Interpreting Corn Silage Quality Test Results - East

Corn silage test results are of little value unless they are understood and used. Not only can the results be used to balance feed rations, but they can also help to improve crop management if the test results indicate the forage sample is of unsatisfactory quality.[1,2,3] Below are common terms used to describe the quality of corn silage used for diary production.

Figure 1. Dairy cows consuming corn silage.

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Term	Desired Value	Definition	Comments
Dry Matter (DM)	Expressed as a percentage with a target value of 30 to 38%.	Everything in the silage except water; this includes protein, fiber, fat, and minerals. In practice, it is the total weight of feed minus the weight of water in the silage.	Silage that is too dry is associated with reduced digestibility, so usually harvest moisture target is 65% for upright silos and 70% for bags or bunkers.
In Vitro Neutral Detergent Fiber Digestibility (IVNDFD)	Expressed as a percentage with a target value of 40 to 60%.	A measure of maximum potential digestion of the NDF portion. This is an in-vitro measurement (incubated in rumen fluid for 12, 24, 30, 48 hours).	The IVNDFD value really depends on laboratory. Higher values are related to higher intake and more milk. Since what laboratory does the analysis has an impact it is hard to give a specific number but silage with values less than the laboratory mean should be fed in lesser amounts. Greater than mean IVNDFD can be fed at higher rates and should be fed to early lactation cows.
Neutral Detergent Fiber (NDF)	Expressed as a percentage with a target value 35 to 55%.	The residue or insoluble fraction left after boiling a feed sample in neutral detergent solution. The NDF is composed of plant cell wall components except for some pectins.	The NDF is considered a close estimate of the total fiber constituents of the silage since it measures cellulose, hemicellulose, lignin, silica, tannins, and cutins. NDF concentration is negatively correlated with dry matter intake (i.e., as NDF in the silage increases, animals will consume less silage). As a result, NDF is often used in formulas to predict the dry matter intake. NDF will generally increase with low grain silage, stress, or immaturity. It can be an inverse predictor of intake. For alfalfa and grasses, high NDF equates to low intake but the relationship is not very strong for corn silage.
Starch	Expressed as a percentage with a target value 25 to 35%	A carbohydrate that is a polysaccharide composed of many glucose subunits and is a readily available source of energy.	Higher may be better, but at higher levels the ration may have to be adjusted. Starch and NDF are negatively correlated (one goes up when the other goes down). Silage with high starch will have lower NDF and if fiber is limited, this could increase cost as those inputs will have to be purchased. If level is below 25% silage was stressed or cut too early.
Crude Protein (CP)	Expressed as a percentage with target value 7 to 9%.	Total amount of nitrogen (N) in the silage; % N multiplied by 6.25.	Higher values are more desirable; low values may be due to lack of nitrogen applied to the crop or loss from rain, improper harvesting, or storage.
Lignin	Expressed as a percentage with target value 2.8 to 4.1%	Not digestible. Lignin provides structural support for the plant and can bind to other contents making them indigestible as well.	Increases as plant matures and is inversely related to digestible NDF (increase lignin, decreases NDF digestibility). Brown mid-rib hybrids have lower lignin content. In conventional corn products it can be managed to some degree by cutting height.
Undigested Neutral Detergent Fiber (uNDF) 12, 24, 30, 48, 72, 96, 120 or 240	Expressed as a percentage with a target value of 8 to 13%.	uNDF is the undigested NDF remaining after in vitro digestion at a given time point.	uNDF is determined by environment and genetics. The growing conditions also impact the formation of the undigested fraction (uNDF). Brown mid-rib hybrids tend to have significantly lower uNDF than conventional hybrids.
Milk per ton	Expressed as pounds of milk per ton of silage.	Milk per ton is an estimate of the milk produced from the energy available from a ton of corn silage dry matter (DM).	The energy available for milk production is calculated as the net energy per unit of corn silage, adjusted for energy required for maintenance of the cow. It is important to note that milk per ton does not consider milk yield per cow. MILK2024 is a spreadsheet tool for calculating both milk per ton and milk per acre.
Milk per acre	Expressed as pounds of milk per acre.	Milk per acre combines yield and quality into a single term, allowing for ranking of corn products used to make silage.	The milk per ton is estimated and multiplied by silage yield to calculate the likely amount of milk produced per acre of corn silage (milk per acre).

Sources

[1]Dairyland Laboratories. 2021. Terms and definitions. Dairyland Laboratories, Forms and Resources. https://44685760.fs1.hubspotusercontent-na1.net/hubfs/44685760/Terms%20%20Definitions%201.pdf

[2]2024. Quality and feeding. University of Wisconsin, Corn Agronomy. https://corn.agronomy.wisc.edu/Silage/S006.aspx

[3]Roth, G.W. and Heinrichs, A.J. 2001. Corn silage production and management. PennState Extension. https://extension.psu.edu/corn-silage-production-and-management

Web sources verified 06/21/2024.

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