Modification of Rate and Extent of Fiber Digestibility In Alfalfa

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Until the 1950s hay quality was determined primarily by color. Methods of measuring nutritive value in alfalfa and other forages have evolved considerably since the Proximate (Weende) Analysis was first used in the 1800s. Recent improvements take into account multiple time points to integrate fiber digestion kinetic parameters and also estimate the total amount of potentially digestible fiber in a forage sample to more accurately predict animal response. Steps where variability is introduced into the measurement of forage quality or feeding value of alfalfa are well understood. These include but are not necessarily limited to the following: sample procurement, drying, grinding, sub-sampling, storage, and NIRS analysis. For researchers to have any chance to meaningfully measure forage quality differences or to expect gain from selection in a breeding program, understanding these sources of variation and developing procedures to minimize their impact are necessary. Routine, yet rigorous, focused selection for lower lignin in diverse germplasm pools was imposed to exploit existing native trait genetic variability. Selection in segregating spaced plant nurseries was based on multiple harvests per year and was imposed across a wide array of fall dormancy groups. Breeder seed (Syn.1) was produced under cage isolation and resulting experimental varieties were entered in standard replicated multiple-location forage yield trials during 2010-2015 which also included conventional experimental varieties from the same breeding cycle as well as commercially available check varieties. Forage yield was measured for 3 or 4 years and forage quality samples taken in the 1st, 2nd, and/or 3rd hay year from a minimum of 3 cuttings. Based on the data, varieties in fall dormancy groups 3, 4, 6, 9, and 10 were advanced commercially and launched with the Hi-Gest® Low Lignin Technology in the Alforex Seeds brand. Data collected during 2010-2015 in all dormancy groups consistently showed that significant positive responses to selection for lower lignin were achieved. Compared to appropriate control check varieties in research trials, Hi-Gest varieties have demonstrated lower lignin, faster rates of digestion (kd), greater extent of digestibility (uNDF240), higher TTNDFD, and higher crude protein. During the 2015 growing season 33 double blind on-farm forage samples (hay or haylage) from commercial growers and dairies across the US were submitted to a commercial feed testing for quality analysis including TTNDFD, kd, uNDF240, and lignin. Compared to other on-farm alfalfa samples, commercially produced Hi-Gest alfalfa averaged lower lignin, had less undigested fiber at 240 hours, higher crude protein, and higher total tract digestibility based on rolling 60-day or 4-year laboratory averages.