The effects of Garlic Oil (*Allium sativa*), Turmeric Powder (*Curcuma longa Linn*) and Monensin on Total Apparent Digestibility of Nutrients in Baloochi Lambs

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**Abstract**—The objective of this study was to determine the effects of garlic oil (*Allium sativa*), turmeric powder (*Curcuma longa Linn*) and Monensin on Total apparent digestibility of nutrients in Baloochi lambs. The experiment was designed as a 4 x 4 Latin square using 4 ruminally baloochi lambs with 4 treatments in four 28-d periods. Treatments were control (no additive), garlic oil (0.4 g/d), monensin (0.2 g/d) and turmeric powder (20 g/d). Total apparent digestibility's (% of intake) of organic matter (OM), dry matter (DM), crude protein (CP), ether extract (EE), non fiber carbohydrate (NFC), acid detergent fiber (ADF) and neutral detergent fiber (NDF) in the total tract were not influenced by addition of either additives.

**Keywords**—apparent digestibility, essential oil, garlic oil, monensin, turmeric

**I. INTRODUCTION**

Essential oils (EO) are volatile, complex mixtures of secondary metabolites and volatile compounds characterized by a strong odor extracted from plants through distillation process and are formed by aromatic plants as secondary metabolites. They are known for their antiseptic, i.e. bactericidal, virucidal and fungicidal, and medicinal properties and their fragrance. Essential oils used traditionally by man for many centuries for the pleasant odor of the essence [1]. Essential oil is classified as generally recognized as safe food additives and have been proposed as a safe alternative to antibiotics growth promoter [2]. Essential oils have been shown to modulate ruminal fermentation to improve nutrient utilization in ruminants [3]-[4]. It is accepted that the controlled administration of certain antibiotics can be useful for ruminants and non ruminants [5]. In ruminants, several types of chemicals agents and antibiotics have been developed in order to manipulate the fermentative digestion and flux of nutrients from rumen [6]. Most of the products used for ruminants are ionophores, these can increasing efficiency of energy metabolism and improve nitrogen metabolism in the rumen [7]. One of the ionophores that most commonly used feed additives in cattle is monensin [8]. There is a great awareness from public health aspects such as residues of these chemicals in the milk and meat and bacterial resistance to antibiotics [9]. In the last two decades have seen a substantial increase in the use of aromatic herbs and essential oils as feed additives in animal nutrition. One of the main reasons for this trend is to substitute antibiotic growth promoters, which have been completely banned as feed additives in the European Union since 2006 [10]. Besem Plants and their extracts have important potential as manipulators of rumen fermentation for productivity and health benefits [11]. Only a few studies to date have investigated the effects of EO or their components on digestion in sheep. Objective of this experiment was to evaluate the effect of monensin, garlic oil (*Allium sativa*) and turmeric powder (*Curcuma longa Lin*) on total apparent digestibility of nutrients in Baloochi lambs.

**II. MATERIALS AND METHODS**

**A. Animals, diet and experimental design**

The Four ruminally fistulated Baloochi lambs (38±1.5 kg body weight) were used in a 4x4 Latin square design with 4 periods. Each period included 21 days of adaptation. The animals were housed in individual metabolically cages (0.5×1.2×1m) and had free access to salt and fresh water throughout the experiment. The animals were fed a diet, (2.48 Mcal kg⁻¹ DM and CP 155 g kg⁻¹DM) containing of Lucerne hay and concentrate (45:55 based on DM, respectively). The treatments were basal diet (as control) or plus 0.4 g of garlic oil, 20 g turmeric powder and 0.2 g monensin (day/head).

**B. Sampling and Chemical Analyses**

Experimental period consisted of 28 days; the first 21 days were designated to adaptation of animals to diets and 7 days of each period for feces collection. The digestibility trial was performed between the 21 and 28 day. For each animal, Dry Matter Intake (DMI) was measured at the last seven days of each period and grab samples of feces (approximately 150 g) were collected at the last seven days of the period. All chemical analyses were performed for each
sample in duplicate. All feed and feces samples were ground through a Wiley mill with a 2 mm screen for chemical analyse. Analytical dry matter (DM) of the samples was determined by drying in air oven at 55 °C for more than 72 h until constant weight[11]. Ash content was determined by oven at 550°C overnight, organic matter (OM) content was calculated as 100 minus the percentage of ash[11].

The neutral detergent fiber (NDF) and acid detergent fiber (ADF) contents were determined using the methods described by Van Soest et al., (1991) [12]. Crude protein (CP) was determined by the Kjeldahl method[11]. Non fiber carbohydrate (NFC) concentration in diet and feces was calculated as NFC= 100-(CP+ ash+ EE+ NDF). Total tract apparent digestibility of nutrients was calculated as suggested with Church (1988) [13].

C. Statistical Analyses

Data were analyzed using the same mixed model procedure of SAS[14] as a Latin square design with treatment, period, and their interaction as fixed effects and lambs within treatment as random effects.

III. RESULTS AND DISCUSSION

Results of the present study indicated that Total apparent digestibility's of DM, OM, CP, NDF, NFC, EE and ADF were not influenced by garlic oil, monensin and turmeric powder supplementation compared with control (Table 1).

IV. CONCLUSION

These results suggest that supplementation of garlic oil, monensin and turmeric powder in the lamb diets had minimal beneficial effects on total digestibility tract of lambs, it did not alter feed digestion under the experimental conditions of the current study. However, evaluation their effects on ruminal fermentation and animal immunity needs to investigation.

REFERENCES


