This is a repository copy of The differential impact of maternal dietary macronutrient composition on offspring birthweight – results from the Danish National Birth Cohort.

White Rose Research Online URL for this paper:
http://eprints.whiterose.ac.uk/137243/

Version: Accepted Version

Proceedings Paper:

https://doi.org/10.1017/S0029665118001891

© The Authors 2018. This article has been published in a revised form in Proceedings of the Nutrition Society https://doi.org/10.1017/S0029665118001891. This version is free to view and download for private research and study only. Not for re-distribution, re-sale or use in derivative works.

Reuse
Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown
If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.
The differential impact of maternal dietary macronutrient composition on offspring birthweight–results from the Danish National Birth Cohort

S.S. Sharma1, D.C. Greenwood2, C. Granström4, N.A.B. Simpson3, S.F. Olsen4 and J.E. Cade1

1Nutritional Epidemiology Group, School of Food Science and Nutrition, University of Leeds, Leeds LS2 9JT, UK,
2Division of Biostatistics, University of Leeds, Leeds LS2 9JT, UK,
3Division of Obstetrics and Gynaecology, University of Leeds, Leeds LS2 9JT, UK
4Centre for Fetal Programming, Department of Epidemiology Research, Statens Serum Institut, Copenhagen, Denmark.

There is limited evidence about the differential impact of the dietary macronutrient composition (carbohydrate [CHO], protein and fat) during pregnancy on offspring birthweight(1,2). The aim of our study was to explore the association between maternal dietary macronutrient intake in the second trimester and offspring birthweight.

The study included 63,755 mother-infant pairs within the Danish National Birth Cohort (DNBC)3 in Denmark. Dietary data was collected in the food frequency questionnaires (FFQs) around the 25th week of gestation. Baseline information was collected from the participants at recruitment around the 12th week of gestation. Multiple linear regression models analysed the association between maternal macronutrient dietary intake in the second trimester and changes in birth weight. Both macronutrient models were mutually adjusted for energy contributing macronutrients. Model 1 was adjusted for confounders including pre-pregnancy body mass index (BMI), alcohol intake, smoking, parity, physical activity, dietary supplements, and competing exposures including gestational age at delivery, and sex of the offspring, and Model 2 was further adjusted for total micronutrient intakes (diet plus supplement) including calcium, iron, folate and vitamin B12.

<table>
<thead>
<tr>
<th>Macronutrient</th>
<th>Trimester 2 n = 63,755</th>
<th>Birthweight(g), Model 1</th>
<th>Birthweight(g), Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Birthweight 95% CI</td>
<td>p value</td>
<td>Birthweight 95% CI</td>
</tr>
<tr>
<td>Total energy</td>
<td>9</td>
<td>6 to 13</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>16</td>
<td>10 to 23</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Fat (g/d)</td>
<td>-22</td>
<td>-27 to -17</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Protein (g/d)</td>
<td>21</td>
<td>14 to 29</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Mutually adjusted for other energy contributing macronutrients *Adjusted for pre-pregnancy body mass index (BMI), alcohol intake, smoking, parity, physical activity, dietary supplements, gestational age at delivery, and sex of the offspring *Additional adjustment for total micronutrient intakes (calcium, iron, folate and vitamin B12).
Results showed that each additional 100 g/day CHO and 30 g/day protein consumption in the second trimester were associated with higher birthweights of 14 g (95 % CI 9 to 20; P < 0·001) and 17 g (95 % CI −9 to 25; P < 0·001) respectively. Conversely, each additional 30 g/day fat consumption was associated with a lower birthweight of 23 g (95 % CI 18 to 27; P < 0·001). CHO and protein intakes in the second trimester are associated with improving birthweight, whereas fat is associated with limiting offspring weight gain. We advise an appropriate balance of dietary energy intake during pregnancy to optimise birthweight.