

**EFFECTS OF DIFFERENT INCLUSION LEVELS OF MARULA (*SCLEROCARYA BIRREA*)
PULP AT ENSILING ON THE NUTRITIVE VALUE OF NAPIER GRASS (*PENNISETUM
PURPUREUM*) SILAGE**

BY

MAKHARAMEDZHA UNARINE

Student no: 11617773

A dissertation submitted in fulfillment of the requirements for the

Degree of Masters of Science in Agriculture

Department of Animal Science

School of Agriculture,

University of Venda

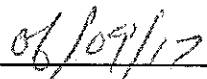
SOUTH AFRICA

2017

Supervisor: Prof. J.J. Baloyi

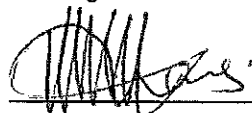


Signature



Date

Co-Supervisor: Mr. M.S Mikasi



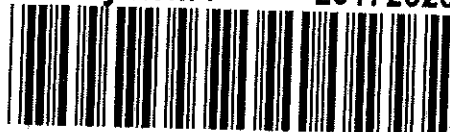
Signature



Date

UNIVEN LIBRARY

Library Item : 20172628



ABSTRACT

This study was conducted to determine the effect of Marula (*Sclerocarya birrea*) pulp inclusion on the chemical composition, rumen degradability and *In vitro* digestibility of Napier grass (*Pennisetum purpureum*) silage. Napier grass was planted at the School of Agriculture Experimental Farm, University of Venda in 4 m x 5 m plots replicated three times and irrigated using spray irrigation for 12 weeks. Fresh Napier grass was manually harvested, chopped and ensiled with Marula pulp included at four different levels of 0 % (control), 10 %, 30 % and 50 % of the grass. After 8 weeks, the Napier grass silage samples were analyzed for chemical composition using standard procedures. Dry matter (DM), crude protein (CP) and neutral detergent fibre (NDF) were determined. Rumen degradability profiles were detected at 0, 6, 12, 24, 48, 72, 96 and 120 hours (h) of sample incubation using three Bonsmara steers fitted with rumen cannulae. Rumen degradability constants were determined by fitting degradability data to the exponential equation $p = a + b(1 - e^{-ct})$ using NEWAY computer program. *In vitro* DM and CP digestibility of rumen undegraded residues after 12, 24 and 48 h of sample incubation was determined by sequential digestion in pepsin and pancreatin solutions. Fermentation characteristics and chemical composition did not differ ($P > 0.05$) with the level of inclusion of Marula pulp. However, the silage was good with 10 % inclusion having the highest CP (97.0 g/Kg) and lowest pH of 3.5. The DM, CP and NDF disappearance of all treatments increased linearly with the duration of ruminal incubation. Fifty percent Marula pulp inclusion increased DM disappearance at 0, 6, 96 ($P < 0.01$) and 120 ($P < 0.05$) incubation h with no effect ($P > 0.05$) on other incubation h. Fifty percent Marula pulp inclusion increased CP disappearance at 6 and 96 ($P < 0.05$), 12 and 120 ($P < 0.01$) incubation h. However, 50 % Marula pulp inclusion increased NDF disappearance at 24 ($P < 0.05$) while no additive treatment outperformed ($P < 0.05$) other treatment at 72 incubation hour. The soluble fractions "a" ranged from 10.9 – 15.7 % among the evaluated treatments. Potential degradability "a+b" of DM showed 30 and 50 % inclusion levels with the highest effective DM degradability ($P < 0.01$) as compared to the 0 and 10 %. Marula pulp additive inclusion had no effect ($P > 0.05$) on both DM and CP *in vitro* digestibility after 12, 24 and 48 h. In conclusion, fresh Marula pulp additive inclusion improved the nutritive value of Napier grass silage with 10 and 50 % inclusion dominating in terms of quality, chemical composition and rumen DM and CP degradability as compared to the other treatments.

Keywords: Napier, Marula, chemical composition, *in sacco*, *In vitro*, degradability, digestibility.