

Original Article**Effect of Concentrate: Roughage Ratio and the Addition of Kefir on the Production Characteristics of Ruminant *in vitro***Al-Galbi, H. A. J^{1*}, Majeed, M. S¹*1. Animal Production Department, College of Agriculture, University of Basrah, Basrah, Iraq*

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Abstract

The stability of the gut ecosystem, especially the rumen, is an important area of research that has an impact on the use of feed additives and is associated with a number of diseases. The current study aimed to survey the effect of concentrate: roughage (C: R) ratio and the addition of kefir on the production characteristics of *in vitro* ruminant fermentation. In a 5x6 factorial order, six ratios of C: R (100:0, 80:20, 60:40, 40:60, 20:80 and 0:100) and five doses of kefir (0, 0.8, 1.6, 2.4, and 3.2 ml) were used, respectively. Gas production during incubation was estimated at 0- 96 h. During inoculation, the rumen fluid was obtained at 0, 4, 8, 12, and 24 h of incubation. Cumulative gas production, GPDM, GPOM, and GPNDP at 24 h was highest at the C: R ratio of 100:0 (67.82 mL, 75.92 mL/ 200 mg, 1979.15 mL/200 mg, and 11.11 mL/ 200 mg, respectively). The kefir addition improved the kinetics and gas production significantly. The highest *in vitro* dry matter and organic matter digestibility (IVDMD and IVOMD) were obtained at the C: R ratio of 100:0 (9.26% and 182.2% higher than those in C: R ratio of 0:100, respectively). The increase of concentrate diet ratio improved the overall volatile fatty acids (TVFA). No interaction effect on the gas production was detected between the C: R ratio and kefir. The microorganism populations were influenced neither by the level of concentrate nor by the level of kefir. Consequently, the high concentrate-to-roughage ratio and the addition of 1.6 mL kefir to the overall dietary substrate could promote rumen fermentation and feed digestibility without affecting microbe counts.

Keywords: Concentrate: Roughage, Gas production, *In vitro* ruminal fermentation, Kefir**1. Introduction**

Feed additives are extremely important in livestock ration due to the increase in nutrient utilization, change in rumen fermentation, and optimization of efficiency in livestock production processes. Due to the prohibition of synthetic hormones and antibiotics in livestock feed additives in many countries, the use of probiotics, feed enzymes, herbs, and other "natural" supplements is becoming increasingly popular and considerable. In addition to increasing the efficacy, these natural food additives minimize the transmission risk of human infections, reduce antibiotic use and risk of developing antibiotic resistance, and limit the

removal of contaminants. Recently, many additives have been examined to replace or reduce the use of antibiotics, such as probiotics (1). Probiotic bacteria are live bacterial feed additives that increase the microbial balance of the host animal. It has been shown that probiotics have multiple functions, including the prevention of young animals from enteropathy diseases, enhancement of feed quality, animal growth, and immunity system (2-4).

Kefir is saline, thick, lightly carbonated, and fermented milk mixture that is often cultured with bacteria and yeasts. Kefir is made from the kefir grains through the inoculation of cow, sheep, or goat milk (5).