SOME OBSERVATIONS ON THE NITROGEN AND ENERGY LOSSES IN THE FAECES AND URINE OF GRAZING SHEEP

By J. M. Vercoe *

Summary

A series of observations was made from May to December, 1961, on the nitrogen and energy losses in the faeces and urine of three Merino wethers grazing an annual pasture consisting of Wimmera ryegrass (*Lolium rigidum* Gaud.) and subterranean clover (*Trifolium subterraneum* L.).

Urinary nitrogen varied from 7.25 g/day and faecal nitrogen from 3.05-9.5 g/day. Urinary energy varied from 80-340 kcal/day and faecal energy from 480-1980 kcal/day.

Discrepancies between these and other data are discussed.

I. INTRODUCTION

Although the losses of energy and nitrogen in the faeces of grazing sheep have been commonly estimated, there is comparatively little information on the losses in both faeces and urine. The absence of this information has been primarily due to the lack of a suitable collection apparatus for urine. However, since the development of such apparatus by Beeston and Hogan (1960), these observations have become possible.

Measurements of energy and nitrogen losses in the faeces and urine of grazing sheep, although they do not constitute full balance studies, are of value in that they provide a base line from which the intake necessary to restore these losses can be calculated. This is particularly so in the case of the nitrogen measurements, because these represent the total loss of nitrogen to the body.

II. METHODS

Three Merino wethers, 4 to 5 years old, were harnessed to permit the total collection of faeces and urine, in a manner similar to that described by Beeston and Hogan (1960). The sheep were grazed at the rate of approximately one sheep per acre, on Wimmera ryegrass (*Lolium rigidum* Gaud.)—subterranean clover (*Trifolium subterraneum* L.) pasture. Collections were made at approximately monthly intervals from May 1961 to December 1961.

Daily collections of faeces and urine were made over 5 consecutive days. The daily collections of faeces were sampled for dry matter determinations. Nitrogen, ash and energy contents were determined on oven dried (24 hr at 105 °C) material, representative of the 5 day collection period. The urine was collected into 50 ml of 9N sulphuric acid, and a constant proportion of each daily volume was used to form a composite sample. The composite samples were analysed for nitrogen and energy content.

Liveweights, uncorrected for fleece weights, were recorded fortnightly.

* School of Agriculture, University of Melbourne
A.O.A.C. (1960) methods of analysis were used for nitrogen and ash determinations, and energy contents were determined in a “Gallenkamp” Adiabatic Bomb Calorimeter.

III. RESULTS AND DISCUSSION

The data on mean losses of nitrogen and energy in the faeces and urine are summarized in Table 1. The loss of nitrogen in the urine varied from 6·8 to 25·1 g/day and declined steadily from the May to the December observation. Urinary energy followed a similar pattern and varied from 18 to 342 kcal/day. Faecal nitrogen ranged from 3·4 to 9·4 g/day and faecal energy from 478 to 1,981 kcal/day, both these measurements being at a minimum in spring. Data on mean faecal organic matter, urine volume and liveweight, are also presented in Table 1.

**Table 1**

<table>
<thead>
<tr>
<th>Date</th>
<th>Urine N (g/day)</th>
<th>Faeces N (g/day)</th>
<th>Faeces Energy (kcal/day)</th>
<th>O.M Faeces (g/day)</th>
<th>Urine Volume (ml/day)</th>
<th>Liveweight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 1961</td>
<td>25·1</td>
<td>9·4</td>
<td>342</td>
<td>1286</td>
<td>211</td>
<td>2656</td>
</tr>
<tr>
<td>June 1961</td>
<td>19·0</td>
<td>9·4</td>
<td>203</td>
<td>1177</td>
<td>214</td>
<td>2830</td>
</tr>
<tr>
<td>August 1961</td>
<td>16·5</td>
<td>6·0</td>
<td>189</td>
<td>819</td>
<td>136</td>
<td>1856</td>
</tr>
<tr>
<td>September 1961</td>
<td>9·9</td>
<td>3·4</td>
<td>147</td>
<td>478</td>
<td>81</td>
<td>1002</td>
</tr>
<tr>
<td>October 1961</td>
<td>8·1</td>
<td>5·2</td>
<td>101</td>
<td>1154</td>
<td>221</td>
<td>612</td>
</tr>
<tr>
<td>December 1961</td>
<td>6·8</td>
<td>8·3</td>
<td>81</td>
<td>1981</td>
<td>392</td>
<td>470</td>
</tr>
</tbody>
</table>

* Mean of two sheep

There are, however, certain features of the data which are disconcerting. Firstly, the observed values for faecal organic matter are well below those previously encountered, and secondly, the pattern of faecal nitrogen loss is almost the reverse of that previously encountered (Pearce, Vercoe and Tribe, unpublished data). In the present observations faecal nitrogen is at a minimum in September, whereas in the previous observations faecal nitrogen loss was at a maximum in September. Thirdly, a loss of liveweight during the spring (September), is, to say the least, highly unusual.

There are three possible alternatives that could help to explain the discrepancies outlined above.

Firstly, the observations may be, in fact, real estimates for freely grazing sheep. In the light of previous measurements made on grazing sheep for faecal nitrogen, faecal organic matter and liveweight (Pearce, Vercoe and Tribe, unpublished data), this appears unlikely.

Secondly, the technique of collection used here, i.e. having the sheep permanently harnessed but only attaching urine carts 7 to 8 days prior to the
collection period, may be unsatisfactory. It can be said in this regard that collections were made only when faecal organic matter and urine volume were uniform and no tendency for these either to increase or to decrease over the collection period was observed.

Thirdly, the attachment of urine carts and faecal bags may interfere with normal grazing behaviour. This explanation would, at present, appear to be the most satisfactory. The evidence presented by Beeston and Hogan (1960) on this point was limited, and further investigations into this aspect of the use of urine and faecal collection harness are suggested.

Until such time as the discrepancies in these data are clarified, it would be unwise to accept them as being typical of the freely grazing sheep in this environment.

IV. REFERENCES
