Feeding High Omega-3 Diets to Crossbred Ewes: Effect on Time to Oestrus

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Prostaglandins are associated with the initiation of oestrus and ovulation (for review, see Abayasekara and Wathes, 1999). Omega-3 fatty acids are associated with decreased prostaglandin F2α (PGF2α) synthesis (Petit et al 2002). However, the effect of omega-3 on PGF2α and time to oestrus and ovulation rate (OR) are unknown. Conserved forages, such as cereal or legume silages, contain high concentrations of omega-3 compared with cereal grains (Dewhurst et al 2006). The aim of the current study was to determine the effect of feeding silage that is high in omega-3 on time to oestrus and OR in crossbred ewes.

Thirty Merino x Border Leicester ewes (age 3-4 years) were randomly allocated to one of two treatment groups according to their mean body condition score (3.5 ± 0.03) and liveweight (86.8 ± 1.00 kg). Ewes were fed either a low omega-3 diet (70% oats, 22% oat/pea silage, 8% cottonseed meal; n = 15) or a high omega-3 diet (100% oat/pea silage; n = 15) together with a commercial vitamin/mineral premix (Ausfarm Nutrition). Ewes were housed in individual pens and fed at 1.2 x maintenance based on individual liveweight for 4 weeks pre- and 1 week post-mating. All ewes had their oestrous cycles synchronised with an injection of PGF2α (Lutalyse®, Upjohn, Australia) and an Eazibreed® Sheep CIDR (Pfizer, Australia). Oestrus was detected over a 5 day period from crayon marks by harnessed rams at the first natural oestrus after synchronisation. OR was measured in both the synchronised and first natural oestrous cycle via trans-rectal ultrasonography (Aloka SSD-500, 7.5 MHz, Vinoles et al 2004). Differences in time to oestrus and OR between groups were analysed using the Mixed model procedure and the proportion of ewes showing oestrus was analysed using proportional hazards regression analysis in SAS.

Time to oestrus (Table 1) and the number of ewes showing oestrus was not significantly different (P=0.067, Figure 1) due to diet. There was also no significant difference (P=0.259, Table 1) in OR due to diet. The increased time to oestrus in ewes fed the high omega-3 diet may be related to decreased in vivo synthesis of inflammatory prostaglandins involved in the initiation of oestrus and ovulation. Further analyses will examine changes in PGF2α synthesis over time and the relationship between PGF2α and fatty acid profiles in plasma and red blood cells.

<table>
<thead>
<tr>
<th>Diet</th>
<th>Time to oestrus (days)</th>
<th>Mean ovulation rate</th>
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</thead>
<tbody>
<tr>
<td>Low omega-3</td>
<td>3.0 ± 0.83</td>
<td>0.67 ± 0.15</td>
</tr>
<tr>
<td>High omega-3</td>
<td>4.4 ± 0.89</td>
<td>0.92 ± 0.16</td>
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<tr>
<td>P value</td>
<td>0.073</td>
<td>0.259</td>
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</tbody>
</table>


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