

Total Mixed Ration Digestion (TMRD) and TMRD Plus Guidelines

For Rock River Laboratory TMRD *in vivo* apparent total tract digestion analyses

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Data represent two+ years of North American samples and results
Goals set are based upon field experience and the top 25th percentile

Total Tract Organic Matter (OM) Digestion (% of Total Diet)	
Goal	> 67%
Average	62.8
Realistic Min	48.3
Realistic Max	77.0

Neutral Detergent Fiber Digestion (% of Total NDF, Total Tract)	
Goal	> 44%
Average	36.7
Realistic Min	12.2
Realistic Max	57.3

Starch Digestion (% of Total Starch, Total Tract)	
Goal	> 97%
Average	94.0
Realistic Min	81.8
Realistic Max	99.0

Crude Protein Digestion (% of Dietary CP, Total Tract)*	
Average	58.5
Realistic Min	37.5
Realistic Max	76.0

Fat Digestion (% of Dietary Fat, Total Tract)*	
Average	59.8
Realistic Min	28.5
Realistic Max	84.4

TMRD Plus Results - Includes all TMRD Results and:

Neutral Detergent Fiber Digestion (% Pot. Digestible NDF, Total Tract)**	
Goal	> 74%
Average	62.2
Realistic Min	27.0
Realistic Max	85.6

Sugar Digestion (% of Sugar, Total Tract)	
Goal	> 92%
Average	90.2
Realistic Min	83.8
Realistic Max	96.1

7h <i>in vitro</i> Rumen Starch Digestion Index (% of Starch, Rumen Starch Use Index)***	
Goal	> 85%
Average	80.1
Realistic Min	58.9
Realistic Max	93.9

*CPD and Fat D interpretations are not straight forward due to endogenous contributions by the cow to feces (Sniffen, 2012 personal communication). Microbial CP and other Fat/CP sources, such as sloughed gut cells, influence fecal CP and Fat measures. As a result goals are not listed.

**NDFD expressed as % of potentially digestible NDF tells you how much of available fiber cows are using (Van Amburgh, 2013 personal communication). This may be a better indicator of how much room there is to improve NDFD with nutritional means.

***7h *in vitro* rumen starch digestion over estimates rumen starch digestion (Heuer et al., 2013), however it is a useful index to rank your TMR

Key Considerations:

- Rock River Laboratory uses a published field approach (Schalla et al., 2012 Journal of Dairy Science)
- TMRD results are complex and our tech support team has unmatched field experience to help interpret meaning for you
 - Evaluate TMR quality control first
 - Dry matter intake influences results and must be considered during interpretation
 - Faster passage rates = less time to digest TMR and lower results
 - Focus on Organic Matter Digestion (OMD) first then carbohydrate digestion second to find opportunities

References

Heuer, C.R., J.P. Goeser, and R.D. Shaver. 2013. Starch digestion variation between *in vitro* and *in situ* digestion techniques. J Dairy Sci:Abstract #T80. 2013 ADSA JAM.

Schalla, A., L. Meyer, Z. Meyer, S. Onetti, A. Schultz, and J. Goeser. 2012. Hot Topic: Apparent total-tract nutrient digestibilities measured commercially using 120-hour *in vitro* indigestible NDF as a marker are related to commercial dairy cattle performance. J Dairy Sci 95:5109-5114.

Sniffen, C.J. 2012. Personal communication.

Van Amburgh, M. E. 2013. Personal communication.