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Processed red meat consumption, socio-demographic characteristics and cardio-metabolic risk

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Globally the prevalence of cardiovascular disease (CVD) and diabetes is increasing [1]. The WHO estimate that by 2030, CVD will be responsible for 23·3 million deaths annually, and the prevalence of diabetes will have risen to 336 million [1]. Processed red meat has been associated with CVD and Type 2 diabetes due to its unfavourable fat profile and high sodium content [2]. The aim of this study was to characterise patterns of dietary meat intakes, socio-demographics and cardio-metabolic risk factors. This study used data from the National Adult Nutrition Survey (NANS), a cross-sectional food consumption survey carried out between 2008 and 2010. Habitual food and beverage intake data was collected for 1500 Irish adults using a 4-day semi-weighted food diary, 79 % of whom provided blood and urine samples [3]. For the purpose of this analysis, under reporters were removed and only participants who provided a fasting blood sample were included. Mean daily processed red meat intake (g/d) was used to divide the NANS into processed red meat consumption groups. Statistical significance 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* = *93*)		Low (*n* = *162*)		Medium (*n* = *179*)		High (*n* = *178*)		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	P
Processed red meat (g/d)	0·0[a]	0·0	11·4[b]	4·7	30·2[c]	6·9	77·1[d]	36·4	**<0·001**
Energy (kcal/d)	2020[a]	570	2058[a]	540	2252[ab]	600	2525[b]	640·1	**<0·001**
Glucose (mmol/l)	5·1	0·71	5·14	0·68	5·27	1·17	5·24	0·83	0·145
Insulin (μIU/ml)	7·22	4·58	8·28	6·89	9·51	7·49	9·76	9·57	**0·026**
C-Peptide (ng/ml)	1·89	2·41	1·74	1·84	2·23	2·24	2·12	2·15	**0·028**
NEFA (mmol/l)	0·59[a]	0·31	0·64[ab]	0·36	0·71[b]	0·36	0·64[ab]	0·34	**0·028**
Triglyceride (mmol/l)	1·05[a]	0·49	1·17[ab]	0·68	1·34[b]	0·86	1·27[ab]	0·67	**0·010**
Total cholesterol (mmol/l)	5·11	1·08	5·06	1·00	4·9	1·05	4·82	0·96	0·770
HDL cholesterol (mmol/l)	1·69[ab]	0·42	1·68[a]	0·43	1·50[b]	0·36	1·49[ab]	0·39	**0·015**
LDL cholesterol (mmol/l)	2·92	0·95	2·85	0·83	2·79	0·88	2·75	0·85	0·803

[abcd] Different uppercase superscript indicate significant differences between consumption groups

Gender, age and social class differed across the consumption groups; the non-consumers were predominantly older, professional females. High consumers were generally younger, unskilled males ($P < 0·001$), with a higher smoking status and with a lower supplement usage ($P < 0·001$). Furthermore, high consumers had a higher BMI ($P = 0·016$), yet a lower body fat percentage ($P = 0·022$), a greater muscle mass ($P = 0·023$) and higher physical activity levels ($P = 0·002$) than all other consumer groups. As a percentage of total energy, lower intakes of carbohydrates, sugars ($P < 0·001$) and higher intakes of total fat, SFA, MUFA and sodium ($P < 0·05$) were observed in high processed red meat consumers. Insulin, c-peptide, NEFA and TAG concentrations increased, but HDL cholesterol decreased with processed red meat consumption. Similarly indices of insulin resistance, $HOMA_{IR}$ and QUICKI, and CVD risk, TAG: HDL, were modulated with meat intake. Therefore it would seem, high processed red meat consumption presents a lower dietary quality, with increased cardio-metabolic risk. Whilst, further pattern analysis is required to investigate this relationship, the data suggest that modification of processed meat composition may be a good target to improve dietary quality.

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