is a valuable forage resource for dairy and beef cattle in the coastal areas of eastern Australia. Production of wilted silages is often difficult due to wet weather during summer and autumn, the periods of maximum growth of kikuyu pastures and when surplus material is available for conservation. Kikuyu grass is also low in the water soluble carbohydrates (WSC) required to support a lactic acid fermentation. As a result kikuyu silages produced on farms are often characterised by low dry matter (DM) content, high pH and high ammonia nitrogen (N) levels, which indicate poor fermentation quality. Previous studies have shown that inclusion of molasses as a source of readily fermentable WSC has improved the fermentation of tropical pasture silages (Catchpoole and Henzell 1971).

2. Materials and Methods

Two experiments were conducted to determine if molasses could improve the silage fermentation of low-DM contentkikuyu. In each experiment 30-day regrowth kikuyu pasture was mown using a conventional disc mower. Two field wilting treatments were compared. In the first the mown forage was left without windrowing (at near mower width) and subsequently manually tedded (morning and afternoon) to maximise drying rate (fast wilt). In the second the forage was raked into windrows immediately after mowing (slow wilt) to simulate common farming practice in Australia.

An unwilted control silage was made immediately post-mowing in both experiments. After two wilting intervals mown kikuyu was collected and manually fed through a precision chop forage harvester, and approximately 3-10 kg batches of fresh forage were ensiled in small plastic bag mini-silos (three per silage treatment). Molasses was applied at varying rates (Table 1) to the forage harvested material using a watering can just prior to ensiling after dilution (1:1) with water.

3. Results and Discussion

In both experiments silages differed significantly ($P<0.01$) in DM content, pH, and ammonia N content (Table 1). Ideal drying conditions in Experiment 1 enabled the fast wilt silages to be made after 6 hours and the slow wilt material after 28.5 hours. Continual rainfall in Experiment 2 resulted in no drying and silages were made after 48 hours. The differences between silages in DM content in experiments 1 and 2 reflected effects of molasses

treatment, initial forage DM (Experiment 1) and wilting treatment (Experiment 2).

In Experiment 2 the slow wilt windrowed treatment seemed to retain more of the rainwater and there appeared to be more discoloration and yellowing of the forage compared to the fast wilt material, which may be indicative of greater deterioration. Many of the silage ammonia N levels were very high (>150 g/kg total N) indicating severe degradation of the protein fraction. In general, silage fermentation characteristics were either poorer or unaffected as a result of the slow wilt treatment compared to the fast wilt. The greater difference in Experiment 1 was attributed to more favourable weather conditions that allowed wilting rate differences to be expressed.

Table 1. Effect of molasses on the fermentation of kikuyu silages

Treatment	Experiment 1			Experiment 2		
(kg molasses/t fresh forage)	DM content (g/kg)	pH	Ammonia N (g/kg total N)	DM content (g/kg)	pH	Ammonia N (g/kg total N)
Unwilted control	133	4.34	148.7	109	4.75	220.9
Fast wilt						
0	224	4.45	136.2	92	4.87	453.7
20	-	-	-	116	3.93	171.7
40	-	-	-	116	3.76	189.3
60	246	3.85	93.6	-	-	-
Slow wilt						
0	239	5.51	260.4	91	4.87	436.6
40	-	-	-	120	3.74	158.7
60	257	4.03	137.4	-	-	-
l.s.d (P<0.05)	11	0.10	15.6	9	0.13	58.4

4. Conclusions

Well-preserved silages should have an ammonia N concentration ≤100 g/kg total N (Wilkinson 1990). Without additives it is difficult to produce adequately preserved silage from low-DM kikuyu grass, particularly when prolonged and ineffective wilting occurs due to poor weather conditions. Our other research has shown that where weather conditions favour wilting, rapid wilting will produce satisfactory silage. Where low-DM silages are produced from rapidly wilted kikuyu, silage ammonia N can be further reduced by the application of molasses. When unfavourable weather conditions prevail molasses can produce large improvements in silage fermentation, but the level of application will need to be higher than that used in Experiment 2. Apart from improving silage preservation, molasses addition will also increase the metabolisable energy content of the silage.

5. Acknowledgements

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6. References

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