BODY COMPOSITION INFLUENCES NET FEED INTAKE IN TERMINAL SIRE RAMS

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Net feed intake (NFI) is commonly used to identify animals that are more efficient at converting feed into weight gain, however, little work has evaluated the potential to use NFI in the Australian sheep industry. Net feed intake is moderately heritable (François et al. 2002) and negatively correlated with lean carcass (Knott et al. 2003). Body composition might have a regulatory role in influencing efficiency (Perry et al. 1997). We hypothesised that variation in the efficiency of energy utilisation in growing sheep, and therefore NFI, may be explained by differences in body composition.

Fifty-three ram lambs (7 months, 36.3 kg) were housed in individual pens and fed a concentrate-based pelleted diet (12 MJ/kg DM metabolisable energy, 16% crude protein). Twice weekly liveweights and daily DM intakes were measured for 49 d. Animals were scanned for body composition using dual energy X-ray absorptiometry at the start and the conclusion of the experiment. Net feed intake was calculated as the difference between actual feed intake and the estimated feed intake given the animal’s requirements for maintenance and growth (SCA 1990).

Net feed intake was found to be correlated with lean tissue mass (LTM) at the start (-0.34, P<0.05) and finish (-0.49, P<0.01); fat tissue mass (FTM) at the start (-0.37, P<0.01); LTM:FTM ratio at the start (0.31, P<0.05); and average daily gain (ADG) (-0.59, P<0.01). Gross feed conversion ratio (FCR) was correlated with NFI (0.59, P<0.01); LTM:FTM ratio at the end (-0.28, P<0.05) and lean tissue gain (g/day) (-0.67, P<0.01). Data from the extreme animals (top (H) and bottom (L) 20%) indicate significant differences (l.s.d. at 5%) for a number of variables (Table 1). When adjusted for variation in initial weight, lean tissue gain (g/day) and LTM at the end were significantly different between the extreme animal groups (H 188.5 g/day, L 121.1 g/day P<0.05; H 40.90 kg, L 36.46 kg P<0.05, respectively). However, the ratio of LTM to FTM was not significantly different at either the start or the end of the experiment.

Table 1. Mean (± s.d.) results for extreme animals in comparison to the group as a whole (n=10 in H and L groups respectively, n=53 in all) for specific weight and intake variables (see the text for definitions of terms).

<table>
<thead>
<tr>
<th>Group</th>
<th>ADG (g/day)</th>
<th>NFI</th>
<th>FCR</th>
<th>Start Wt (kg)</th>
<th>End Wt (kg)</th>
<th>Intake (kg DM/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (H)</td>
<td>495 (55)\textsuperscript{a}</td>
<td>-0.6 (0.2)\textsuperscript{a}</td>
<td>4.0 (0.5)\textsuperscript{a}</td>
<td>38.9 (4.2)\textsuperscript{a}</td>
<td>61.5 (2.5)\textsuperscript{a}</td>
<td>1.82 (0.2)\textsuperscript{a}</td>
</tr>
<tr>
<td>Low (L)</td>
<td>309 (90)\textsuperscript{b}</td>
<td>0.1 (0.1)\textsuperscript{b}</td>
<td>5.6 (0.9)\textsuperscript{b}</td>
<td>35.2 (5.0)\textsuperscript{b}</td>
<td>50.4 (7.2)\textsuperscript{b}</td>
<td>1.69 (0.4)\textsuperscript{b}</td>
</tr>
<tr>
<td>All</td>
<td>407 (90)</td>
<td>-0.3 (0.3)</td>
<td>4.6 (0.8)</td>
<td>36.3 (4.7)</td>
<td>55.3 (6.5)</td>
<td>1.75 (0.3)</td>
</tr>
</tbody>
</table>

\textsuperscript{a,b} means with different letters are significantly different (P<0.05, applies to H & L groups only)

The data for the H and L groups indicate that feed energy is utilised less efficiently for liveweight gain in L, and that this is associated with reduced lean tissue gain. This is supported by the overall negative correlation between LTM and NFI and confirms results found in a previous study using sheep from the same flock (Knott et al. 2003). Differences in body composition and composition of gain explain some of the differences in NFI and FCR between sheep.


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