Modified Step-point System for Botanical Composition and Basal Cover Estimates

CLENTON E. OWENSBY

Highlight: Instructions for use and assembly are presented for a modified step-point sampler. Modifications were made to eliminate bias and to increase ease of use.

Basal-hit, single point sampling in botanical census has been shown to be effective and efficient (Goodall, 1952). Evans and Love (1957), describing the step-point method of sampling, concluded that the method's accuracy and objectivity made it suitable for valid analysis of field research plots.

Step-point sampling uses a single pin lowered perpendicularly to the soil surface through a notch in the toe of the sampler's boot at a 30° angle to the ground. Basal or foliage hits may be recorded. Nonplant hits are recorded as misses and the species nearest to the point in a forward, 180° arc is recorded. Information is obtained for basal or foliage cover of individual species, their collective total, and for percentage composition. An estimated frequency may be obtained by grouping points.

Subconscious selection of plants that affects pin placement is a serious defect (Cain and Castro, 1959; Goodall, 1952), which random selection of a single pin from a point frame with several pins would alleviate (Goodall, 1952). Using a single pin instead of groups of pins reduces the number of points needed for comparable accuracy (Blackman, 1935; Goodall, 1952; Greig-Smith, 1957). Single pin measurements require one-third as many points as groups of pins do for comparable accuracy (Goodall, 1952), and time required is reduced to one-sixth or one-eighth that required for the point-frame method (Evans and Love, 1957).

The point-frame modification presented here seeks to eliminate subconscious bias in point placement and to make single-point sampling easier.

The author is research agronomist, Department of Agronomy, Kansas State University, Manhattan.

Manuscript received September 13, 1972.

Fig. 1. Diagram of the modified step-point sampler (a-sample point, b-initial contact points).
pivot point mechanism, which adjusts horizontal angle and sample rod length. That enables the sampler to vary sample rod angle and length for sampling different vegetative types. Tinney et al. (1937) indicated better accuracy with an inclined point. Two legs sharpened at the tip (b) are used to eliminate side movement of the sample rod as it moves through the vegetation. Construction is of steel rod or tubular steel with the sample rod being hardened steel with a long-tapered, fine point.

**Procedure**

The sampler follows a designated line through the plot area. One leg of the point frame is placed at the end of the sampler’s boot each time his right (or left) foot hits the ground. The point frame is leaned back towards the sampler on initial ground contact and is leaned forward until point contact is made with a plant crown or bare soil. That enables the sampler to watch its progress much the same as with a point frame. Species recorded are those whose bases are contacted by the point. If no basal hit occurs, the species nearest the point forward (180° arc) is recorded. Basal hit or miss information is also recorded for basal cover estimates. Species and basal cover information are coded by number for ease in computer analysis.

Preliminary use of the device showed it to be easily used with two samplers and a recorder. The two samplers read from opposite feet with one moving while the other was reading the sample point. That permitted the samplers to read 3,000 to 4,000 points per 7-hour day, which covered about 60 acres in the experimental area. Monotony reduced the number taken. To remain alert and avoid inaccurate work, frequent rest breaks are recommended. An average of 2,500 to 3,000 points per day, we think, is realistic.

**Literature Cited**

---

**Pine Sawdust as a Roughage Replacement in Gestating Beef Heifer Rations**

**Highlight:** No abortive tendencies were noted with Angus X Hereford crossbred heifers when fed a corn-roughage ration containing 25% sawdust during the last one-third of the pregnancy period. Inclusion of sawdust in the ration did not affect the calving difficulty score or birth weights.

Preliminary studies have shown that pine sawdust levels up to 10% of the total ration presented no visible toxicity symptoms with calves fed a growing ration during a 90-day period (Kamstra and Minyard, 1970). Also, no detrimental effects on either feedlot performance or carcasses were shown with cattle fed high energy rations for 115 days when sawdust was used to replace half the alfalfa roughage in a 90% concentrate ration. (Slyter and Kamstra, 1971b).

Sawdust has been suggested as a possible roughage in wintering rations for breeding stock in the range areas when other roughage materials are in short supply. The purpose of this study was to ascertain whether any toxicity might result from incorporating sawdust in wintering rations for pregnant heifers. Special emphasis was given to the possibility of embryonic abortion, since pine needles have been suggested as a causitive factor by Canadian researchers as early as 1927 (Bruce, 1927).

**Materials and Methods**

Twelve Angus X Hereford crossbred pregnant heifers were randomly allotted to two pens of six each. Experimental rations consisted of either 20 lb per head daily of grass and alfalfa loose hay or 20 lb of a mixed ration consisting of 25% ground corn, 25% sawdust, and 50% alfalfa hay starting December 24, 1970. These rations were calculated to be approximately equivalent in TDN and crude protein levels. Trace mineral salt and dicalcium phosphate (50-50) were provided free choice. Animals were weighed monthly, calves were weighed at birth, and calving difficulty was subjectively scored (Table 1, footnote). Animals were taken off treatment at calving.

The authors are with the Department of Animal Science, South Dakota State University, Brookings.

The study was conducted at the U.S. Department of Agriculture Newell Field Station, Newell, South Dakota. The article is published with the approval of the Director of the South Dakota Agricultural Experiment Station as Publication No. 1062 of the Journal Series. Manuscript received January 27, 1972.

**Results and Discussion**

No abortive tendencies were observed during this trial. The first calf was born February 18 and the last calf on June 8. Sawdust feeding was terminated on March 16, since only two animals remained on each treatment. The average calving date was March 23 and March 22 for the control and sawdust groups, respectively. One set of twins was born in the sawdust-fed group, although not attributable to sawdust feeding. Both rations supported adequate weight gains during the period fed (Table 1).

No significant differences were noted in calving difficulty or calf birth weights (Table 1).

**Table 1. Weight changes and calving results.**

<table>
<thead>
<tr>
<th>Ration</th>
<th>Control</th>
<th>25% Sawdust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number in lot</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Average wt</td>
<td>878.3</td>
<td>883.3</td>
</tr>
<tr>
<td>Average wt 03-16-71</td>
<td>904.2</td>
<td>925.8</td>
</tr>
<tr>
<td>Average calving score</td>
<td>1.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Average birth wt of calves</td>
<td>56.7</td>
<td>59.4</td>
</tr>
</tbody>
</table>

1 Weights included four heifers post-calving and two pre-calving in each lot.
2 Scored as follows: 1 = no difficulty; 2 = slightly difficult; 3 = difficult, calf puller needed; 4 = extremely difficult.
3 Includes one set of twins.

Previous work (Kamstra and Minyard, 1970) would suggest that not only is sawdust, fed at levels up to 25% of the ration, nontoxic, but it serves as a nutritive component as well. They found that fecal excretion of fiber did not increase proportionally with increases in sawdust in the ration. Increasing the level of sawdust from zero to 5% increased fecal fiber excretion from 39.6% to 40.0%; but when sawdust was increased to 25% of the ration, the feces contained only 46.6% fiber. In vitro dry matter digestibility ranged from 6 to 10% when used as the only substrate during a 48-hour fermentation period. This would suggest that stock could not be maintained on high sawdust rations unless the sawdust is treated to increase utilization, even if abortive tendencies or other toxicity factors were not critical.

**Summary and Conclusions**

Feeding a ration containing 25% raw pine sawdust to first-calf beef heifers during the last one-third of gestation resulted in no abortion or intake problems. No differences were noted in calf birth weights or calving difficulty in heifers fed the control or sawdust rations. Based on these results, it would appear...