

Effects of Ammoniated Sugar Beet Pulp by Different Levels of Ammonia and Added Enzyme on Parameters of In Vitro Gas Production

B. Sadighian and A. A. Naserian

Department of animal science of Ferdowsi University of Mashhad, Mashhad, Iran Dept.
Animal Science, Excellence Centre for Animal Science, Faculty of Agriculture, Ferdowsi
University of Mashhad, P O Box 91775-1163, Mashhad, Iran
Corresponding email: behnamsadighian@yahoo.com

ABSTRACT

The objective of the present study was to evaluate the effect of ammoniation of sugar beet pulp (BP) by ammonia and enzyme on in vitro gas production parameters. The samples were left treated with ammonia 1, 2 and 3 percent of (BP) and untreated or treated with enzyme 0.5 g/kg. The gas production data were fitted using an exponential equation of $P = b(1 - e^{-ct})$, where b is the volume of gas produced, c is the fractional rate constant of gas production (/h), t is the incubation time (h) and P is the volume of gas produced at time t . A significant difference of gas production parameters ($p < 0.05$) was observed among the feed samples evaluated in the present study. Present results indicate increase level of ammonia caused a significant decrease ($p < 0.05$) in both b and c fractions of ammoniation BP. The enzyme was also decreased in both parameters. The most important finding of the present study is the different response of the feed samples evaluated when treated with ammonia.

Key Words: Sugar beet pulp, Ammoniation, Enzyme

INTRODUCTION

A goal of ruminant microbiologists and nutritionists is to manipulate the ruminal microbial ecosystems to improve the efficiency of converting feed to animal products consumable by humans. The ammoniation of feeds such as Roughage and proven to be a useful tool to reduce protein and nitrogen losses from the diet. The ammoniation sugar beet pulp is a process for treating BP with anhydrous ammonia (NH₃) to improve crude protein, digestibility and available fiber and carbohydrates. It has been shown to improve the nutritive value of low quality forages such as corn stover (Kunkle et al., 1980). Most different of the chemical compound and nutrition quality of sugar beet pulp associated amounts of molasses; and no don't have any information about fermentation parameters.

MATERIALS AND METHODS

The effect ammoniation BP was of evaluated in an in vitro gas production (Menke and Steingass, 1988). Samples were moisture sugar beet pulp (by 60 percent addition water) ammoniation with ammonia 1, 2 and 3 percent of BP and used as untreated or treated with enzyme 0.5 g/kg. The enzyme was a mix of several enzymes (Cellulase, Xylanase, Beta-glucanase, Pectinase, Phytase, and Alpha-amylase). Treatments were ensiled for 2 weeks. Each treatment had 3 replicates. After 14 days, trial silages were evaluated for fermentational properties. Approximately 0.2 g of each sample (four replicates) ground through a 2 mm screen and was placed in a 125 ml glass vial. Blank vials were incubated with buffer alone. Then, vials were incubated in four replicate and blanks were incubated in two replicated. Three ruminally fistulated steer were used as donors of rumen fluid. Rumen content was collected before the morning feeding. The gas production method of

Menke and Steingass (1988) was used. Rumen fluid was immediately strained through four layers of cheesecloth and mixed in a 2:1 with buffer, then, 30 ml of diluted fluid was added into the vials. Each vial was gassed with CO₂ then incubated at 38.6°C. The volume of gas produced was determined at 2, 4, 8, 12, 24, 36, 72 and 96 h after the incubation. The gas

production data were fitted using an exponential equation of $P = b(1 - e^{-ct})$, where b is the volume of gas produced, c is the fractional rate constant of gas production (/h), t is the incubation time (h) and P is the volume of gas produced at time t . Statistical analysis was conducted using SAS 9.2 software.

RESULTS AND DISCUSSION

Effect of ammoniation BP on in vitro gas production parameters is shown in Table 1. Increase level of ammonia caused to significant ($p < 0.05$) decrease in both b and c parameters. Also, it had a negative ($p < 0.05$) effect on b and c parameters of sugar beet pulp, while addition enzyme to BP. Results of the present study demonstrated that the gas production parameters of the feed samples were significantly different ($p < 0.05$).

Table 1. Effect of ammoniation BP on in vitro gas production parameters

Level of ammonia	Level of enzyme	b	c
1	0	64.8402±1.28 ^a	0.076±0.0012 ^a
1	1	62.5163±4.74 ^b	0.07361±0.0009 ^{ab}
2	0	59.1379±0.42 ^c	0.074±0.0017 ^{ab}
2	1	56.7956±2.11 ^e	0.07326±0.00102 ^{ab}
3	0	57.8087±3.1 ^d	0.07201±0.0014 ^c
3	1	56.7515±1.35 ^e	0.07024±0.0011 ^d

In addition, results indicated that the gas production parameters of the feed samples were significantly altered when ammonia and enzyme were included in the medium.

REFERENCES

- Kunkle, W. E., E. C. Leffel and E. N. Escobar. 1980. Effect of method of harvest, anhydrous ammonia treatment and supplemental protein on the feeding value of corn residue. *J. Anita. Sci.* 51 (Suppl. 1):241.