

Examination of Tef as a New Forage Crop for Dairy Cows in Israel

Submitter to the Israel milk board

By: Y. Saranga, S.J. Mabeesh, S. Ben-Zeev and P. Wagali.

The Hebrew University of Jerusalem, Faculty of Agriculture Food and Environment

Abstract:

Eragrostis tef (hereinafter: tef) is a grain and forage cereal crop, originated and primarily cultivated in Ethiopia. Tef is known worldwide as a multi-cut forage crop with highly productivity and excellent quality, as also confirmed in our previous works.

Objectives: Our overall objective was to examine the potential of tef as a new multi-cut summer forage crop for Israel. More specially we aimed to: (a) characterize the performance different tef varieties as multi-cut summer fodder, (b) examine the effects of harvest at various phenological stages, (c) characterize the productivity, water-use efficiency and quality of tef fodder under diverse irrigation regimes, (d) examine the effect of feeding with tef hay on the performance of high-yielding dairy cows.

Harvest regimes: 12 tef genotypes of different earliness levels were tested in the field across two years (2020-21) and harvested at either flowering onset, grain filling or grain maturity. The various genotypes were harvested during the experiment 2-4 times at flowering onset, 1-2 times at the grain filling and once at grain maturity. The total dry biomass harvested at flowering onset throughout the experiment reached up to 18 t/ha and at grain filling up to 25 t/ha. The protein content in dry matter reached 18% at flowering stage.

Response to water quantity: In a series of 3 experiments, using a single line method, we examined the responses of four tef genotypes to water doses of 190-340 mm. The results indicated a potential production of over 1500 kg per dunam in a single harvest at grain filling using 300-350 mm of water, with an average increase of 2.27 kg dry matter per mm of irrigation water.

Feeding in rations containing tef forage: Feeding trial of high-yielding cows in rations containing tef indicates a significant advantage of tef hay as a source of roughage in terms of milk yields and its components. Metabolites in the rumen, particularly volatile fatty acids, suggest rumen microbial fermentation towards an increased production of propionic acid, which is a precursor for available energy in the cow's body that is routed to anabolic pathways and synthesis.

Preservation of tef as silage: Another experiment that was not included in the original plan involved examining the possibility of preserving tef as silage. The results showed for the first time that the tef can be silaged, despite of its extremely low soluble carbohydrate content (WSC) compared to maize which is considered an ideal forage for silage.

In summary: The results of the current study indicate the potential of the tef as a high quality summer forage crop for ruminants in general and especially for the dairy cows.

Publications cased on this research:

1. Wagali P. S, C. Sabastian T, Y. Saranga PI, S. Ben-Zeev S, S.J. Mabeesh PI. 2023. The Effects of Irrigation, Genotype and Additives on Tef Silage Making. *Animals* 13:470.
2. Wagali P., G. Ngomuo, J. Kilama, C. Sabastian, S. Ben-Zeev, Y.A. Ben-Meir, N. Argov-Argaman, Y. Saranga, S.J. Mabeesh. 2023, Effect of tef (*Eragrostis tef*) hay inclusion on feed intake, digestibility, and milk production in dairy cows. *Front. Anim. Sci.* 4:1260787.
3. Wagali P., C. Sabastian, S. Ben-Zeev, Y. Saranga, S.J. Mabeesh. 202#, Effect of harvest regime on tef forage production and quality (*Eragrostis tef*). 202#. (In prep.)