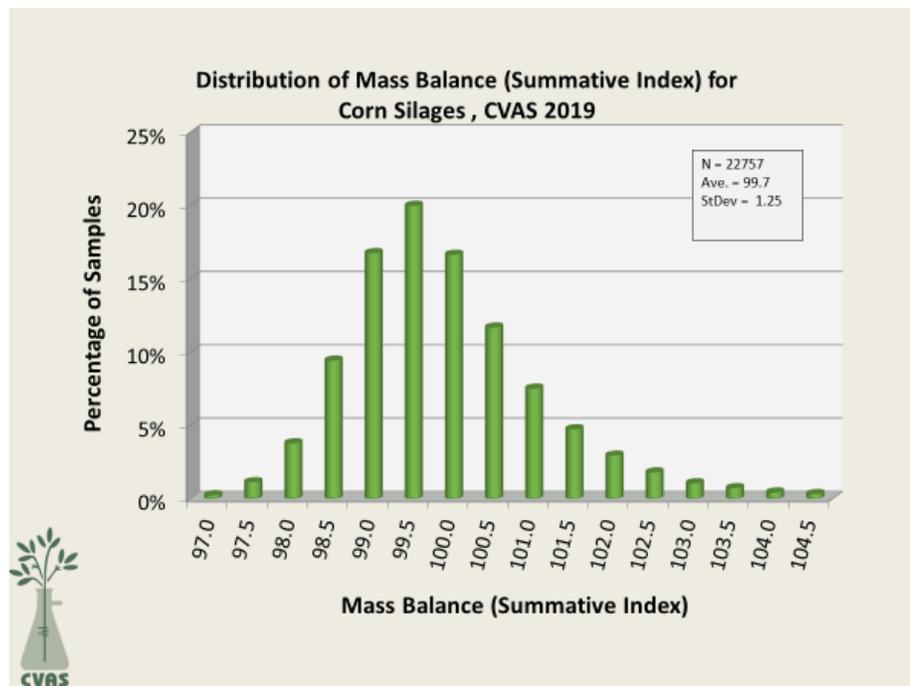




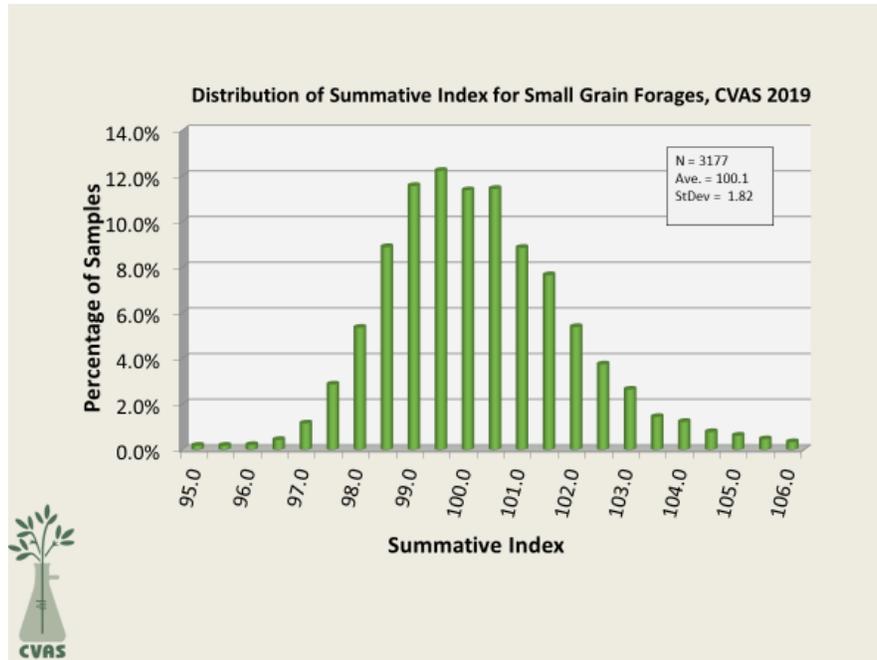
Interpreting your forage report – “Mass Balance”

A key approach to evaluating the correctness or “integrity” of a forage report is to consider to what degree the dry matter components sum to 100% of the dry matter. On CVAS forage reports for fermented forages, most of the nutritional components are determined either by NIR or chemistry processes. Adding the nutrient components of dry matter should yield a mass balance (sometimes called a “summative index”) within 2 to 3 units of 100. CVAS reports the “Summative Index / Mass Balance” on the lower right of the forage report in the calculations section. An example of the distribution of mass balance values in corn silage is provided below:



In the example above, 95% of reported corn silages will have a mass balance within 2.5 units of 100. This gives us a degree of confidence in the integrity of the forage analysis. If summing the nutritional constituents of dry matter yields a value of more than 3 units from 100, then we need to evaluate the analysis critically to consider what nutrients may not be characterized correctly.

An example of the distribution of mass balance values for small grain silage is provided below. In this case, 95% of the reported mass balance values will be between 97 and 103.



Calculating Mass Balance

In a fermented forage sample, the components of mass balance and the calculation would be:

$$\text{Crude Protein} + \text{aNDFom} + \text{Fat} + \text{Ash} + \text{Starch} + \text{ESC} + \text{Soluble Fiber} + \text{Lactic Acid} + 0.5(\text{Acetic Acid}) + 0.5(\text{Butyric})$$

In cases where certain nutrients have not been determined, average values can be used to fill in the missing information.

To develop a correct definition of the summative index, NDF should be as “NDFom” (on an organic matter basis). If this is not done ash-free that is part of NDF may be subtracted twice, once as part of the NDF fraction and then as part of total ash.

Many labs determine soluble fiber by difference. If the soluble fiber value seems unusually high or low it may be that the summation of other nutrients is leading to a false value. When CVAS reports a soluble fiber value, it is an actual NIR determination. This allows for a true mass balance to be calculated.

If fat is reported but not fatty acids, make an adjustment of the fat value by subtracting “1” to arrive at an estimate of fatty acids.

VFA such as acetic, propionic, and butyric acids should be subtracted, but only fractionally. CVAS studies have shown that approximately 40% of the VFA are driven off during the drying process. Lactic acid is not volatile and should be subtracted in full.