INTRODUCTION
Estimates of in vivo NDF digestibility by in vitro TTNDFF® have been demonstrated to be closely correlated. The in situ TTNDFF® method would be a useful alternate method for predicting in vivo NDFD if validated.

OBJECTIVE
Compare potentially digestible NDF (pdNDF) and pdNDF digestion rate (kd), using in situ (IS) or traditional in vitro (TR) rumen digestion assays, and compare subsequent estimates of total-tract NDF digestibility (TTNDFF) to in vivo (IV) TTNDFF measurements.

MATERIALS AND METHODS
9 feed samples of high and low digestibility corn silage, high fiber concentrates, and haylage were coded so the laboratory could not identify the samples or replicates.

• All feed samples were previously characterized in vivo for pdNDF, kd, and TTNDFF.

9 timepoints were used in replicated runs, using 2 method

• 6, 12, 24, 30, 48, 72, 96, 120, and 240h

• In vitro rumen digestion

Traditional in vitro rumen NDFD method (Goering and Van Soest, 1970)

• 0.5g 2mm Udy mill ground placed in Ankom F57 bags

• Placed in rumen in reverse order or hours, all samples removed at the same time

• 2 replicated runs, each using 3 different cows

Statistical Methods

• Ingredient results were mathematically combined to compare to in vivo results

• SAS JMP (v11.0) nonlinear option for exponential decay model to determine pdNDF and kd for each method. TTNDFF was then calculated from those values.

• Student’s T-test was used to compare techniques.

DEFINITIONS

pdNDF – potentially digestible NDF

iNDF – indigestible NDF

NDF = pdNDF + iNDF

Figure 1. NDFD, % of NDF, by method over time. Red = traditional in vitro, blue = in situ rumen digestion over time for 9 feeds

Figure 2. Comparison of TTNDFF by method. IS = in situ, IV = in vivo, Trad = traditional in vitro

Table 1. Feed Characterization.

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Feed Type</th>
<th>NDF, % of DM</th>
<th>iNDF, % of NDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conv. Corn Silage</td>
<td>33.9%</td>
<td>22.3%</td>
</tr>
<tr>
<td>2</td>
<td>Haylage</td>
<td>41.2%</td>
<td>30.5%</td>
</tr>
<tr>
<td>3</td>
<td>Conv. Corn Silage</td>
<td>41.0%</td>
<td>22.1%</td>
</tr>
<tr>
<td>4</td>
<td>Conv. Corn Silage</td>
<td>42.4%</td>
<td>26.3%</td>
</tr>
<tr>
<td>5</td>
<td>High Dig. Corn Silage</td>
<td>39.9%</td>
<td>13.5%</td>
</tr>
<tr>
<td>6</td>
<td>Haylage</td>
<td>37.6%</td>
<td>34.3%</td>
</tr>
<tr>
<td>7</td>
<td>Conv. Corn Silage</td>
<td>44.1%</td>
<td>18.7%</td>
</tr>
<tr>
<td>8</td>
<td>Low Starch Concentrate</td>
<td>41.0%</td>
<td>0.8%</td>
</tr>
<tr>
<td>9</td>
<td>High Starch Concentrate</td>
<td>24.2%</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

Table 2. Comparison of method on silage rate of digestion and predicted TTNDFF by feed type.

<table>
<thead>
<tr>
<th>Feed Type</th>
<th>In situ kd</th>
<th>Trad. kd</th>
<th>TTNDFF®</th>
<th>Trad. TTNDFF®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haylage</td>
<td>5.49%</td>
<td>13.67%</td>
<td>50.8%</td>
<td>51.0%</td>
</tr>
<tr>
<td>HD CS</td>
<td>2.39%</td>
<td>4.64%</td>
<td>46.4%</td>
<td>52.8%</td>
</tr>
<tr>
<td>CS</td>
<td>1.97%</td>
<td>1.89%</td>
<td>39.5%</td>
<td>36.9%</td>
</tr>
<tr>
<td>Concentrate</td>
<td>4.23%</td>
<td>8.14%</td>
<td>69.5%</td>
<td>82.8%</td>
</tr>
</tbody>
</table>

MATERIALS AND METHODS

In situ rumen NDFD method (modified NorFor method)

• 0.5g 2mm Udy mill ground placed in Ankom F57 bags

• Placed in rumen in reverse order or hours, all samples removed at the same time

• 2 replicated runs, each using 3 different cows

DISCUSSION

• Tradition in vitro results in a faster rate of digestion for feeds and greater estimate of TMR TTNDFF compared to the in vivo results (P<0.01).

• In situ predictions of TTNDFF resulted in greater variability than the traditional in vitro methods, but did not differ from in vivo results.

CONCLUSIONS

• In situ NDFD assay can be used to predict the TTNDFF in corn silages, haylage, and concentrates.
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