

High Fiber Content does not insure Low Sugar Content in Hay

Kathryn Watts

Hay cut in mature stages of growth is often considered to be of lower nutritional value because of a higher proportion of fiber content. However, in a plant cell, fiber and Non Structural Carbohydrates (sugar, starch and fructan) do not share the same space; therefore they are not mutually exclusive. By definition, Non Structural Carbohydrates are those found on the inside of plants cells, while fiber (Structural Carbohydrates including cellulose and hemicellulose) is found in cell walls. A useful analogy is a warehouse full of bins. The bins can be empty, or the bins can be full, without changing the mass of the walls. Fiber content is dependent on stage of growth when hay is cut. Sugar, starch and fructan concentrations are dependent on environmental conditions when hay is cut.

Two plantings of oat hay were grown side by side, one planted in early spring and one planted early summer, repeated over two growing seasons. The first planted oats were subjected to freezing temperatures in spring at early stages of growth, and the later planted oats were subjected to freezing temperatures in late stages of growth. Hay samples (4 reps) cut at 7 stages of growth from each planting were analyzed by USDA- ARS- Forage and Rangeland Research Lab, Logan, UT. Hay cut at late maturity, but under cold conditions, with Neutral Detergent Fiber content of over 50% contained as much NSC (30% of dry matter) as hay cut at early boot in spring with NDF of 30%. (Chatterton, Watts, *et al* 2006)

13 different species grass were allowed to mature one full month past the time considered optimum for hay production. 4 reps from each were analyzed by Dairy One for Neutral Detergent Fiber, WSC and starch. Correlation (r) of NDF to WSC was -.61 and NDF to NSC (WSC +starch) was -.66 (p = .05). This means that if only fiber content was used to determine suitability of hay for carbohydrate intolerant horses, you could be wrong 1/3 of the time. Choosing hay for horses with insulin resistance requires that sugar and starch content of hay be measured directly. NSC concentration cannot be accurately inferred from fiber content.

Chatterton, N. J., Watts, K., A., Jensen, K. B., Harrison, P. A., Horton, H. W., (2006) Non-structural carbohydrates in oat forage, *J. Nutrition*, **136**: 2111S-2113S