BLOAT IN CATTLE. XVII. WHEAT PASTURE BLOAT AND ITS PREVENTION WITH POLOXALENE \textsuperscript{1,2}

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SUMMARY

In four controlled experiments, it was established that bloat occurring in rumen fistulated cattle pastured on wheat is a foamy type. Poloxalene effectively prevented foaming, and bloat scores of controls and those receiving poloxalene differed significantly. Though differences among daily treatments of 1.0, 1.5 or 2.0 g of poloxalene per 100 lb (45.4 kg) body weight were nonsignificant, a dose-response relationship was suggested. A fifth experiment, conducted with 112 heifers pasturing wheat, indicated that a molasses liquid supplement containing poloxalene and a molasses-salt block containing poloxalene significantly reduced bloat incidence and severity during the periods they were offered. The bloat-provocative pastures contained 35.1 to 37.7\% crude protein, 9.5 to 12.4\% insoluble protein, 17.4 to 18.7\% soluble protein, and 6.8 to 7.7\% nonprotein nitrogen.

(Key Words: Bloat, Wheat Pastures, Cattle, Poloxalene.)

INTRODUCTION

Generally cattle pastured on grasses have been considered to be relatively safe from bloat. However, in recent years the incidence of bloat in cattle grazing young wheat has been high. Deaths from bloat in the 4 to 5 million cattle grazing wheat in Kansas, Texas and Oklahoma have been estimated to reach 2 to 3\% (Clay, 1973). Gains of up to 2 lb (.91 kg) per head per day (Tillman, 1972) have increased the popularity of grazing wheat. Increases in use of nitrogen fertilizer and irrigation, and in numbers of cattle being pastured may explain the increased incidence of wheat pasture bloat.

The primary cause of legume bloat is excessive foaming of rumen contents (Clarke and Reid, 1974). Bartley and Scott (1969) developed an agent, poloxalene\textsuperscript{3}, which effectively prevents legume bloat (Bartley, 1965). This study was to determine if wheat pasture bloat is the foamy type that can be prevented with poloxalene.

EXPERIMENT PROCEDURE

**Experiment 1.** An 8-acre (3.23 ha) field sown to wheat in the fall of 1971 was used beginning April 24, 1972. Eight rumen-fistulated dairy or beef cattle weighing between 485 and 1437 lb (220 and 653 kg) were divided into two similar groups. Both groups were pastured on highly fertilized, lush, succulent wheat approximately 12 in (30 cm) tall, in early stages of growth. The cattle were pastured 2.5 hr in the morning and 2.5 hr in the afternoon. When removed from pasture, they were examined for bloat and then kept in drylot with water available.

Poloxalene was introduced into the rumen once daily (before morning pasturing) via rumen cannula. Poloxalene was administered at 0, 1.0 and 2.0 g per 100 lb (45.4 kg) body weight. A 2-day repeating crossover design was used with eight time periods (table 1). A 2-day
TABLE 1. EFFECT OF POLOXALENE ON BLOAT IN CATTLE PASTURED ON WHEAT (EXPERIMENT 1)

<table>
<thead>
<tr>
<th>Date (1972)</th>
<th>No. of days</th>
<th>Group</th>
<th>No. of animals</th>
<th>Treatmenta</th>
<th>Avg bloat index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>am</td>
</tr>
<tr>
<td>April 25, 26</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>Control (pretreatment)</td>
<td>.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>4</td>
<td>Control (pretreatment)</td>
<td>.38</td>
</tr>
<tr>
<td>April 27, 28</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>1.0 g poloxalene</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>4</td>
<td>Control</td>
<td>.50</td>
</tr>
<tr>
<td>April 29, 30</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>Control</td>
<td>.63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>4</td>
<td>1.0 g poloxalene</td>
<td>0</td>
</tr>
<tr>
<td>May 1, 2</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>1.0 g poloxalene</td>
<td>.25</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>4</td>
<td>Control</td>
<td>.63</td>
</tr>
<tr>
<td>May 3, 4</td>
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<td>1</td>
<td>4</td>
<td>Control</td>
<td>.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>4</td>
<td>2.0 g poloxalene</td>
<td>0</td>
</tr>
<tr>
<td>May 5, 6</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>2.0 g poloxalene</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>4</td>
<td>Control</td>
<td>.25</td>
</tr>
<tr>
<td>May 7, 8</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>Control</td>
<td>.63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>4</td>
<td>2.0 g poloxalene</td>
<td>0</td>
</tr>
<tr>
<td>May 9, 10</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>2.0 g poloxalene</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>4</td>
<td>Control</td>
<td>.25</td>
</tr>
<tr>
<td>Average</td>
<td>1,2</td>
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<td></td>
<td>Control</td>
<td>.59</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.0 g poloxalene</td>
<td>.08**</td>
</tr>
<tr>
<td>Average</td>
<td>1,2</td>
<td></td>
<td></td>
<td>Control</td>
<td>.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.0 g poloxalene</td>
<td>0**</td>
</tr>
</tbody>
</table>

aPer 100 lb (45.4 kg) body weight.

*Significantly different from control (P<.01).

pretreatment control period preceded the experiment. Bloat was scored by a scale used by Bartley (1965) to rate foamy bloat in fistulated animals. The nature of the foam was examined and photographed. The scale was as follows:

0 = no foam, no abdominal distention
1 = slight foam, no abdominal distention
2 = definite foam, no abdominal distention
3 = definite foam, distention of left side
4 = definite foam, distention of left and right side, animal distressed
5 = definite foam, severe distention of left and right side, and animal in severe distress. Presumed terminal unless relieved.

**Experiment 2.** After Experiment 1 was terminated, the field was plowed and used for this experiment, initiated on October 16, 1972. Poultry manure was applied at the rate of 10 tons (9,091 kg) per acre and ammonium nitrate at the rate of 300 lb per acre (55 kg per hectare). Wheat sowed in early September was washed out by heavy rain; it was resown the middle of September. A good stand was established, and the cattle were pastured when the wheat was from 6 to 12 in (15 to 30 cm) tall. Eight rumen-fistualted dairy or beef cattle weighing between 492 and 1,468 lb (224 and 667 kg) were used. The procedure followed in Experiment 1 was repeated (table 2) except that one level of poloxalene [2.0 g per 100 lb (45.4 kg) body weight] was tested and there were four time periods.

**Experiment 3.** This study was initiated, using the 8-acre (3.23 ha) field used in Experiments 1 and 2, on April 4, 1973, when the wheat was approximately 6 in (15 cm) tall, was in early stage of growth, and was lush and succulent. Nine rumen-fistulated dairy or beef cattle weighing between 604 to 1,475 lb (275 to 670 kg) were pastured and after the first 3 days they were divided into three groups based on their susceptibility to bloat. A 3 x 3 latin square design was used to compare 0, 1.0 and
TABLE 2. EFFECT OF POLOXALENE ON BLOAT IN CATTLE PASTURED ON WHEAT (EXPERIMENT 2)

<table>
<thead>
<tr>
<th>Date (1972)</th>
<th>No. of days</th>
<th>Group</th>
<th>No. of animals</th>
<th>Treatment*</th>
<th>Avg bloat index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>am</td>
</tr>
<tr>
<td>October 17, 18</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>Control (pretreatment)</td>
<td>.75</td>
</tr>
<tr>
<td>October 19, 20</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>Control (pretreatment)</td>
<td>1.75</td>
</tr>
<tr>
<td>October 21, 22</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>2.0 g poloxalene</td>
<td>0</td>
</tr>
<tr>
<td>October 23, 24</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>Control</td>
<td>0</td>
</tr>
</tbody>
</table>

Average 1,2

2.0 g poloxalene per 100 lb (45.4 kg) body weight (table 3). Each treatment lasted 2 days, with a 1-day transition between treatments. Other aspects of the experiment were similar to those of Experiments 1 and 2.

Experiment 4. This experiment was initiated on April 15, 1973, again using the same pasture used in Experiment 3 and involving the six animals most likely to bloat. An augmented (extra period) 3 x 3 latin square design was used to compare 0, 1.5 and 2.0 g poloxalene per 100 lb (45.4 kg) body weight (table 4). A 2-day preliminary period was followed by 3-day treatment periods, with 2-day transition between periods.

Experiment 5. A commercial beef herd (located at Leoti, Kansas) consisting of 112 heifers of mixed breeding and weighing 450 to

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**TABLE 3. EFFECT OF POLOXALENE ON BLOAT IN CATTLE PASTURED ON WHEAT (EXPERIMENT 3)**

<table>
<thead>
<tr>
<th>Period</th>
<th>No. of days</th>
<th>Poloxalene*</th>
<th>Bloat score*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(g)</td>
<td></td>
</tr>
<tr>
<td>Preliminary</td>
<td>2</td>
<td>0</td>
<td>.58</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1.17</td>
</tr>
<tr>
<td>Transition</td>
<td>1</td>
<td>0</td>
<td>.67</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2.0</td>
<td>0</td>
</tr>
<tr>
<td>Transition</td>
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<td>0</td>
<td>.50</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>1.0</td>
<td>.08</td>
</tr>
</tbody>
</table>

Poloxalene (g) Bloat score

Average of 3 groups for periods 1, 2, 3

<table>
<thead>
<tr>
<th>Poloxalene (g)</th>
<th>Bloat score</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.11</td>
</tr>
<tr>
<td>1.0</td>
<td>.18**</td>
</tr>
<tr>
<td>2.0</td>
<td>.08**</td>
</tr>
</tbody>
</table>

---

*Per 100 lb (45.4 kg) body weight.

*Significantly different from control (P<.01).
## TABLE 4. EFFECT OF POLOXALENE ON BLOAT IN CATTLE PASTURED ON WHEAT (EXPERIMENT 4)

<table>
<thead>
<tr>
<th>Period</th>
<th>Group 1</th>
<th></th>
<th>Group 2</th>
<th></th>
<th>Group 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Polox-</td>
<td>Bloat</td>
<td>Polox-</td>
<td>Bloat</td>
<td>Polox-</td>
<td>Bloat</td>
</tr>
<tr>
<td></td>
<td>alene</td>
<td>score</td>
<td>alene</td>
<td>score</td>
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<td>score</td>
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<tr>
<td></td>
<td>(g)</td>
<td></td>
<td>(g)</td>
<td></td>
<td>(g)</td>
<td></td>
</tr>
<tr>
<td>Preliminary</td>
<td>2</td>
<td>0.13</td>
<td>4</td>
<td>0.75</td>
<td>0</td>
<td>1.38</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>1.5</td>
<td>6</td>
<td>1.38</td>
<td>2</td>
<td>1.38</td>
</tr>
<tr>
<td>Transition</td>
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<td>1.00</td>
<td>2.0</td>
<td>0</td>
<td>1.00</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>1.33</td>
<td>1.67</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Transition</td>
<td>2</td>
<td>2.0</td>
<td>0.63</td>
<td>1.5</td>
<td>0</td>
<td>1.5</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>1.00</td>
<td>1.63</td>
<td>1.5</td>
<td>0</td>
<td>1.5</td>
</tr>
<tr>
<td>Transition</td>
<td>2</td>
<td>2.0</td>
<td>2.42</td>
<td>1.5</td>
<td>0</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Average of 3 groups for periods 1, 2, 3, 4

<table>
<thead>
<tr>
<th>Poloxalene (g)</th>
<th>Bloat score</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.88</td>
</tr>
<tr>
<td>1.5</td>
<td>0**</td>
</tr>
<tr>
<td>2.0</td>
<td>.02**</td>
</tr>
</tbody>
</table>

### Notes

- **a**: Dose per 100 lb (45.4 kg) body weight.
- **b**: Average daily bloat score per animal.
- ****: Significantly different from control (P<.01).

650 lb (205 to 295 kg) was used. The experiment was initiated on March 22, 1974. The cattle were grazed on 320 acres (129 ha) of wheat that was approximately 4 in (10 cm) tall, on land that had been irrigated and fertilized with nitrogen, phosphorus and zinc. During the week of March 17 (before the study), five heifers grazing this wheat had died from bloat, and neighboring ranchers also had lost 64 head of cattle to wheat-pasture bloat.

The 112 heifers were pastured continuously with only water available. Each animal had a numbered, plastic ear tag. The heifers were scored for bloat each morning and evening using this scale:

- 0 = no sign of bloat
- 1 = mild distention on left side
- 2 = distention on left side with some distention on the right side
- 3 = severe distention of both sides and obvious discomfort
- 4 = severe distress — terminal unless aid given

The cattle were scored for bloat for 2 days, then for 6 days were offered a molasses liquid supplement containing poloxalene (table 5). After the supplement was removed, the cattle were observed for 4 days, then in succession offered a salt-molasses block containing poloxalene for 2 days; no block for 2 days; and block again for 3 days. The liquid supplement was supplied in tanks with lick wheels. Six wheels were available for the 112 head. The tanks were placed adjacent to drinking-water tanks. The quantity of supplement consumed was determined daily using a dip measuring stick. Fifteen block boxes, each weighing 33.33 lb (15.15 kg) were placed near the drinking-water tanks.

Periodically wheat samples from Leoti were analyzed for nitrogen fractions. Also sampled and analyzed were a wheat pasture near Scott City where cattle had bloated and died; and a wheat pasture near Manhattan where six rumen-fistulated cattle had grazed without acquiring rumen foam or bloat.

To fractionate the nitrogen components of the fresh wheat samples (refrigerated), a method similar to that of Wooding et al. (1970)
### TABLE 5. EFFECT OF MOLASSES LIQUID SUPPLEMENT CONTAINING POLOXALENE (L. S.) OR MOLASSES-SALT BLOCK CONTAINING POLOXALENE IN CATTLE PASTURED ON WHEAT (EXPERIMENT 5)

<table>
<thead>
<tr>
<th>Day</th>
<th>Treatment</th>
<th>No. of animals</th>
<th>L. S. intake (lb)</th>
<th>Total no. bloat score</th>
<th>Total score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>head/day&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>None</td>
<td>112&lt;sup&gt;b&lt;/sup&gt;</td>
<td>. . .</td>
<td>49</td>
<td>23 25 1 77</td>
</tr>
<tr>
<td>2</td>
<td>None</td>
<td>111</td>
<td>. . .</td>
<td>55</td>
<td>39 15 1 72</td>
</tr>
<tr>
<td>3</td>
<td>L. S.</td>
<td>111</td>
<td>1.23</td>
<td>50</td>
<td>44 6 0 56</td>
</tr>
<tr>
<td>4</td>
<td>L. S.</td>
<td>111</td>
<td>2.95</td>
<td>21</td>
<td>20 1 0 22</td>
</tr>
<tr>
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<td>L. S.</td>
<td>111</td>
<td>2.95</td>
<td>9</td>
<td>9 0 0 9</td>
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<td>6</td>
<td>L. S.</td>
<td>111</td>
<td>1.94</td>
<td>10</td>
<td>9 1 0 11</td>
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<td>111</td>
<td>1.23</td>
<td>6</td>
<td>4 2 0 8</td>
</tr>
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<td>L. S.</td>
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<td>1.94</td>
<td>7</td>
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<td>17 6 0 29</td>
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<tr>
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<td>None</td>
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<td>27</td>
<td>17 10 0 37</td>
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<tr>
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<td>None</td>
<td>111</td>
<td>. . .</td>
<td>33</td>
<td>18 15 0 48</td>
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<tr>
<td>12</td>
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<td>111</td>
<td>. . .</td>
<td>45</td>
<td>29 16 0 61</td>
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<tr>
<td>13</td>
<td>Block&lt;sup&gt;c&lt;/sup&gt;</td>
<td>111</td>
<td>. . .</td>
<td>21</td>
<td>14 7 0 28</td>
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<tr>
<td>14</td>
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<td>111</td>
<td>. . .</td>
<td>22</td>
<td>13 9 0 31</td>
</tr>
<tr>
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<td>18</td>
<td>13 5 0 23</td>
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<td>None</td>
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<td>. . .</td>
<td>30</td>
<td>14 16 0 46</td>
</tr>
<tr>
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<td>. . .</td>
<td>7</td>
<td>5 2 0 9</td>
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<td>18</td>
<td>Block</td>
<td>111&lt;sup&gt;d&lt;/sup&gt;</td>
<td>. . .</td>
<td>11</td>
<td>7 4 0 15</td>
</tr>
<tr>
<td>19</td>
<td>Block</td>
<td>110</td>
<td>. . .</td>
<td>10</td>
<td>4 6 0 16</td>
</tr>
</tbody>
</table>

<sup>a</sup>The average liquid supplement intake was 2.04 lb (.93 kg) per head per day [equivalent to a daily intake of 2.78 g poloxalene per 100 lb (45.4 kg) of body weight.]

<sup>b</sup>One animal died from bloat.

<sup>c</sup>The blocks were weighed at the end of the trial. The average intake was .36 lb (.16 kg) per head per day [equivalent to a daily intake of .98 g poloxalene per 100 lb (45.4 kg) of body weight].

<sup>d</sup>One animal died but not from bloat.

was used. One gram of the green tissue from each sample was analyzed for Kjeldahl nitrogen (total nitrogen) (A.O.A.C., 1970). Ten grams of green tissue from each sample was cut into small pieces [approximately ¼ in (.6 cm)], added to 100 ml of distilled water, and chopped (23,000 rpm) for four 15-sec intervals (to control foaming) with a VirTis macrohomogenizer. The homogenate was filtered with suction through Whatman no. 4 filter paper and washed repeatedly with distilled water. The residue was transferred to Kjeldahl flasks to determine insoluble nitrogen. Eighty milliliters of the measured filtrate was acidified to pH 4.5 (acetic acid), heated at 100 C to precipitate soluble proteins, and refrigerated overnight. The mixture was filtered with suction through Whatman no. 2 filter paper and the residue and filtrate were transferred to Kjeldahl flasks to determine nitrogen of the soluble protein and nonprotein nitrogen fractions, respectively.

### RESULTS

**Experiment 1.** Slight foaming of the rumen contents occurred in some animals on the second day of pasturing. By the third day, rumen contents of most animals were foaming though the foam had not become severe enough to produce abdominal distention. The experiment was started on the third day when sufficient foam was present to test the effect of poloxalene. One gram of poloxalene per 100 lb (45.4 kg) of body weight significantly reduced foaming (table 1). Because poloxalene reduced foaming to a greater extent in the morning than in the afternoon, 2.0 g level was used during the second portion of the experiment. The 2.0 g level completely prevented foam formation (table 1).

**Experiment 2.** Based on the results of Experiment 1, a 2.0 g level of poloxalene was tested. This level of drug effectively reduced foaming (table 2). Occasionally in the after-
noon slight foaming was observed in the poloxalene-treated animals, but it was considerably below that of the controls. A carry-over effect from the drug was observed (data not shown). Because the effect of poloxalene was carrying over to the next day, when the animals were switched to controls, a transition (wash-out) phase was used between treatments in subsequent experiments.

Experiment 3. The results are shown in table 3. During the preliminary period foaming occurred in all animals except one, and abdominal distention was observed in two animals. Poloxalene administered at both 1.0 and 2.0 g levels markedly reduced the degree of bloat. Bloat scores of controls and those receiving poloxalene were significantly different (P<.01). All control animals bloated. Only three animals developed bloat while receiving 1.0 g of drug. Two of these showed no bloat and one showed less bloat when receiving 2.0 grams. Though differences between the two drug levels were not significant, a strong dose-response relationship was suggested. Also, a carry-over effect during transition periods was evident but was too slight to be significant.

Experiment 4. Because of the suggestion of a dose-response relationship in Experiment 3, 1.5 g was compared with 2.0 grams. There was a statistically significant difference (P<.01) in bloat scores between controls and each level of poloxalene (table 4). All controls bloated; only one animal receiving poloxalene was scored (1.0) for bloat. Although the responses to the two drug levels were not significantly different, the data for the transition periods suggested a dose-response relationship. All animals bloated on the second day of the transition period; on the first day all controls had positive bloat scores but only five of the six animals which received 1.5 g of drug had positive scores and only 3 of the six which received 1.0 g of drug had positive scores. The data clearly demonstrate that the effect of both dosages carried over into the first day of the transition period.

The bloat observed in Experiments 1, 2, 3 and 4 was foamy and appeared similar to legume bloat. The foamy character of the bloat is illustrated in figure 1.

Experiment 5. The results (table 5) show that incidence and severity of bloat were reduced in cattle receiving the liquid supplement containing poloxalene. An effect was observed the first day they were exposed to the drug, and by the third day the effect had reached its maximum. The drug's effect on bloat definitely carried over for at least 2 days after it was removed. Incidence and severity of bloat were significantly (P<.01) reduced when the cattle received the drug, compared with the two periods they were given none. That bloat incidence and severity were similar during the two periods when the drug was not received negated the possibility that the pasture had lost its bloating potential when the liquid supplement was offered.

Four days after liquid supplement had been removed from cattle on pasture, they were offered blocks containing poloxalene, which promptly reduced the incidence and severity of bloat (table 5). The reduction in bloat during block treatment, compared with two days before the blocks were offered, was significant (P<.01). Data obtained from days 15 and 16 when no drug was given were not used in the analysis because of an apparent carry-over effect from the previous block treatment. Though the data were limited, the effectiveness of the liquid supplement and blocks in preventing wheat pasture bloat are apparent.

Analyses of the wheat pastures that were bloat provoking are shown in table 6. The north and south parts of the pasture at Leoti used in Experiment 5 and of a pasture near Scott City where cattle had bloated and died (figure 2) contained more crude protein on a dry-matter basis (35.1 to 37.7%) than did a wheat pasture (29.9% crude protein) at Manhattan that was not bloat provoking. Also, the bloat-provocative pastures contained more soluble protein and more nonprotein nitrogen than did the nonprovoking pasture.
TABLE 6. COMPOSITION OF WHEAT PASTURE IN RELATION TO CERTAIN PROTEIN FRACTIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Leoti north pasturea</th>
<th>Leoti south pasturea</th>
<th>Pasture near Scott Citya</th>
<th>Manhattan pastureb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry matter</td>
<td>24.9</td>
<td>24.9</td>
<td>24.3</td>
<td>23.6</td>
</tr>
<tr>
<td>Crude protein (DM basis)</td>
<td>36.5</td>
<td>37.7</td>
<td>35.1</td>
<td>29.9</td>
</tr>
<tr>
<td>Insoluble protein</td>
<td>12.0</td>
<td>12.4</td>
<td>9.5</td>
<td>10.4</td>
</tr>
<tr>
<td>Soluble protein</td>
<td>17.4</td>
<td>17.6</td>
<td>18.7</td>
<td>15.3</td>
</tr>
<tr>
<td>Nonprotein nitrogen x 6.25</td>
<td>7.1</td>
<td>7.7</td>
<td>6.8</td>
<td>4.3</td>
</tr>
</tbody>
</table>

aBloated and dead cattle observed in these wheat pastures.
bThis wheat was pastured during the same period. There was no evidence of bloat.

Discussion

Data from Experiments 1, 2, 3 and 4 show that wheat-pasture bloat is a foamy type. Bartley and Bassette (1961) showed that legume bloat foams are proteinaceous, and several workers (Clarke and Reid, 1974; Synhorst et al., 1963; McArthur and Miltimore, 1964) have shown that soluble protein in legumes apparently is more closely related to bloat than is insoluble protein. Preliminary data presented here suggest a similar relationship for wheat-pasture bloat. A total crude protein content of more than 35% for the young wheat plant is similar to protein values for bloat-provoking alfalfa plants (E. E. Bartley, unpublished).

It has been demonstrated that poloxalene can control legume bloat effectively (Clarke and Reid, 1974). Recommended levels for bloat prevention are 1.0 to 2.0 g per 100 lb (45.4 kg) body weight (Feed Additive Compendium, 1974). It is apparent from these data that similar levels effectively control wheat-pasture bloat. Several studies have shown that molasses-salt blocks containing poloxalene and that molasses liquid supplements containing poloxalene effectively prevent legume bloat (Bartley et al., 1972; Essig and Shawver, 1968; Foote et al., 1968; Scheidy et al., 1972; Stiles et al., 1967). The preliminary data presented here suggest the two methods may be satisfactory for administering poloxalene to cattle pastured on wheat.

LITERATURE CITED