Effects of Stage of Harvest on Yield and Quality Traits in Tall Fescue (*Festuca arundinace*)

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Introduction Tall fescue (Festuca arundinacea *Schreb) is one of the main perennial grasses that growsnaturally in temperate pasture and rangelands in north and west of Iran . It is used for hay production and grazing by livestock . Tall fescue grows in Iran at elevations of 1200m to 2900m in areas receiving more than 300 mm annual precipation (Rechinger , 1970) . Maturity stage at harvest is the most important factor determining forage quality in grass species . This study was designed to determine the effect harvest date had on forage dry matter (DM) yield and three quality traits : dry matter digestibility (DMD) , water soluble carbohydrate (WSC) , and crude protein (CP) in Tall fescue (*Festuca arundinace *Schreb) .

Material and methods Eight foreign and domestic accessions of tall fescue were sown as spaced plants using a randomized complete-block design with two replications in irrigated plots . Plantings were made at the Research Institute of Forests and Rangelands , Karaj , Iran in 2004 . Main plots were divided into 5 subplots each containing 10 spaced plants in rows 50 cm apart , with 40 cm spacing within rows . No measurements were taken during the establishment year . Forage was cut at five maturity stages (vegetative , panicles emergence date , anthesis date , milky and soft dough seeds [maturity]) . When harvested plants were cut and weighed . A subsample was taken , dried at 70 ℃ for 12 h , and reweighed to determine DM yield , then ground with a 1 mm screen mill . Three quality traits (DMD , WSC and CP) were estimated in the first cuts for two subsequent years using near infrared spectroscopy (NIR) . Details of the methodology and calibrations of NIR are given by Jafari et al . *(2003) . Data were analyzed using a factorial experiment for individual year . Data were also subjected to a combined analysis of variance across years using a split-plot-in-time design with years as sub-plots (Steel & Torrie 1980) .*

Results and discussions Results showed the significant effects of phenological stages for all of traits . Average values of DM yield were increased from 3 .4 to 5 .4 ton/ha from vegetative to soft dough stage , respectively (Figure 1 and 2) . In vegetative stage , DM yield values were 54% lower than soft dough . Therefore , as a general rule one can estimate about half the yield at vegetative than what would be expected at soft dough in tall fescue . Percent of DMD and CP were highest when the plants were immature . CP tends to drop sharply as the plants go to milky stage and then its value was consistent from milky to soft dough stage (Figure 1) . DMD values were declined from 55 .18 to 40 .62 for vegetative and soft dough stage , respectively . DMD declines were slower than for CP with advancing maturity from vegetative to milky stages . But , DMD valuesdropped off sharply from milky to soft dough stage (Figure 2) . The effects of genotypes were significant for DM yield and DMD% . Festurina with average values of 4 .9 ton/h had higher DM yield over all of phenological stages . The genotypes × phenology interaction effect was significant for DM yield and non significant for three quality traits . Yields of quality traits (DMD , CP and WSC) were estimated for each phenological stage (Figure 3) . The higher yield values for DMD , CP and WSC were obtained in milky stage . Since , DM yield were consistent over both milky and soft dough stage , it was concluded that milky stage is the best time of harvesting for both yield and quality traits in tall fescue under conservation management .

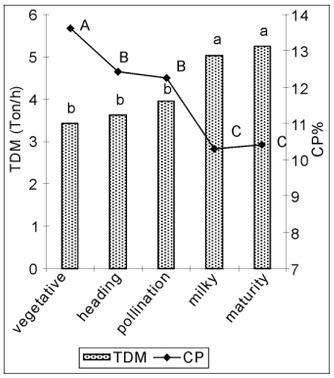

Figure 1 *The effects of maturity stages on both DM yield and CP% in tall fescue .*

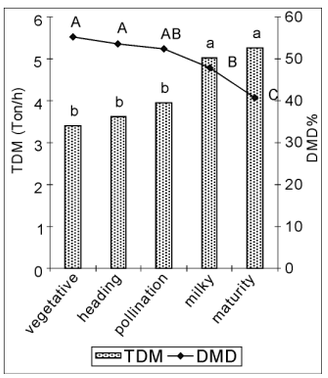

Figure 2 *The effects of maturity stages on DM yield and DMD% in tall fescue .*

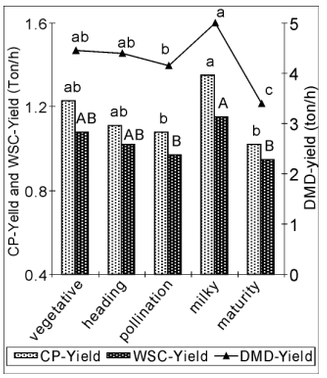

Figure 3 *The effects of maturity on CP yield , WSC yield and DMD yield .*

Reference

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