



Industry research has shown that the use of fat to balance dairy rations should be expanded to include the breakdown of the fat into its individual fatty acids for more complete ration balancing. In the majority of feed ingredients there are five common fatty acids found in significant quantities. These are palmitic (C16:0), stearic (C18:0), oleic (C18:1), linoleic (C18:2) and linolenic acids (C18:3). The table below gives some additional information on each of these.

Fatty Acid	Name	Category	How is it utilized?
C16:0	Palmitic	Saturated	Helps increase milk fat yield.
C18:0	Stearic	Saturated	Too much will decrease digestibility of fatty acids. When not in a rumen protected form C18:1, C18:2 and C18:3 are converted to Stearic Acid in the rumen.
C18:1	Oleic	Unsaturated	Improves the digestibility of fats. Beneficial to increase body condition scores in early lactation. Part of Rumen Unsaturated Fatty Acid Load (RUFAL)*.
C18:2	Linoleic	Unsaturated	An Omega 6 fatty acid. Feeding high levels can result in reduced dry matter intake, milk fat and other negative effects to cattle. Part of RUFAL.
C18:3	Linolenic	Unsaturated	Provides reproductive health benefits. Part of RUFAL.

*RUFAL is the sum of the C18:1, C18:2 and C18:3 unsaturated fatty acids. High levels of RUFAL can disrupt fermentation, affect animal health, and lead to depressed milk fat production.

Each of these fatty acids are unique in how the dairy cow will digest, absorb and metabolize it within their system. Maintaining the correct balance of fatty acids is important to the cow's milk fat production as well as the overall health of the animal. Average fatty acid values for some common feed types are in the following table.

CVAS Fatty Acid Profile Data, 2019 (% of Dry Matter)						
Feed	C16:0	C18:0	C18:1	C18:2	C18:3	RUFAL
Haylage	0.38	0.06	0.06	0.35	0.75	1.16
Grass Haylage	0.30	0.03	0.06	0.33	0.76	1.15
Hay	0.37	0.06	0.03	0.23	0.40	0.66
Grass Hay	0.28	0.03	0.06	0.23	0.38	0.67
Corn Silage	0.45	0.06	0.55	1.15	0.10	1.80
TMR	0.76	0.15	0.66	1.23	0.26	2.15
Corn Grain	0.56	0.07	0.88	2.06	0.05	2.99

CVAS offers Fatty Acid Profile data by traditional chemistry analysis or NIR. It can be added to an NIR package by selecting the plus option.

NIR Fatty Acid Profile Analysis:

When the Plus Option is added to the NIR results for hay, haylage, corn silage, corn grain or total mixed ration (TMR) feed types, a Fatty Acid Profile Analysis Report will be generated. The report includes palmitic, stearic, oleic, linoleic and linolenic acids. A total unsaturated fatty acid value (RUFAL) will also be provided on this report (example below).



Fatty Acid Profile Analysis Report

NIR Analysis of CORN SILAGE*

Fat (ether extract)	2.94 % DM
Total Fatty Acids	2.34 % DM
Fatty Acid as % Ether Extract	79.6 %

Fatty Acid Content (selected key fatty acids):

16:0	Palmitic Acid	0.43 % DM
18:0	Stearic Acid	0.06 % DM
18:1	Oleic Acid	0.60 % DM
18:2	Linoleic Acid	1.12 % DM
18:3	Linolenic Acid	0.01 % DM
Total Unsaturated Fatty Acids (RUFAL)		1.73 % DM

* For critical evaluation request fatty acid analysis by chemistry methods

Chemistry Fatty Acid Profile:

Choosing the fatty acid profile report by chemistry methods will provide an expanded panel of fatty acids. CVAS has the ability to test for 46 distinct fatty acids. Our report will provide a listing of all fatty acids present in your sample as well as their percentage of the dry matter and the total fat of that feed. If you require a critical analysis of the fatty acids your sample, this report will provide the additional information you need.