Nutritive value and cattle preferences in an old Boer lovegrass stand treated with biosolids in Cananea, Sonora, México

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Introduction

Boer lovegrass (*Eragrostis curvula* var. *conferta*) is an introduced species planted to increase productivity on deteriorated rangelands in northern Mexico. Forage production with Boer lovegrass achieves an increase of two to three fold when compared to native grasses, however, as stands became old, pasture productivity and forage quality declines due to a reduction in available nutrients causing a reduction in grazing capacity and beef production. Previous studies have shown that biosolids enhance seedling establishment, plant growth and increases forage production in the species, but no data is available to measure changes in forage quality and animal performance. This study was conducted to evaluate pasture nutritive value and cattle preferences on a 15 year old Boer lovegrass stand three summers following biosolids application.

Methods

The study was conducted from 2006-2008 at Cananea, Sonora, México (Latitude 30° 58' 00" N and Longitude 110° 08' 30" W). Type "A" biosolids were hand-applied at rates of 0, 25, and 50 t DM/ha during 2006 on triplicate 5 m x 5 m plots. Plant samples were harvested during the summer growing season of 2008 from 10 randomly selected Boer lovegrass plants on each plot. Forage samples were sent to the University of Sonora laboratory and were analyzed by triplicate (AOAC 1984). Variables evaluated were crude protein, available phosphorus, crude fibre, digestibility and animal preference. A mature Hereford cow was used to test grazing preferences during the summer of 2008. Three grazing periods of 60 minutes each were allowed and each was considered as a replication. A different cow was used on each grazing event. Time spent grazing was recorded on each plot. A completely randomized block design was used to set the experiment. Data was analysed by ANOVA ($P \leq 0.05$).

Results and discussion

Records show that precipitation was close to average during the study period with 412, 425 and 420 mm for 2006, 2007 and 2008, respectively. All variables except crude fibre were different ($P \leq 0.05$) between treatments (Table 1). Crude protein was 5.1 % in the control and averaged 7.5 and 9.9 % on plots treated with biosolids at rates of 25.0 and 50.0 t DM/ha respectively. Available phosphorus was 0.078 % in the control and averaged 0.11 and 0.13 % on plots treated with biosolids at the rates of 25.0 and 50.0 t DM/ha respectively. Crude fibre was similar among treatments ($P \geq 0.05$) and varied from 27.2 to 31.5 %. Digestibility averaged 37.1 % in control and averaged 40.5 and 46.3 % on plots treated with biosolids at rates of 25.0 and 50.0 t DM/ha respectively. Cattle preferred ($P \leq 0.05$) to graze Boer lovegrass plants on plots treated with biosolids.

Cows spent 28.2 min (15.7 %), 58.5 min (32.5 %), and 93.2 min (51.8 %) on plots treated with biosolids at rates of 0, 25 and 50 t/ha, respectively. Overall, cows spent 84.3 % of the time grazing plants on the biosolid treated plots. Our results agree with Fresquez *et al.* (1990) and Mata-Gonzalez *et al.* (2002) who have reported positive forage responses even 4 to 6 years after biosolid application. Increases in nitrogen, phosphorus, magnesium and sodium are common in plant tissue following biosolids application (Cuevas *et al.* 2000), and crude protein and digestibility increases in forage (Tiffany *et al.* 2000). These nutritive value changes in forage may account for the greater animal preference ratios reported in different environments (Pierce *et al.* 1998; Sullivan *et al.* 2006) and for the significantly greater animal gains reported in rangelands treated with biosolids (Wester *et al.* 2003).

Table 1. Forage quality and animal preference on old Boer lovegrass stands after hand application of several rates of biosolids at north Sonora, México.

Variable	Biosolids rates		
	0 (t DM/ha)	25 (t DM/ha)	50 (t DM/ha)
Crude protein (%)	5.100 c	7.50 b	9.90 a
Available phosphorus (%)	0.078 c	0.11 b	0.13 a
Crude fibre (%)	27.200 a	28.90 a	31.50 a
Digestibility (%)	37.100 c	40.50 b	46.30 a
Animal preference (min grazing)	28.200 c	58.50 b	93.20 a

Conclusion

We conclude that biosolids increase forage quality in Boer lovegrass plants. The residual nutritive effect of biosolids continues for three growing seasons after treatment application. Cows consistently preferred Boer lovegrass plants on plots treated with biosolids as compared to plants on the control areas. The uses of these nutrient-rich organic materials play an important role on the improvement of deteriorated rangelands in northern México.

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