3. CONSERVATION OF NAPIER GRASS AS SILAGE BY SMALL HOLDER DAIRY FARMERS IN TANZANIA

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$A2^3$ factorial experiment was conducted to investigate the best method of conserving napier grass as silage under small-scale dairy farmers situation. Four treatments (methods) were imposed on the forage before it was ensiled in either earth pits or concrete silos. namely; T1-5cm chopped grass with 3% molasses. T2 - 5cm chopped grass without molasses, T3 - unchopped grass with 3% molasses and T4 - unchopped grass without molasses. The silage was sampled after 3 months, and analyzed for percentage DM losses, chemical composition, fermentation and sensory qualities. *In vitro* DM and OM digestibilities and DM degradability. The rate of silage intake in gDM/minute was determined using six dairy heifers. Additionally, cost of producing the silage under each method were estimated in Tsh./kgDM of useful silage. Both chopped and 3% molasses treated napier silage showed lower ($P<0.01$ and $P<0.05$, respectively) percentage DM losses as compared to unchopped and unmolassed silage. However, the DM losses did not differ significantly between the silo designs used. Chopped silage had more ($P<0.001$ and $P<0.01$) CP and WSC contents than unchopped silage. Also addition of 3% molasses significantly increased ($P<0.01$ and $P<0.001$) the CP and WSC composition of napier silage. The CP content however, was more reserved in napier silage produced in the earth pits than the concrete silos. The preservative quality of napier silage was highly ($P<0.001$) improved by chopping and/or addition of 3% molasses at ensiling. Lower pH (3.99 vs 4.64), NH_3-N(4.04 vs 6.37) and butyric acid concentration (2.6 vs 7.5 gkg^{-1} DM) and higher content of lactic acid (37.3 vs 14.2 gkg-1 DM) and acetic acid (38.5 vs 21.8 gkg-1 DM) were observed in chopped than unchopped silage. Lower pH, NH3 - N and butyric acid (4.21 vs 4.43, 4.09 vs 6.31% and 3.8 vs 6.4 gkg^{-1} DM, respectively) were also observed in molasses treated compared to untreated silage, while lactic and acetic acid concentrations were significantly higher (36.8 vs 14.7 gkg^{-1} DM and 40.3 vs 20.1 gkg-1 DM respectively).

Additionally the sensoric scores were significantly ($P<0.001$) better for chopped and/or molasses treated napier silage. The condition which was more observed on silage made in the earth pit silos. Chopped silage had significantly higher ($P<0.001$ and $P<0.01$) in vitro DM and OM digestibility and In sacco DM degradability than unchopped silage. Also molassed. Silage showed significantly higher ($P<0.001$) *In vitro* DM and OM digestibility. There was a significant ($P<0.01$ and $P<0.001$) improvement in rate of silage intake when the animals were fed on pre-chopped and/or molasses treated napier silage, however minor differences were observed for the silage made in either type of the silo. Economically, chopping and addition of molasses at ensiling produced napier silage at a least cost especially from the earth pit silos compared with other ensiling methods. It is concluded that, pre-chopping and addition of at least 3% molasses to napier grass at ensiling produced good quality silage. Also the technique can be more economical and technically feasible in short terms when plastic sheet covered earth pit silos are used rather than the concrete silos which have higher initial construction costs.