



Effect of Monensin and Plant Extract Supplementation on Feeding Behaviors, Production and Carcass Characteristics of Afshari Lambs

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Introduction The ionophore antibiotics have been added to high-grain diets as feed additives and reduced digestive problems with this compound have been reported in many studies. Monensin is an important ionophore that has been used for approximately four decades based on its potential to control rumen fermentation pattern and to decrease the incidence of acidosis and increase efficiency of nutrient utilization. These ionophores facilitate the release of ions from the lipid membrane of bacteria and protozoa also ionophores increase propionate and decrease methane production. However, the use of antimicrobial agents as feed additives can contribute to antimicrobial resistance both in animals and humans, posing a serious risk to the public health. More recently, there has been a growing interest in the potential use of plant extracts as alternatives for antimicrobial feed additives in ruminants. The essential oils are second metabolites of plants, which have some effects on ruminal protein degradation and mitigate methane production. We hypothesized that replacing the plant extract for monensin would affect behavior and performance of Afshari lambs fed high concentrate diet.

Materials and Methods Thirty two Afshari lambs with an average initial weight of 41 ± 5.6 kg and six months old were used in a completely randomized design with four treatments and eight replications in each treatment for 56 days with 21 days as an adaptation period and 35 days as an experimental period. In these periods, four diets for feedlot lambs were given. The basal diet was contained 20 % alfalfa hay, 65 % ground barley and 11% soybean meal. The basal diet was formulated with Cornell model software. Crude protein and metabolizable energy were 16 % and 2.75 Mcal/kg of dry matter respectively. The experimental diets were; 1) basal diet without additives, monensin or essential oil, 2) basal diet with 30 mg monensin/d for each lamb, 3) basal diet with two grams of a commercial plant extract, and 4) basal diet with periodically inclusion of 30 mg monensin/d for each lamb for two weeks and no for next two weeks. The lambs were weighed weekly and feed intake was measured daily. Feeding behavior and rumination and rumen pH determination was performed every two weeks. At the last day the lambs were slaughtered and the carcasses characteristics were determined.

Results and Discussion Differences in dry matter intake did not differ due to relatively large individual variation in voluntary intake, but it tended to lower ($P = 0.06$) with monensin fed lambs. Effect of monensin on feed intake varied over time. The increases in feed efficiency and propionate production have hypothesized in many studies for decreasing DMI with monensin supplementation. Monensin can increase propionate production and its supply to liver and it has a hypophagic effect. Monensin inclusion to basal diet result to increase the time spent eating, chewing activity and the mean of eating meals, and also it increased eating and chewing activity for each kg of dry matter intake ($P < 0.05$), and however, these effects were not observed with periodical inclusion of monensin. It is reported that monensin had an effect on rumen fermentation and it can reduce absorption of nutrients during a meal, so the meal size is reduced. Lambs fed high concentrate diets were adapted and had decreased rumen pH fluctuations when monensin was included in diet. Daily weight gain and slaughter weight was not significantly different between treatments ($P > 0.05$). The lambs fed monensin periodically had numerically lowest weight gain and monensin fed lambs had greater hot and cold carcass weight. Proposed that increased propionic acid as a result of the effects of monensin may be used in gluconeogenesis, thus it spared the amino acids for glucose and indirectly increase muscle or protein accretion. In addition, monensin stimulates micro-organisms in the digestive tract, so it optimizes nutrient synthesis in rumen and improves nutrient absorption in the digestive system.

Conclusion The results showed that periodically inclusion of monensin to lambs diet may compromise performance compared to daily inclusion of monensin and plant extract. Inclusion of plant extract had a positive

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effect on daily weight gain and could be replaced for monensin, but further research is need to warrant these effects and ruminal and metabolic aspects of plant extracts and monensin.

Keywords: Essential oil, Finishing lamb, High grain diet, Monensin.