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Effect of semi-arid native fennel (*Foeniculum vulgare*) essential oil on *in vitro* gas production parameters of various ruminant fiber source feeds

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The effect of semi-arid native fennel (*Foeniculum vulgare*) essential oil (FE) on the fermentation potential of cottonseed hulls (CH) and wheat straw (WS) was evaluated. Samples were ground through a 1-mm screen, and then dried (66 °C for 48 h). Both CH and WS were subjected to an *in vitro* gas production technique as un-supplemented or supplemented with FE as 40 or 80 µl/g DM; named CHFE40, WSFE40, CHFE80 and WSFE80, respectively. Approximately 0.2 g of each feed sample (n=4) was placed in a 100 ml glass syringe containing 40 ml of buffere:rumen fluid (2:1). Rumen fluid was obtained from two rumen cannulated sheep (body weight= 45.5±2 kg) before the morning feeding and immediately strained through four layers of cheesecloth. Animals were fed 1.5 kg DM alfalfa hay and 0.4 kg DM concentrate (165 g CP/kg DM) per head per day. Syringes were incubated at 39 °C and the volume of gas produced was recorded at 2, 4, 8, 12, 24, 36, 48, 72 and 96 h. The gas production data were fitted to an exponential equation of $P = b(1 - e^{-ct})$, where b= volume of gas produced, c= fractional rate constant (/h), t= incubation time (h) and P= volume of gas produced at time t. The parameters of the supplemented samples were compared with the non-supplemented samples as controls using Dunnett's test at P<0.05. Supplemented samples of CH and WS had a significant (P<0.05) less b fraction compared with the non-supplemented samples (CH=73, CHFE40=9, CHFE80=11, WS=86, WSFE40=7 and WSFE80=10 ml/0.2 g DM). The rate constant of gas produced (c) from CH and WS (0.02 and 0.03, respectively) was significantly (P<0.05) increased by the adding of FE at the both applied rates (0.05 and 0.05, 0.05 and 0.04, respectively). The present results indicate that FE has a potential to alter the fermentation characteristics of the both feed samples evaluated.

Feeding value of carob (*Ceratonia siliqua* L.) as an industrial processing by-products

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Nutrient composition, digestibility, feed and feeding value of carob (*Ceratonia siliqua* L.) pulp and pulp silage were evaluated through chemical analysis and fecal collection method. Laboratory analysis indicated that carob pulp and carob silage contained 34.43 and 37.63% dry matter (DM), 96.95 and 92.47% organic materials (OM), 7.20 and 5.5% crude protein (CP), 0.66 and 0.16% ether extracts (EE), 9.24 and 12.58% crude fiber (CF), 3.05 and 7.53% crude ash (CA) 76.80 and 74.23% nitrogen-free extracts (NFE) in dry matter basis, respectively. Digestion coefficients of DM, OM, CP, EE, CF, NFE of pulp and pulp silage calculated depending upon the data collected from digestion trials conducted on three Chios rams were 55.32, 54.65, 59.89, 63.69, 66.54, 52.27%; 53.43, 51.76, 63.04, 62.14, 65.56, 49.13%, respectively. The feed value of carob pulp and pulp silage in terms of total digestible nutrients (TDN) and starch unit (SU) were calculated as 51.32 and 47.96%, 474 and 417 g/kg (47.40 and 41.70%). Similarly, DE, ME and NE contents were found to be 2258 and 1856, 1117 and 2110, 1734 and 982 kcal/kg., respectively. In addition, pH of the carob pulp silage measured and ranked as 'good' depending on organic acid contents and as 'very good' according to both sensory evaluations and Flieg scoring method. Overall results of the research indicated that carob pulp and pulp silage could be efficient alternative roughage in ruminant nutrition.