EFFECTS OF ADDING SUGARCANE MOLASSES TO GRASSES FROM STADIUM TURFS AND AGRI-PARKS ON SILAGE FERMENTATION

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ABSTRACT

Batches of freshly mowed grasses for 1. *Cenchrus clandestnus* mixed with perennial ryegrass, collected from a stadium in Limpopo Province, 2. *Panicum maximum*, collected from agri-park in Kwa Zulu Natal (KZN), 3. *Cenchrus clandestnus*, collected from a stadium in the Gauteng Province (GP), 4. *Dactylis glumerata*, collected from an agri-park in Mpumalanga Province (MP), and 5. a mixture of *Digitaria eriantha* and *Cenchrus clandestnus*, collected from a stadium in the North West (NW) province of South Africa. The mowed grass was mixed with sugarcane molasses at 5% and ensiled in 210 L drums for 60 days. Mixing the grass with sugarcane molasses improved ($P<0.05$) the sugar content of the grass but the terminal pH of the silage was high in most of the silages except for the mixture of *Cenchrus clandestnus* and perennial ryegrass that had lower ($P < 0.05$) that resulted in increased lactic acid production. Silage can be produced from grass that are collected from stadiums with the aid of sugarcane molasses, but care should be taken not to ensile grass that was treated with pesticides

Keywords: drums, fermentation, forages, mowing, stadium, provinces

INTRODUCTION

Shortage of animal feeds is a challenge faced by emerging livestock farmers in South Africa, especially during the drought months. These farmers lost so many livestock during the drought of 2015-2017 in South Africa. Fortunately, there is a lot of grasses from stadium turfs and agri-parks that are mowed and dumped. These grasses contain nutrients such as protein, fibre, etc which can benefit livestock production if used for animal feeding. In order to have enough forage for animal feeding during droughts, mowed grasses can be ensiled to curb feed shortages. However, most of the mowed grasses are legumous in nature and may be high in buffering capacity and contain less sugar to promote silage making (McDonald *et al*., 2010). With the low content of water-soluble carbohydrate (WSC) from these mowed grasses, the addition of sugarcane molasses has been recommended (Zhang *et al*., 2013). Therefore, the present study evaluated the ensiling potential of mowed grasses from stadiums and agri-parks in some parts of South Africa.

MATERIAL AND METHODS

Batches of mowed grasses for 1. *Cenchrus clandestnus* mixed with perennial *yegrass*, collected from a stadium in Limpopo Province, 2. *Panicum maximum*, collected from agri-park in Kwa Zulu Natal (KZN), 3. *Cenchrus clandestnus*, collected from a stadium in the Gauteng Province (GP), 4. *Dactylis glumerata*, collected from an agri-park in Mpumalanga Province (MP), and 5. a mixture of *Digitaria eriantha* and *Cenchrus clandestnus*, collected from a stadium in the North West (NW) province of South Africa. The grasses were mowed with a grass mower (Red rhino ride-on lawn mower, model RLM-TTM86H) in a 2week intervals, which were repeated 3 times before the collection of samples. The mowed grass was then collected immediately after the third cut (i.e. 3rd interval) of the season for ensiling. This allowed us to collect samples of <5 mm length for good compaction. Sugarcane molasses was added to the grass at 5% of the total biomass collected. The mixture of grass with sugar cane molasses were ensiled in 210 L drums that were lined with plastic bags. Samples of the freshly mixtures

Tab. 1: Fermentation characteristics of grasses from stadium and agri-parks ensiled for 60 days (n =3)

Grass type	Province					SEM	P
	Limpopo	KZN	MP	GP	NW		
	Cenchrus clandestnus + perennial ryegrass	*Panicum maximum*	*Dactylis glumerata*	*Cenchrus clandestnus*	*Digitaria eriantha* mixed with *Cenchrus clandestnus*		
Pre-ensiled forages (day 0)							
DM g/kg	331.6^{c}	347.7^{c}	216.2^{d}	512.2^{a}	417.4^{b}	0.964	0.001
WSC g/kg DM	124.17^{a}	50.17^{b}	69.63^{b}	10.54^{d}	82.88^{b}	6.22	0.001
pH	6.295^{bc}	6.353^{ab}	6.425^{a}	6.268^{c}	6.340^{bc}	0.0242	0.004
Fermentation characteristics after 60 days of fermentation							
DM g/kg	456.0	419.1	487.4	526.3	456.2	30.2	1.111
WSC g/kg DM	53.88^{a}	10.17^{b}	12.61^{b}	7.92^{b}	49.71^{a}	3.33	0.001
Lactic acid g/kg DM	116.66^{a}	41.89^{b}	27.26^{b}	33.23^{b}	72.61^{b}	15.15	0.004
pH	3.883^{d}	4.285^{bc}	4.520^{ab}	4.742^{a}	4.197^{c}	0.103	0.001

$^{a\text{-}d}$Means with different letters in a row differ significantly ($P < 0.05$)

DM = Dry matter; WSC = water soluble carbohydrates, KZN = Kwa-Zulu Natal; MP = Mpumalanga; GP = Gauteng Province; NW = North West

https://doi.org/10.11118/978-80-7701-093-1-0160

were collected prior to ensiling for the analysis of dry matter (DM), WSC and pH. After 60 days of ensiling, the drums were opened, samples collected and analysed for DM, WSC, pH and lactic acid (LA).

RESULTS AND DISCUSSION

According to Table 1, mixing the grasses with sugarcane molasses improved ($P < 0.05$) the sugar content of the forages, consistent with Zhang *et al*. (2013) when sugar cane molasses was added to Urtica cannabina forage at ensiling. Lunden-Pettersson and Lindgren (1990) recommended an amount of 60–70 g WSC/kg DM in a forage to achieve a well-preserved silage. All the grasses of this study had WSC content of more than 60 g/kg DM, sufficient for proper fermentation, except for the grasses from KZN and GP provinces. It is well established that forages from legumes have a high buffering capacity, leading to higher final pH (> 4.00) of the silage (McDonald *et al*., 2010). This is one of the reasons we experienced higher silage pH in the study except for the silage from the mixture of Cenchrus clandestnus and perennial ryegrass. This silage had higher ($P < 0.05$) content of LA which was supported by the low ($P < 0.05$) residual WSC and pH contents of the silage compared to other silages. The increased LA content from the silage of Cenchrus clandestnus and perennial ryegrass mixtures is consistent to Sucu and Filya (2006). However, the higher ($P < 0.05$) residual WSC from this silage may lead to poor aerobic stability since higher residual WSC in a silage serves as food for aerobic microbes (Weinberg *et al*., 1993).

CONCLUSION

Silage can be produced from stadiums and agri-parks grasses with the addition of sugarcane molasses at ensiling. The nutritive values of these silage and animal feeding trials should be determined.

REFERENCES

Lunden-Pettersson, K., Lindgren, S. 1990. The influence of carbohydrate fractionand additives on silage quality. *Grass Forage Sci*. 45, 223–233.

McDonald, P., Edwards, R. A., Greenhalgh, J. F. D., Morgan, C. A., Sinclair, L. A.,Wilkinson, R. G. 2010. Silage (Chapter 19). In: *Animal Nutrition*. 7th edition, pp. 499–520.

Sucu, E. , Filya, I. 2006. Effects of homofementative lactic acid bacterial inoculants on the fermentation and aerobic stability characteristics of low dry matter corn silages. *Turk. J. Vet. Anim. Sci.* 30, 83–88.

Weinberg, Z.G., Ashbell, G., Hen, Y., Azreli, A.. 1993. The effect of applying lactic acid bacteria at ensiling on the aerobic stability of silages. *J. Appl. Bacteriol.* 75, 512–518.

Zhang, X. Q., Jin, Y. M., Zhang, Y. J., Yu, Z., Yan, W. H. 2013. Silage quality and preservation of Urtica cannabina ensiled alone and with additive treatment. *Grass Forage Sci.* 69(3) 405–414.

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