Relationship of IVDMD to ADF in Oat (Avena Sativa) And Barley (Hordeum Vulgare L.) Forage[1]

W. Poland[2], H. Peterson[3], R. Ashley[2] and L. Tisor[2]
Cooperative Extension Service, North Dakota State University, [2]Dickinson and 3Beach

ABSTRACT: Estimation of energy concentration and digestibility of forages from relationships with ADF concentration is common in nutrient analysis. Although a constant relationship is assumed across small grain forage, recent research suggests that the relationship between digestibility and ADF may differ between oat (OAT) and barley (BAR) forage. Three sample sets of OAT and BAR forage were collected over two years, pooled across sample sets and used to test the hypothesis that the relationship between digestibility and ADF concentration differs among OAT and BAR forage. The first sample set included 17 samples collected directly from producers. The other two sample sets were from replicated trials designed to test the effects of species (OAT or BAR) and varietal type on forage yield and quality. Eighty-three samples were sent to one of two forage testing laboratories to obtain ADF, and estimated TDN, concentration using standard methodologies. IVDMD concentration was determined in the Nutrition Laboratory of NDSU. Although each of the commercial laboratories used a different equation to estimate TDN from ADF in small grain forage, the overall relationship was highly correlated (R2 =.995; TDN = 99.15 - 1.022*ADF). IVDMD was also correlated with ADF (R2=.720); however, the intercept (P<.01) and slope (P<.01) of the relationship differed by species. IVDMD in OAT was estimated by the equation [IVDMD = 72.27 - .399*ADF] and in BAR by the equation [IVDMD = 86.02 - .644*ADF]. Digestibility of BAR was 14% greater than OAT at 30% ADF and 5% greater at 45% ADF. Plotting the ratio of IVDMD to TDN suggests that standard equations for estimating TDN in small grain forage overestimates BAR digestibility below 34% ADF and OAT digestibility below 44% ADF. These data demonstrate that the digestibility, and thus energy concentration, of oat and barley forage are linearly related to ADF concentration. However, this relationship differs from standardized equations in use in the Northern Plains and differs between oat and barley forages. Using IVDMD at a common ADF concentration as a quality criteria, barley forage is of superior quality when compared to oat forage.

Key Words: Oat, Barley, Annual Forage

The full paper was published in the Western Section, American Society of Animal Science Proceedings Vol. 55, 2004.