

Silage fermentation characteristic of perennial grass-legume mixture ⁽¹⁾

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Received: Jun. 7, 2016; Accepted: Nov. 2, 2016

Abstract

Grass-legume mixture has the function of elevating nutritional value of forage and balancing soil nutrient. Owing to the humid climate of Taiwan, hay drying of grass is not easy, hay making of grass-legume is even more difficulty. Ensiling will be a feasible alternative for mixture production. Three experiments were conducted in this research to investigate the fermentation characteristics of grass-legume mixture and their affecting factors. Two grasses and two legumes were included in experiment I and their grass percentage ranged from 30% to 100%. After 8 weeks ensiling of the un-wilted forages, the pH were 4.25-4.85, total acids were 3.0-6.4% (dry base) and all were low in lactic acid and low lactic acid/acetic acid ratio and high butyric acid yielding. It indicated that good fermentation can't be attained under high moisture condition even inoculation were applied. In experiment II, silages were made of pangola-alfalfa mixture wilted to 38% DM (dry matter) with or without inoculation and were assayed at 4, 8 and 12 weeks. Silages of experiment II showed lower total acids, lower acetic acid and butyric acid but higher lactic acid/acetic acid ratio as compared to those in experiment I. All treatments in experiment II got excellent score except that without inoculation. All inoculants used in this experiment were helpful to lactic acid synthesis, but had different effects on fermentation product. Silages without inoculation were higher in pH than others at 4 weeks storage, while the differences between them were closer after 8 weeks. It indicated that though good fermentation could be achieved without inoculation under proper condition, but longer time was required for fermentation. In experiment III, grass-legume mixtures were filled into barrel and sausage bag with or without inoculation. The results showed that divergence effects of inoculation or not were magnified under the conditions that air can't be exclusively repelled. Silage with inoculation were excellent in grade, while that of without inoculation were failed in both types of ensiling. It is concluded that moisture is the key factor to grass-legume ensiling. In practical operation, which rigorous anaerobic condition is hard to reach, inoculation can promote and stabilize fermentation quality. The endurable ranges of moisture that act in concert with inoculation for good fermentation need further study.

Key words: Grass-legume mixture, Inoculant, Silage.

(1) Contribution No. 2513 from Livestock Research Institute, Council of Agriculture, Executive Yuan.

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