PDF - IN- VITRO GAS FERMENTATION PATTERN OF MAIZE STRAW WITH CASSAVA PEEL BASED SUPPLEMENT - researchcub.infoABSTRACT

This study was carried out to investigate the in vitro gasfermentation pattern using maize straw with cassava peels based supplement fedto WAD goats. The goats were fed in six different treatments, with (treatment1: maize straw +10%cassava peels concentrate without oil drench, treatment2:maize straw +25%cassava peels concentrate with oil, treatment 3:maize straw +50% cassava peels without oil, treatment 4:maize straw+25% cassava peelsconcentrate without oil, treatment 5:maize straw+50%cassava peels concentratewithout oil and treatment 6:maize straw +10%cassava peels concentrate withoil). Maize straw and cassava peels were later dried and milled for chemicalanalysis and in vitro gas fermentation study. Chemical analysis of maize strawand cassava peels show that cassava peels concentrate produced higher crudeprotein content than maize straw. The NDF values for maize straw and cassavapeels was 55% and 33% while the ADF values were 31.5% and 16% respectively. Invitro gas studies show that treatments with oil did not show significantdifference (P>0.05) to treatments without oil in terms of gas production asshown in treatment 3 with oil and treatment 5 without oil. Gas volume wassignificantly higher (P>0.05) in treatment 2 with oil compare to treatment 4without oil. Value for methane production varied from 0.33ml to 4ml fortreatments with oil and 2ml to 4.33ml for treatment without oil.DMD was highestin treatment 5 and lowest in treatment 6.This result show that oil hadsignificant effect (P<0.05) on gas production using maize straw supplementedat low levels (0-25%) with cassava peels based concentrate as fed suggestingthat oil did significantly reduce the rate of methanogenesis in terms ofmethane reduction at low level of supplementation with cassava peels.

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CHAPTER ONE
INTRODUCTION
The in vitro gas production technique has been frequentlyused to assess biological values of feeds based on their pattern of accumulatedgas when incubated with rumen fluid under anaerobic conditions. The techniquewas initially proposed by Menke et al., (1979) to assess digestibility andmetabolizable energy (ME) content f feeds commonly fed to ruminants. Empiricalequations using gas production and chemical components of the feeds were usedto predict ME (Menke and Steingass, 1988). Furthermore, it has been reportedthat the feedstuffs in vitro is time consuming, laborious, expensive, requireslarge quantities of feed and is unsuitable for large scale feed evaluation.
Methodology used to measure in vitro gas production isreviewed to determine impacts of sources of variation on resultant gasproduction profiles (GPP). Current methods include measurement of gasproduction at constant pressure (e.g., use of gas tight syringes), a systemthat is inexpensive, but may be less sensitive than others thereby affectingits suitability in some situations. Automated systems that measure gasproduction at constant volume allow pressure to accumulate in the bottle, whichis recorded at different times to produce a GPP, and may result in sufficientlyhigh pressure, that solubility of evolved gases in the medium is affected,thereby resulting in a recorded volume of gas that is lower than that predictedfrom stoichiometric calculations. Several other methods measure gas productionat constant pressure and volume with either pressure transducers or sensors,and these may be manual, semi-automated or fully automated in operation. Inthese systems, gas is released as pressure increases, and vented gas isrecorded. Agitating the medium does not consistently produce more gas withautomated systems, and little or no effect of agitation was observed withmanual systems.
The annual world production of cereal straws and stovers isapproximately 2 000 million tons, however, the energy contained in this vastbulk of material is on the whole poorly utilized and its nitrogen incompletelyreturned to the soil (Reddy et al.,2003). With the rising prices of both energyand nitrogen fertilizer, interest is developing in more efficient ways ofutilizing straws, presently used mainly as livestock

feed and as compostmaterial (small amounts are used for the manufacture of paper and fibreboards).In the tropical and subtropical areas of the world almost all straw is fed tolivestock, the resulting dung being widely used as fuel. With straw feeding,energy utilization is relatively efficient, except for the residual energy inthe indigestible matter which is wasted, but the introduction of dungfermentation in place of dung burning increases the proportion of strawnitrogen which is returned to the soil, thus improving the overall efficiency.In developing countries like Nigeria where there is abundance of agriculturalwastes, the use of in vitro becomes relevant. The in vitro method of feedevaluation is less expensive and less time consuming when compared with in vivomethods (Akinfemi et al., 2010). The in vitro gas production system helps tobetter quantity the nutrient utilization and its accuracy in describingdigestibility in animal has been validated numerous experiments (Rymer etal.,1999). Although, gases produced during rumen fermentation are colossalwaste products and of no nutritive value to the ruminant, but gas productiontest are used routinely in feed research as gas volumes are related to both theextent and rate of substrate degradation.

1.1 Research Objective

The objective of this paper is to investigate the effect ofin vitro gas production using maize straw with cassava peels supplements as feedsfor ruminants. This will help to show;

The degradation of maize straw with cassava peels supplementin terms of digestibility.

The effect of oil drench in defaunation of ruminants.

Effect of oil on methane gas production.

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