

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 gas fermentation pattern using maize straw with cassava peels based supplement fed to WAD goats. The goats were fed in six different treatments, with (treatment 1: maize straw +10% cassava peels concentrate without oil drench, treatment 2: maize straw +25% cassava peels concentrate with oil, treatment 3: maize straw +50% cassava peels without oil, treatment 4: maize straw +25% cassava peels concentrate without oil, treatment 5: maize straw +50% cassava peels concentrate without oil and treatment 6: maize straw +10% cassava peels concentrate with oil). Maize straw and cassava peels were later dried and milled for chemical analysis and in vitro gas fermentation study. Chemical analysis of maize straw and cassava peels show that cassava peels concentrate produced higher crude protein content than maize straw. The NDF values for maize straw and cassava peels were 55% and 33% while the ADF values were 31.5% and 16% respectively. In vitro gas studies show that treatments with oil did not show significant difference ($P > 0.05$) to treatments without oil in terms of gas production as shown in treatment 3 with oil and treatment 5 without oil. Gas volume was significantly higher ($P > 0.05$) in treatment 2 with oil compared to treatment 4 without oil. Value for methane production varied from 0.33ml to 4ml for treatments with oil and 2ml to 4.33ml for treatment without oil. DMD was highest in treatment 5 and lowest in treatment 6. This result shows that oil had a significant effect ($P < 0.05$) on gas production using maize straw supplemented at low levels (0-25%) with cassava peels based concentrate as fed suggesting that oil did significantly reduce the rate of methanogenesis in terms of methane reduction at low level of supplementation with cassava peels.

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CHAPTER ONE

INTRODUCTION

The in vitro gas production technique has been frequently used to assess biological values of feeds based on their pattern of accumulated gas when incubated with rumen fluid under anaerobic conditions. The technique was initially proposed by Menke et al., (1979) to assess digestibility and metabolizable energy (ME) content of feeds commonly fed to ruminants. Empirical equations using gas production and chemical components of the feeds were used to predict ME (Menke and Steingass, 1988). Furthermore, it has been reported that the feedstuffs in vitro is time consuming, laborious, expensive, requires large quantities of feed and is unsuitable for large scale feed evaluation.

Methodology used to measure in vitro gas production is reviewed to determine impacts of sources of variation on resultant gas production profiles (GPP). Current methods include measurement of gas production at constant pressure (e.g., use of gas tight syringes), a system that is inexpensive, but may be less sensitive than others thereby affecting its suitability in some situations. Automated systems that measure gas production at constant volume allow pressure to accumulate in the bottle, which is recorded at different times to produce a GPP, and may result in sufficiently high pressure, that solubility of evolved gases in the medium is affected, thereby resulting in a recorded volume of gas that is lower than that predicted from stoichiometric calculations. Several other methods measure gas production at constant pressure and volume with either pressure transducers or sensors, and these may be manual, semi-automated or fully automated in operation. In these systems, gas is released as pressure increases, and vented gas is recorded. Agitating the medium does not consistently produce more gas with automated systems, and little or no effect of agitation was observed with manual systems.

The annual world production of cereal straws and stovers is approximately 2 000 million tons, however, the energy contained in this vast bulk of material is on the whole poorly utilized and its nitrogen incompletely returned to the soil (Reddy et al., 2003). With the rising prices of both energy and nitrogen fertilizer, interest is developing in more efficient ways of utilizing straws, presently used mainly as livestock

feed and as compost material (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 to livestock, the resulting dung being widely used as fuel. With straw feeding, energy utilization is relatively efficient, except for the residual energy in the indigestible matter which is wasted, but the introduction of dung fermentation in place of dung burning increases the proportion of straw nitrogen which is returned to the soil, thus improving the overall efficiency. In developing countries like Nigeria where there is abundance of agricultural wastes, the use of in vitro becomes relevant. The in vitro method of feed evaluation is less expensive and less time consuming when compared with in vivo methods (Akinfemi et al., 2010). The in vitro gas production system helps to better quantify the nutrient utilization and its accuracy in describing digestibility in animal has been validated numerous experiments (Rymer et al., 1999). Although, gases produced during rumen fermentation are colossal waste products and of no nutritive value to the ruminant, but gas production test are used routinely in feed research as gas volumes are related to both the extent and rate of substrate degradation.

1.1 Research Objective

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

The degradation of maize straw with cassava peels supplement in terms of digestibility.

The effect of oil drench in defaunation of ruminants.

Effect of oil on methane gas production.

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