NO₃ binds hemoglobin in bloodstream = MetHgb
MetHgb unable to absorb O₂; animal can asphyxiate; fetus can asphyxiate

NO₂ energy
NH₃ amino acids, proteins

low energy
When do nitrates build up?

- Slow growth
- Drought
- Long periods of cloudy weather
- Herbicide injury
- High levels of N fertilization
Which plants are most likely to be a problem?

- Sorghum, sudangrass, sorghum-sudangrass hybrids, corn, millet, perennial grasses

- Curly dock, jimsonweed, johnsongrass, kochia, lambsquarters, nightshade species, pigweed, Canada thistle, smartweed

- Lower plant parts (stems/stalks) are higher in nitrates than leaves
## How much nitrate is too much?

<table>
<thead>
<tr>
<th>NO$_3$-N (ppm)</th>
<th>NO$_3$ (ppm)</th>
<th>Category</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 550</td>
<td>0 to 2,500</td>
<td>SAFE</td>
<td>Forage is generally safe to feed to all classes of livestock.</td>
</tr>
<tr>
<td>550 to 1,100</td>
<td>2,500 to 5,000</td>
<td>CAUTION</td>
<td>Forage with this nitrate (NO$_3$) content can cause a problem with pregnant and young animals. Do not feed forage with nitrate levels this high in combination with nonprotein nitrogen supplements, and limit forage with NO$_3$ levels this high to one-half of total ration.</td>
</tr>
<tr>
<td>1,100 to 3,400</td>
<td>5,000 to 15,000</td>
<td>DANGER TOXIC</td>
<td>Limit forage with this NO$_3$ level to one-fourth of total ration. Should supplement forage of this type with energy, minerals and vitamin A.</td>
</tr>
<tr>
<td>More than 3,400</td>
<td>More than 15,000</td>
<td>EXTREMELY TOXIC</td>
<td>Forage with this NO$_3$ level or higher is toxic and should not be fed under any circumstance. If forage with this NO$_3$ concentration must be fed, it should be mixed with other feed and make up no more than 15 percent of the total ration.</td>
</tr>
</tbody>
</table>
What to do with high nitrate forage

- TEST to be sure the forage is high
- Wait for plants to regrow for 5 days or so after a significant rain
- Increase residual grazing and/or harvest height
- Make silage
  - 25 to 50% of nitrate lost during ensiling process
- Dilute with other feeds
- Slowly increase nitrate levels in feed
- Feed to non-reproductive stock
- IF GREEN CHOPPED, FEED IMMEDIATELY