



Summer Meeting, 6–9 July 2015, The future of animal products in the human diet: health and environmental concerns

## Dietary and plasma fatty acid concentrations associated with processed red meat consumption

Y.M. Lenighan, A.P. Nugent, K.F. Li, L. Brennan, H.M. Roche and B.A. McNulty  
UCD Institute of Food and Health, University College Dublin, Belfield, Dublin 4, Ireland

Intakes of red meat have been associated with chronic diseases including CVD and Type 2 diabetes<sup>(1)</sup>. Recent evidence however has suggested that the unhealthier fatty acid profile; high SFA and low LC n-3 PUFA content of processed red meat may be the driving force of these negative health effects<sup>(2,3)</sup>. This aim of this study was to characterise the dietary intakes of Irish processed red meat consumers/non-consumers and relate this to plasma fatty acid composition. The National Adult Nutrition Survey (NANS) assessed habitual food and beverage intake, between 2008 and 2010 for 1500 Irish adults using a 4-day semi-weighted food diary<sup>(4)</sup>. A large proportion (79 %) also provided blood and urine samples. Plasma total fatty acids were extracted and transesterified using Bligh & Dyer and Ohta methods<sup>(5)</sup>. For this analysis, under reporters were removed and only participants with fasting blood samples were included, the average amount of processed meat consumed was calculated and the population divided into non-consumers and low, medium and high consumers of processed red meat. Statistical differences between groups was assessed using a general linear model, controlled for age, gender, energy (kcal), social class, smoking status, supplement use and physical activity, with Bonferoni *post hoc* test.

Processed Red Meat Consumers	Non (n = 89)		Low (n = 155)		Medium (n = 177)		High (n = 167)		P
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Processed red meat (g/d)	0.0 <sup>a</sup>	0.0	11.4 <sup>b</sup>	4.7	30.2 <sup>c</sup>	6.9	77.1 <sup>d</sup>	36.4	<0.001
Energy (kcal/d)	2020 <sup>a</sup>	570	2058 <sup>a</sup>	540	2252 <sup>ab</sup>	600	2524 <sup>b</sup>	640	<0.001
% Total Plasma Fatty Acids									
Palmitic (C16:0)	22.79	3.04	22.83	1.83	22.66	2.57	23.15	2.00	0.576
Palmitoleic (C16:1)	2.33 <sup>a</sup>	0.78	2.54 <sup>ab</sup>	0.75	2.54 <sup>b</sup>	0.90	2.56 <sup>b</sup>	0.87	0.020
Stearic (C18:0)	10.25	3.06	9.83	2.42	9.73	2.64	10.24	2.72	0.635
Oleic (C18:1)	17.53	3.04	17.89	3.04	18.83	4.20	18.55	3.36	0.060
Linoleic (C18:2)	26.68	4.46	26.34	3.71	25.86	4.00	25.82	3.68	0.070
Gamma Linolenic (C18:3)	0.51 <sup>a</sup>	0.18	0.55 <sup>ab</sup>	0.18	0.56 <sup>ab</sup>	0.19	0.59 <sup>b</sup>	0.19	0.025
Alpha Linolenic (C18:3)	0.81	0.28	0.83	0.26	0.84	0.24	0.87	0.24	0.916
Arachidonic (C20:4)	7.15 <sup>a</sup>	1.84	7.70 <sup>ab</sup>	1.82	7.69 <sup>ab</sup>	2.15	7.67 <sup>b</sup>	1.85	0.032
Eicosapentaenoic (C20:5)	1.62 <sup>a</sup>	1.30	1.51 <sup>ab</sup>	0.96	1.27 <sup>b</sup>	0.71	1.18 <sup>b</sup>	0.56	0.008
Docosahexaenoic (C22:6)	2.74 <sup>a</sup>	1.16	2.67 <sup>ab</sup>	0.97	2.32 <sup>b</sup>	0.85	2.08 <sup>b</sup>	0.76	0.003

<sup>abcd</sup> Different uppercase superscript indicate significant differences between consumption groups

High consumers comprised of younger males; this trend shifted across the consumer groups with non-consumers being older females (P < 0.001). High consumers had higher intakes (%TE) of meats, potatoes, butters and oils, while intakes of cereals, grains, fish, fruit, vegetables, nuts and seeds were higher in the non-consumers (P < 0.05). These intakes were reflected in the plasma fatty acid profiles; high consumers of processed meats had significantly higher concentrations of C16:1 and C18:3. The non-consumers presented the highest plasma EPA and DHA concentrations, which decreased across the consumption groups, corresponding directly with fish intakes (P < 0.05). These results indicate that consumption of a diet high in processed red meat is associated with an unhealthy fatty acid profile; high SFA and low LC n-3 PUFA. Modification of the fatty acid profile of processed red meat by increasing LC n-3 PUFA could be a potential strategy to improve dietary quality and reduce the risk of CVD and T2D.

This project was funded by FIRM under the NDP 2007–2013

1. Micha R, Wallace SK & Mozaffarian D (2010) *Circulation* **121** 2271–2283
2. Pavan E & Duckett SK (2012) *Meat Sci* **93** 371–377
3. Pan A, Sun Q & Bernstein AM *et al.* (2012) *Arch Intern Med* **172** (7) 555–563
4. National Adult Nutrition Survey Summary Report (2011) Available at: <http://lt.cn/8s77yIu>
5. Li KF, McNulty BA & Tierney AM *et al.* (2014) *Proc Nutr Soc* **73** (OCE2) E46

