Net Energy for Growing & Finishing Beef Cattle

Net energy for maintenance (NE\textsubscript{m}) and gain (NE\textsubscript{g}) are used to formulate diets for growing and finishing cattle. These energy values are more useful than TDN, because they allow more accurate prediction of the amount of energy used for maintenance and gain purposes. NE\textsubscript{m} of a feed measures the ability of the feed to meet the energy requirement for maintenance. NE\textsubscript{g} of a feed measures the ability of the feed to meet the energy requirements for gain. Remember, that energy needs for maintenance must be met first before the animal can use any energy for growth (gain). Once energy needs for maintenance are met, then the remaining energy in the diet can go towards gain. Net energy values of feeds, along with feed intake, can also be used to predict the gain that animals will make on particular diets. The reason that feeds have two different NE composition values, one for maintenance and one for gain, is that feed energy is used more efficiently for maintenance than for gain. Therefore, NE\textsubscript{m} values are always higher for a feed than NE\textsubscript{g} values.

A cattle feeder is feeding the following diet to a group of 715 lb growing yearling steers (1,300 lb at finishing; Use Table 9 for requirements).

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>% of diet</th>
<th>NE\textsubscript{m}, Mcal/kg</th>
<th>NE\textsubscript{m} supplied, Mcal/kg</th>
<th>NE\textsubscript{g}, Mcal/kg</th>
<th>NE\textsubscript{g} supplied, Mcal/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn silage</td>
<td>20</td>
<td>1.63</td>
<td>0.20 x 1.63 = 0.326</td>
<td>1.03</td>
<td>0.20 x 1.03 = 0.206</td>
</tr>
<tr>
<td>Corn</td>
<td>73</td>
<td>2.24</td>
<td>0.73 x 2.24 = 1.6352</td>
<td>1.55</td>
<td>0.73 x 1.55 = 1.1315</td>
</tr>
<tr>
<td>SBM</td>
<td>5</td>
<td>2.06</td>
<td>0.05 x 2.06 = 0.103</td>
<td>1.40</td>
<td>0.05 x 1.40 = 0.07</td>
</tr>
<tr>
<td>Alfalfa meal</td>
<td>2</td>
<td>1.34</td>
<td>0.02 x 1.34 = 0.0268</td>
<td>0.77</td>
<td>0.02 x 0.77 = 0.0154</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>2.091</td>
<td></td>
<td>1.42</td>
<td></td>
</tr>
</tbody>
</table>

The diet fed above supplies: \underline{2.091} Mcal/kg of NE\textsubscript{m}, and \underline{1.42} Mcal/kg of NE\textsubscript{g}

If the 715 lb yearling steers (1,300 lb at finishing) are consuming 16 lb of the above diet each day, what is their expected average daily gain?

NE\textsubscript{m} required per day (Table 9) = \underline{5.89} Mcal/day

Amount of diet required for maintenance = \underline{6.21} lb

\[
\text{amt diet req for main} = (\text{NE}_m \text{ required})/(\text{NE}_m \text{ per kg of diet})
\]

\[
\text{amt diet req for main} = \frac{5.89 \text{ Mcal}}{2.091 \text{ Mcal/kg}} = 2.82 \text{ kg}
\]

Convert from kg to lb

\[
2.82 \text{ kg} / 0.454 \text{ lb/kg} = 6.21 \text{ lb required for maintenance}
\]

Amount of diet left for gain = \underline{4.44} kg

\[
\text{amt diet left for gain} = (\text{Intake}) - (\text{feed req for main})
\]

\[
\text{amt diet left for gain} = 16 \text{ lb} - 6.21 \text{ lb} = 9.79 \text{ lb}
\]
Convert from lb to kg
9.79 lb x 0.454 = 4.44 kg

Amount of NE\textsubscript{g} available for gain = \textbf{6.30} Mcal

amt NE\textsubscript{g} available = \( \text{NE}\textsubscript{g}/\text{kg of diet} \times \text{kg diet remaining} \)

amt NE\textsubscript{g} available = \( \frac{1.42 \text{ Mcal/kg}}{} \times \frac{4.44 \text{ kg}}{} = \frac{6.30 \text{ Mcal}}{} \)

From Table 9, find the NE\textsubscript{g} for 715 lb yearling steers (1,300 lb at finishing) that most closely approaches the amount of NE\textsubscript{g} available for gain. Estimate the average daily gain for these animals.

\textit{Need 6.94 Mcal to gain 3.99 lb/day, so extrapolate}

\( \frac{3.99 \text{ lb}}{6.94 \text{ Mcal}} = \frac{x \text{ lb}}{6.30 \text{ Mcal}} \)

\( x = 3.62 \text{ lb/day} \)