INTRODUCTION

- During foetal development, the brain has very high requirements for PUFA.
- Rumens consume very little arachidonic (C20:4n-6) and docosahexaenoic (C22:6n-3) acids, which may be too low for correct brain growth.
- C20:4n-6 and C22:6n-3 precursors, linoleic (C18:2n-6) and linolenic (C18:3n-3) acids respectively, may not be absorbed in sufficient quantities due to rumen bio-hydrogenation.

OBJECTIVES

To study the effect of the type of fat supplement on PUFA transfer from dam to foetus.

MATERIAL AND METHODS

- Animals:
  - From 15 months pre-term
  - 16 goats received a control diet containing a concentrate rich in rapeseed (rich in C18:1n-9 (oleic acid), 25%); low in C18:3n-3, 5%)
  - 14 goats received a diet containing a concentrate rich in linseed (L, rich in C18:3n-3, 23%; low in C18:1n-9, 7%)
- Sampling at birth:
  - Goat and kid jugular plasma
  - Cotyledon and umbilical blood
- Analyses:
  - Fatty acid profile
  - ANOVA

Table 1. Effect of the type of concentrate (rich in rapeseed or linseed) on the fatty acid % at birth in different pools

<table>
<thead>
<tr>
<th>Fatty acid</th>
<th>Rapeseed (n=16)</th>
<th>Linseed (n=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C16:0</td>
<td>14.6 c</td>
<td>16.5 c</td>
</tr>
<tr>
<td>C18:0</td>
<td>24.1 a</td>
<td>14.9 c</td>
</tr>
<tr>
<td>C18:1n-9</td>
<td>21.7 a</td>
<td>43.1 a</td>
</tr>
<tr>
<td>C18:2n-6</td>
<td>19.4 a</td>
<td>3.0 c</td>
</tr>
<tr>
<td>C18:3n-6</td>
<td>0.2 c</td>
<td>0.2 bc</td>
</tr>
<tr>
<td>C20:4n-6</td>
<td>5.8 de</td>
<td>7.9 a</td>
</tr>
<tr>
<td>C20:5n-3</td>
<td>1.2 c</td>
<td>1.1 c</td>
</tr>
<tr>
<td>C22:6n-3</td>
<td>0.3 e</td>
<td>1.9 bc</td>
</tr>
</tbody>
</table>

GJ: goat jugular plasma, Cot: cotyledon, V: umbilical vein, KJ: kid jugular plasma, Art: arterial blood. For a given line, values with different letters are different: ***: P<0.001, **: P<0.01, *: P<0.05, +: P>0.1. D: diet effect, T: tissue effect, DXT: diet x tissue interaction.

RESULTS

- % of C18:3n-3, C20:5n-3 and C22:6n-3 increased and % C20:4n-6 decreased after the L compared to the control diet (Table 1).
- For both diets the % of C18:2n-6 and C18:3n-3 decreased between the goat jugular and the umbilical vein and the % of C20:4n-6 and C22:6n-3 increased (Figure 1).

CONCLUSION

- Diet effect on FA proportions modest compared to the differences in diet composition, probably due to rumen bio-hydrogenation.
- Transfer of C18:3n-3 and C18:2n-6 from dam to foetus appears to be very low while C20:4n-6 and C22:6n-3 appear to be concentrated in the foetus compared to the dam.
- There may be either a selective placental transport system for PUFA, or C18:2n-6 and C18:3n-3 may be elongated and desaturated in the placenta to C20:4n-6 and C22:6n-3.

We thank VALOREX for supplying the concentrate diets and Christine Ficheux for technical assistance.

Figure 1. PUFA proportions (%) in different pools at birth.

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