EFFECT OF INCREASED PLASMA AMMONIA AND UREA CONCENTRATIONS ON PLASMA PROGESTERONE CONCENTRATIONS IN THE EWE

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High protein intakes elevate plasma urea and ammonia concentrations and this can be negatively associated with plasma progesterone concentrations in cows (Jordan and Swanson 1979; Jordan et al. 1983). Low plasma progesterone concentrations may compromise embryo survival and there are reports of negative relationships between protein intake and conception rate in dairy cattle (eg Jordan and Swanson 1979; Kaim et al. 1983). This experiment examined the direct effects of elevated plasma urea and ammonia concentrations on plasma progesterone concentrations in cycling ewes (used as models for cows).

Twenty-four 4-year old Merino cross ewes, liveweights 37 ± 1.2 kg, were allocated to five treatments, placed in individual pens and fed a maintenance diet of oaten and lucerne chaff. The treatments were: (i) control (4 sheep); (ii) jugular infusion of 0.9% saline (4 sheep); (iii) oral urea supplement (10 g/day) (4 sheep); (iv) oral urea plus jugular saline infusion (4 sheep); and (v) jugular infusion of 10 g urea/day in saline (8 sheep). The oral and infused urea was given to elevate plasma ammonia and urea concentrations, respectively. The oestrus cycles of the ewes were synchronized with intravaginal sponges containing progesterone. Jugular blood samples for the determination of concentrations of plasma ammonia, urea and progesterone were obtained during the second synchronized oestrus cycle.

As infusion of saline had no effect on plasma metabolites, groups one and two became the control treatment and groups three and four the infused urea treatment.

Table 1. The mean plasma ammonia, urea and maximum progesterone concentrations

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Oral urea</th>
<th>Infused urea</th>
<th>s.e.m.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia ug/ml</td>
<td>70.0$^c$</td>
<td>250.0$^a$</td>
<td>109.0$^b$</td>
<td>3.40</td>
</tr>
<tr>
<td>Urea mg/100 ml</td>
<td>8.0$^c$</td>
<td>17.0$^b$</td>
<td>23.0$^a$</td>
<td>0.40</td>
</tr>
<tr>
<td>Progesterone mg/ml</td>
<td>4.0</td>
<td>3.9</td>
<td>3.5</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Values on the same line with different superscripts are significantly different, P<0.05

These results show that while oral urea supplementation increased plasma ammonia concentrations and intravenous urea infusions increased plasma urea concentrations neither of these responses were associated with significant depressions in maximum plasma progesterone concentrations. Therefore, the study provided no evidence of a negative association between elevated plasma ammonia and urea concentrations and depressed progesterone concentrations in sheep.