

**Effects of a fibrolytic enzyme and bacterial inoculants on the
fermentation, chemical composition and aerobic stability of ensiled
potato hash**

BY

MUTAVHATSINDI TSHILIDZI FAITH

Student no: 11584739

A dissertation submitted in fulfillment of the requirements for the

Degree of Master of Science in Agriculture.

Department of Animal Science

School of Agriculture,

University of Venda

Thohoyandou

SOUTH AFRICA

March 2015

UNIVEN LIBRARY
Library Item : 20150990



Supervisor:

Dr. J.J. Baloyi

Co-Supervisor:

Dr. B.D Nkosi

ABSTRACT

A study was conducted to evaluate the effects of adding a fibrolytic enzyme and its combination with bacterial inoculants on the fermentation, chemical composition and aerobic stability of ensiled potato hash (PH). Potato hash silage (PHS) was produced by mixing 800 g PH/kg and 200 g wheat bran/kg. The mixture was ensiled with either no additive or enzyme Celluclast (low or high dose) or bacterial inoculants of Emsilage and Silosolve. The enzyme and bacterial inoculant combinations (treatments) used were (1) No additive, (2) Celluclast low dose (CLD), (3) Celluclast high dose (CHD), (4) Emsilage (EMS), (5) CLD + EMS, (6) CHD + EMS, (7) Silosolve (SLS), (8) CLD + SLS, and (9) CHD + SLS. These treatments were ensiled in 81 x 1 L anaerobic jars for 90 days with nine replicates per treatment. Three samples per treatment were collected before ensiling and after 90-day ensiling and analysed for fermentation characteristics and chemical composition. In addition, samples of day 90 were subjected to an aerobic stability test, where they were exposed to air for 5 days. Enzyme addition, either alone or in combination with bacterial inoculants reduced ($P < 0.05$) acid detergent fibre (ADF) and neutral detergent fibre (NDF), thus making more sugar available for fermentation. The combination of high dose enzyme and Emsilage (CHD + EMS) reduced ($P < 0.05$) silage pH, thus preserving the silage compared to other treatment combinations. Enzyme (CLD+ no bact.inoc, and CHD+ no bact.inoc) increased ($P < 0.05$) the crude protein (CP) content while its combination with Emsilage (CLD+EMS and CHD+EMS) increased ($P < 0.05$) the gross energy content of the silage. Enzyme addition without bacterial inoculants reduced ($P < 0.05$) silage aerobic stability as indicated by increased pH, CO₂ production and yeasts and moulds populations, as well as reduced number of hours of aerobic stability. Enzyme addition (used at both low and high dose), and bacterial inoculants improved the fermentation characteristics of ensiled potato hash. In addition, enzyme addition improved the chemical composition but impaired the aerobic stability of potato hash silage. Further work to test these findings on animal performance is warranted.

Keywords: aerobic stability, enzyme, fibre, nutrients, silage, water soluble carbohydrates