

S1 Table. Characteristics of 102 randomized controlled feeding trials evaluated in the meta-analysis of effects of diets with different macronutrient compositions on glucose-insulin homeostasis.

Author, publication year, Location (Reference)	Design	N arms	Length days*	Dietary arms	N adults	Mean age (SD or range), years	Men, %	Mean BMI, kg/m ²	Glucose, mmol/L†	Macronutrient intake CHO/SFA/MUFA/PUFA % of energy‡	Measures §	Quality score
Trials of healthy adults												
Coulston, 1983 United States [56]	Crossover	2	10	High CHO	11	45 (22-67)	45.5	24.9	5.1	60 / 5.8 / 8.3 / 6.9	Fasting	6.0
				Low CHO	11	45 (22-67)	45.5	24.9	5.1	40 / 11 / 16 / 14		
Gustafsson, 1992 Sweden [80]	Parallel	2	21	MUFA	17	58.4 (52-72)	37.5	24.9	4.9	56 / 7.3 / 15 / 4.8	Fasting	7.0
				PUFA	19	58.4 (40-65)	37.5	24.6	5.0	56 / 7.8 / 8.4 / 10		
Nydahl, 1994 Sweden [36]	Crossover	2	25	High MUFA	26	51.2 (23-74)	69.2	25.6	5.0	55 / 8 / 15 / 4	Fasting	7.0
				High PUFA	26	51.2 (23-74)	69.2	25.6	5.0	56 / 8 / 8 / 11		
Uusitupa, 1994 Finland [44]	Crossover	2	21	MUFA	7	23 (1.6)	0	21.5	4.5	44 / 8.5 / 19 / 10	Fasting	7.5
				SFA	7	23 (1.6)	0	21.5	4.5	45 / 20 / 12 / 3.9		
Nydahl, 1995 Sweden [112]	Crossover	2	25	Canola oil	22	54.2 (35-69)	54.5	25.3	5.2	56 / 7.8 / 14 / 8.9	Fasting	8.0
				Olive oil	22	54.2 (35-69)	54.5	25.3	5.0	56 / 8.7 / 16 / 5.5		
Schwab, 1995 Finland [68]	Crossover	2	28	Lauric acid diet	15	23.9 (4.6)	0	21.4	5.0	46 / 20 / 10 / 4.9	Fasting	8.5
				Palmitic acid diet	15	23.9 (4.6)	0	21.4	5.0	44 / 19 / 13 / 5.2	IV	
Espino-Montoro, 1996 Spain [117]	Crossover	2	28	Olive oil	20	22.5 (19-26)	100	24.4	5.3	46 / 9.8 / 25 / 4.5	Fasting	7.5
				Sunflower oil	20	22.5 (19-26)	100	24.4	5.3	46 / 9 / 26 / 4.9		
Niskanen, 1997 Finland [39]	Parallel	2	56	MUFA	14	55.4 (5.7)	64.3	29.1	6.4	43 / 11 / 19 / 8	Fasting	8.0
				PUFA	17	55.0 (5.3)	52.9	30.8	6.2	46 / 11 / 10 / 10	IV	
Jeppesen, 1997 United States [42]	Crossover	2	21	High CHO	10	66 (5.0)	0	27.0	4.9	40 / 14 / 17 / 14	Fasting	7.0
				Low CHO	10	66 (5.0)	0	27.0	5.1	60 / 7.8 / 9.4 / 7.8		
Schwab, 1997 Finland [43]	Crossover	2	21	PUFA	8	23 (21-25)	0	21.1	4.0	44 / 10 / 11 / 18	Fasting	8.5
				SFA	8	23 (21-25)	0	21.1	4.0	44 / 21 / 13 / 5		
Louheranta, 1998 Finland [66]	Crossover	2	28	Oleic acid	15	22 (2.3)	0	22.6	4.7	42 / 13 / 19 / 6.4	Fasting	7.0
				Stearic acid	15	22 (2.3)	0	22.6	4.7	45 / 19 / 12 / 6.4	IV	
Lovejoy, 1998 United States [22]**	Crossover	2	21	High fat, AA	20	36.6 (1.4)	100	31.9	5.2	35 / 20 / 19 / 11	Fasting	7.5
				Low fat, AA	20	36.6 (1.4)	100	31.9	5.2	55 / 7.4 / 8.4 / 4.2	IV	
	Crossover	2	21	High fat, White	11	34.4 (1.8)	100	30.2	5.2	35 / 20 / 19 / 11	Fasting	7.5
				Low fat, White	11	34.4 (1.8)	100	30.2	5.2	55 / 7.4 / 8.4 / 4.2	IV	
Louheranta, 1999 Finland [70]	Crossover	2	28	MUFA	14	23 (3.0)	0	20.8	5.0	50 / 13 / 19 / 5.8	Fasting	8.5
				Trans fat	14	23 (3.0)	0	20.8	5.0	50 / 11 / 19 / 6.5	IV	
Thomsen, 1999 Denmark [72]	Crossover	2	28	CHO	16	35 (2.0)	37.5	25.8	4.2	53 / 8.8 / 8.1 / 6.7	Fasting	10.0
				MUFA	16	35 (2.0)	37.5	25.8	4.2	41 / 9.4 / 24 / 5.5	IV	
Louheranta, 2000 Finland [69]	Crossover	2	28	Low fat	18	53 (8.5)	72.2	29.6	6.1	47 / 8.4 / 18 / 7.8	Fasting	7.5
				MUFA	18	53 (8.5)	72.2	29.6	6.1	43 / 10 / 22 / 6.9	IV	
Matthan, 2001 United States [21]**	Latino Square	6	35	Butter	18	60 (7.0)	100	28.1	5.3	54 / 17 / 8.1 / 2.4	Fasting	9.0
				PHSO	18	60 (7.0)	100	28.1	5.1	56 / 7.3 / 8.1 / 12		
				Semiliquid margarine	18	60 (7.0)	100	28.1	5.2	52 / 8.6 / 8.1 / 14		
				Shortening	18	60 (7.0)	100	28.1	5.3	53 / 8.6 / 9.9 / 8.1		
				Soft margarine	18	60 (7.0)	100	28.1	5.1	53 / 8.4 / 8 / 11		
				Stick margarine	18	60 (7.0)	100	28.1	5.2	54 / 8.5 / 8.5 / 6.3		
	Latino Square	6	35	Butter	18	67 (4.0)	0	26.5	5.2	54 / 17 / 8.1 / 2.4	Fasting	9.0
				PHSO	18	67 (4.0)	0	26.5	5.1	56 / 7.3 / 8.1 / 12		

S1 Table. Characteristics of 102 randomized controlled feeding trials evaluated in the meta-analysis of effects of diets with different macronutrient compositions on glucose-insulin homeostasis.

Author, publication year, Location (Reference)	Design	N arms	Length days*	Dietary arms	N adults	Mean age (SD or range), years	Men, %	Mean BMI, kg/m ²	Glucose, mmol/L†	Macronutrient intake CHO/SFA/MUFA/PUFA % of energy‡	Measures §	Quality score
				Semiliquid margarine	18	67 (4.0)	0	26.5	5.1	52 / 8.6 / 8.1 / 14		
				Shortening	18	67 (4.0)	0	26.5	5.2	53 / 8.6 / 9.9 / 8.1		
				Soft margarine	18	67 (4.0)	0	26.5	5.0	53 / 8.4 / 8 / 11		
				Stick margarine	18	67 (4.0)	0	26.5	5.1	54 / 8.5 / 8.5 / 6.3		
Kriketos, 2001 United States [53]	Parallel	3	70	Omega-3 PUFA	16	46.9	37.5	33.4	5.6	50 / 9.3 / 23 / 9.3	Fasting IV	6.5
				Omega-6 PUFA	17	47.0	35.3	33.5	5.5	50 / 9.3 / 23 / 9.3		
				SFA	19	47.0	31.6	33.5	6.1	50 / 12 / 29 / 3		
Vidon, 2001 France [31]	Crossover	2	21	High fat	7	40 (22-48)	42.9	20-27	4.8	41 / 14 / 15 / 14	Fasting OTT	6.5
				High CHO	7	40 (22-48)	42.9	20-27	4.3	55 / 10 / 10 / 11		
Perez-Jimenez, 2001 Spain [118]	Crossover	2	28	High CHO	59	23.1 (1.8)	50.8	22.9	4.9	55 / 9.2 / 14 / 5.2	Fasting	7.0
				Mediterranean	59	23.1 (1.8)	50.8	22.9	4.9	44 / 9.2 / 24 / 4.8		
Poppitt, 2002 New Zealand [29]	Crossover	2	21	Control butter	20	23 (4.2)	100	21.7	4.7	47 / 20 / 6 / 14	Fasting	8.0
				Modified butter	20	23 (4.2)	100	21.8	4.7	48 / 15 / 8 / 16		
Kratz, 2002 Germany [23]**	Parallel	3	28	Olive oil	10	25.7 (5.4)	100	23.0	4.4	47 / 11 / 23 / 3.4	Fasting	8.0
				Rapeseed oil	10	25.7 (5.4)	100	23.0	4.4	47 / 9.1 / 19 / 8.9		
				Sunflower oil	10	25.7 (5.4)	100	23.0	4.5	48 / 10 / 8.7 / 18		
	Parallel	3	28	Olive oil	9	25.7 (5.4)	0	23.0	4.1	47 / 11 / 23 / 3.4	Fasting	8.0
				Rapeseed oil	7	25.7 (5.4)	0	23.0	4.3	47 / 9.1 / 19 / 8.9		
				Sunflower oil	9	25.7 (5.4)	0	23.0	4.2	48 / 10 / 8.7 / 18		
Lovejoy, 2002 United States [23]**	Crossover	3	28	MUFA	25	28 (10.0)	48.0	23.5	4.9	57 / 5.8 / 15 / 6.3	Fasting IV	9.0
				SFA	25	28 (10.0)	48.0	23.5	4.8	58 / 11 / 9.3 / 6.4		
				Trans fat	25	28 (10.0)	48.0	23.5	4.7	58 / 7.3 / 8.4 / 4		
Clifton, 2004 Australia [119]	Parallel	2	84	High MUFA	31	47.1 (10.7)	0	35.0	5.0	44 / 6.4 / 20 / 6.6	Fasting	8.0
				Very low fat	31	46.9 (9.9)	0	34.7	5.1	65 / 4.1 / 3.7 / 2.1		
Johnston, 2004 United States [58]	Parallel	2	42	High CHO, low fat	7	36.4 (4.2)	14.3	28.7	5.2	66 / 5.8 / 4.2 / 2.1	Fasting	7.5
				High prot, low fat	9	40.1 (3.6)	11.1	29.1	5.3	40 / 7.9 / 11 / 5.4		
Hwalla, 2004 Lebanon [86]	Parallel	2	28	High MUFA	7	28.6 (19-48)	100	34.8	5.3	35 / 10 / 30 / 5	Fasting	7.5
				High CHO	8	28.6 (19-48)	100	35.2	5.2	60 / 9 / 4 / 7		
Segal-Isaacson, 2004 United States [87]	Crossover	2	42	Low CHO	4	52.3 (3.8)	0	33.3	5.3	5 / 22 / 22 / 21	Fasting	9.0
				Low fat	4	52.3 (3.8)	0	33.3	5.3	50 / 6 / 8 / 6		
Luscombe-Marsh, 2005 Australia [77]	Parallel	2	112	High fat, standard prot	30	48.9 (23.2)	43.3	34.6	5.8	35 / 9.2 / 23 / 9.3	Fasting	8.5
				Low fat, high prot	27	51.7 (18.7)	44.4	33.4	5.6	35 / 9.3 / 14 / 3.8		
Noakes, 2005 Australia [78]	Parallel	2	84	High prot	52	50 (10.0)	0	32.0	6.2	44 / 5.4 / 9.4 / 4.7	Fasting	8.0
				Low prot	48	49 (9.0)	0	33.0	6.1	61 / 4.6 / 8.3 / 4.7		
Keogh, 2005 Australia [120]	Crossover	4	21	CHO	40	55.9 (10.7)	47.5	27.3	5.3†	65 / 7 / 6 / 3	Fasting	8.0
				MUFA	40	55.9 (10.7)	47.5	27.3	5.3	44 / 8 / 19 / 7		
				PUFA	40	55.9 (10.7)	47.5	27.3	5.4	45 / 9 / 10 / 15		
				SFA	40	55.9 (10.7)	47.5	27.3	5.9	45 / 19 / 12 / 4		
Johnston, 2006 United States [120]	Parallel	2	42	Ketogenic low CHO	9	38.4 (11.7)	22.2	35.0	5.5	9 / 21 / 20 / 8	Fasting	8.5
				Non-ketogenic low CHO	10	37.2 (12.3)	20.0	34.6	5.2	42 / 8 / 10 / 4		
Tricon, 2006	Crossover	2	36	CLA-rich dairy	32	45.5 (8.7)	100	25.0	5.1	45 / 11 / 8.1 / 4.1	Fasting	9.0

S1 Table. Characteristics of 102 randomized controlled feeding trials evaluated in the meta-analysis of effects of diets with different macronutrient compositions on glucose-insulin homeostasis.

Author, publication year, Location (Reference)	Design	N arms	Length days*	Dietary arms	N adults	Mean age (SD or range), years	Men, %	Mean BMI, kg/m ²	Glucose, mmol/L†	Macronutrient intake CHO/SFA/MUFA/PUFA % of energy‡	Measures §	Quality score
United Kingdom [37]				Normal dairy	32	45.5 (8.7)	100	25.0	5.1	45 / 13 / 9.1 / 5.2		
Schutte, 2006	Parallel	3	56	Cashew	21	45.7 (22.0)	38.1	34.7	4.8	44 / 9.3 / 16 / 7.8	Fasting	8.5
Control				21	44.4 (18.5)	47.6	35.5	4.9	47 / 12 / 11 / 9.5			
Walnut				20	45.5 (22.2)	50.0	35.9	4.8	42 / 8.2 / 11 / 21			
Noakes, 2006	Parallel	3	84	High PUFA	21	46.1 (9.5)	25.0	33.4	5.4	48 / 5.6 / 12 / 7.5	Fasting OTT	8.5
Low CHO				24	48.4 (8.0)	16.7	32.5	5.3	10 / 18 / 27 / 6.4			
Low fat				22	50.7 (10.3)	22.7	32.6	5.3	67 / 4.7 / 3.4 / 1.7			
Tholstrup, 2006	Parallel	2	35	Control	20	26.1 (3.6)	100	22.5	4.7	46 / 24 / 9.6 / 3.6	Fasting	8.0
Denmark [97]				Vaccenic acid diet	22	25.2 (3.9)	100	23.0	4.8	42 / 23 / 15 / 3.8		
Vega-Lopez, 2006	Crossover	2	35	Canola oil	15	63.9 (5.7)	33.3	26.0	4.9	53 / 6.4 / 15 / 8.7	Fasting	8.0
United States [107]				Palm oil	15	63.9 (5.7)	33.3	26.0	5.0	52 / 15 / 11 / 3.5		
Berglund, 2007	Crossover	3	49	Average American diet	85	35.5 (9.4)	61.2	27.6	5.2	49 / 16 / 14 / 5.8	Fasting	8.5
United States [105]				CHO diet	85	35.5 (9.4)	61.2	27.6	5.2	55 / 8 / 16 / 5.5		
				MUFA diet	85	35.5 (9.4)	61.2	27.6	5.2	49 / 8.7 / 21 / 6.2		
St-Onge, 2007	Crossover	3	25	High PUFA	33	43.6 (2.5)	21.2	29.4	5.2	49 / 8.5 / 15 / 9.7	Fasting	8.0
United States [38]				High SFA	33	43.6 (2.5)	21.2	29.4	5.2	46 / 11 / 16 / 5.8		
				High CHO	33	43.6 (2.5)	21.2	29.4	5.1	55 / 8.5 / 14 / 5.2		
Paniagua, 2007	Latino Square	3	28	CHO	10	62.3 (9.4)	36.4	32.6	5.5	65 / 6 / 8 / 6	Fasting	8.5
Spain [108]				MUFA	11	62.3 (9.4)	36.4	32.6	5.5	47 / 9 / 23 / 6		
				SFA	11	62.3 (9.4)	36.4	32.6	5.5	47 / 23 / 9 / 6		
Sundram, 2007	Crossover	3	28	Esterified fat	30	30.0 (8.0)	34.4	22.0	5.4	53 / 18 / 5.9 / 7	Fasting	9.0
Malaysia [33]				PHSO	30	30.0 (8.0)	34.4	22.0	5.4	53 / 9.1 / 12 / 5.8		
				Palm oil	30	30.0 (8.0)	34.4	22.0	5.4	53 / 14 / 14 / 3.6		
Egert, 2008	Parallel	3	21	ALA	15	25.9 (6.8)	27.1	22.2	4.3	44 / 9.1 / 19 / 9.8	Fasting	8.0
Germany [106]				DHA	16	25.9 (6.8)	27.1	22.2	4.3	44 / 8.7 / 20 / 9.8		
				EPA	17	25.9 (6.8)	27.1	22.2	4.1	44 / 8.7 / 20 / 9.9		
Mensink, 2008	Crossover	2	21	Oleic acid, high trans-fat	44	41.0 (21.1)	25.0	23.9	5.5	44 / 12 / 19 / 6.2	Fasting	10.0
Netherlands [85]				Palmitic acid, low trans-fat	44	41.0 (21.1)	25.0	23.9	5.5	45 / 15 / 16 / 6.2		
Tay, 2008	Parallel	2	168	High CHO low fat	43	51.0 (7.5)	39.5	33.5	5.6	47 / 6 / 12 / 7	Fasting	8.0
Australia [122]				Low CHO high fat	45	50.3 (8.4)	31.1	33.9	5.7	5.1 / 21 / 25 / 8		
Vega-Lopez, 2009	Crossover	2	14	Corn oil	30	64.2 (7.5)	0	25.6	5.1	57 / 5.7 / 7.2 / 12	Fasting	7.5
United States [113]				PHSO	30	64.2 (7.5)	0	25.6	5.1	57 / 6.3 / 7.8 / 5.9		
Bradley, 2009	Parallel	2	56	Low CHO	12	37.1 (8.9)	37.5	34.5	5.5	20 / 21 / 21 / 13	Fasting OTT	8.0
United Kingdom [62]				Low fat	12	40.5 (10.4)	37.5	32.8	5.6	60 / 7 / 6 / 3		
Tardy, 2009	Parallel	3	28	Dairy trans-fat	20	40 (18-50)	0	32.7	5.3	45 / 16 / 16 / 6	Fasting	9.5
France [30]				Industrial trans-fat	19	40 (18-50)	0	32.9	5.4	42 / 14 / 19 / 7.2		
				Low trans-fat	19	40 (18-50)	0	32.7	5.2	43 / 14 / 20 / 7.2		
Jebb, 2010	Parallel	2	168	High MUFA, low GI	100	51.4 (10.0)	42.0	28.5	5.4	45 / 9.6 / 16 / 6.9	Fasting IV	8.0
United Kingdom [27]**				Low fat, low GI	108	51.4 (10.0)	42.0	28.5	5.4	52 / 8.3 / 9.7 / 5.1		
	Parallel	3	168	High MUFA, high GI	104	51.4 (10.0)	42.0	28.5	5.4	45 / 9.5 / 16 / 6.6	Fasting	8.0

S1 Table. Characteristics of 102 randomized controlled feeding trials evaluated in the meta-analysis of effects of diets with different macronutrient compositions on glucose-insulin homeostasis.

Author, publication year, Location (Reference)	Design	N arms	Length days*	Dietary arms	N adults	Mean age (SD or range), years	Men, %	Mean BMI, kg/m ²	Glucose, mmol/L†	Macronutrient intake CHO/SFA/MUFA/PUFA % of energy‡	Measures §	Quality score
				High SFA, high GI	79	51.4 (10.0)	42.0	28.5	5.4	42 / 16 / 12 / 5.8	IV	
				Low fat, high GI	108	51.4 (10.0)	42.0	28.5	5.4	51 / 9.2 / 9.8 / 5.2		
Forsythe, 2010 United States [114]	Crossover	2	42	PUFA	8	45 (7.9)	100	30.0	6.0	12 / 17 / 25 / 15	Fasting	6.5
				SFA	8	45 (7.9)	100	30.0	6.0	13 / 31 / 21 / 4.5		
Bos, 2010 Netherlands [123]	Parallel	2	56	High MUFA	18	58.9 (5.1)	44.0	27.6	5.2	46 / 11 / 20 / 7	Fasting	9.5
				High SFA	19	52.0 (7.2)	42.0	26.1	5.4	47 / 19 / 11 / 5.4		
Yeung, 2010 United States [47]	Crossover	2	42	CHO	161	53.6 (10.9)	55.0	30.2	5.2	58 / 6 / 13 / 8	Fasting	8.0
				Unsaturated fat	161	53.6 (10.9)	55.0	30.2	5.2	48 / 6 / 21 / 10		
Bendsen, 2011 Denmark [91]	Parallel	2	112	Control fat	25	58.8 (5.5)	0	28.1	5.3	44 / 12 / 14 / 4.3	Fasting	9.0
				Trans fat	24	58.5 (4.6)	0	28.8	5.2	44 / 11 / 10 / 4.5		
Goree, 2011 United States [46]	Parallel	2	56	Reduced CHO, high fat	34	35.6 (8.5)	43.0	33.3	5.5	43 / 12 / 13 / 11	Fasting	7.0
				Standard diet	29	34.6 (8.1)	48.0	31.3	5.4	56 / 8.3 / 9.8 / 7.8		
Hjerpsted, 2011 Denmark [98]	Crossover	2	42	Butter	49	55.5 (12.4)	57.0	25.3	5.6	48 / 16 / 11 / 4.6	Fasting	6.0
				Cheese	49	55.5 (12.4)	57.0	25.3	5.6	45 / 15 / 10 / 4.4		
Iggman, 2011 Sweden [40]	Crossover	2	21	Rapeseed oil	20	50.9 (10.0)	70.0	26.3	5.5	49 / 7.8 / 16 / 8.7	Fasting	8.0
				SFA or dairy FA	20	50.9 (10.0)	70.0	26.3	5.5	49 / 19 / 11 / 3.6		
Johnstone, 2011 Scotland [92]	Crossover	2	28	Low CHO	16	55 (14.0)	100	35.8	5.8	4.7 / 21 / 29 / 12	Fasting	7.0
				Mod CHO	16	55 (14.0)	100	35.8	5.8	37 / 12 / 15 / 5.4		
Tholstrup, 2011 Denmark [124]	Crossover	3	21	Lard	32	29.6 (10.3)	100	22.9	5.3	49 / 15 / 15 / 5.6	Fasting	7.0
				Olive oil	32	29.6 (10.3)	100	22.9	5.3	51 / 8.7 / 20 / 5.8		
				Palm olein	32	29.6 (10.3)	100	22.9	5.3	49 / 14 / 15 / 6.4		
Tierney, 2011 8 European nations[125]	parallel	4	98	High MUFA	111	54.6 (8.7)	41.4	32.4	5.9	42 / 10 / 19 / 6.7	Fasting	8.5
				High SFA	100	54.9 (8.6)	45.0	31.8	6.0	41 / 18 / 13 / 6.3	IV	
				Low fat high CHO	106	54.7 (9.4)	44.3	32.5	5.9	49 / 8.6 / 12 / 6		
				Low fat high CHO n-3 fat	100	55.4 (9.6)	45.0	32.4	6.0	50 / 8.7 / 11 / 5.7		
Bjermo, 2012 Sweden [48]	Parallel	2	70	Linoleic acid	32	57 (51-63)	44.0	30.3	5.3	44 / 10 / 12 / 15	Fasting	10.0
				SFA	29	56 (50-64)	44.0	31.3	5.4	43 / 21 / 14 / 4.6		
Guay, 2012 Canada [109]	Crossover	2	3	High fat	12	27.1 (3.9)	100	25.2	5.0	50 / 15 / 13 / 4.3	Fasting	7.0
				Low fat	12	27.1 (3.9)	100	25.2	5.0	62 / 6 / 12 / 4.9		
Haghighatdoost, 2012 Iran [49]	Crossover	2	42	MUFA-rich	17	34.8 (7.9)	0	27.6	4.4	52 / 8.5 / 13 / 7.5	Fasting	9.5
				SFA-rich diet	17	34.8 (7.9)	0	27.6	4.4	50 / 14 / 7 / 11		
Wycherley, 2012 Australia[126]	Parallel		84	CHO diet	34	50.2 (9.3)	100	33.0	5.8	51 / 7.5 / 9.6 / 4.6	Fasting	9.0
				Protein diet	32	51.3 (9.4)	100	33.0	5.8	37 / 8.2 / 11 / 4.6		
Kien, 2013 United States [24]**	Crossover	2	21	Oleic acid	9	28.9 (7.6)	100	23.4	4.6	44 / 3.7 / 29 / 6.6	Fasting	7.0
				Palmitic acid	9	28.9 (7.6)	100	23.4	4.6	43 / 18 / 16 / 5.1	IV	
	Crossover	2	21	Oleic acid	9	30 (6.6)	0	22.8	4.5	44 / 3.7 / 29 / 6.6	Fasting	7.0
				Palmitic acid	9	30 (6.6)	0	22.8	4.5	43 / 18 / 16 / 5.1	IV	
Young, 2013 United States [94]	Crossover	3	56	High fat	17	57 (6.0)	0	28.0	6.0	45 / 28 / 29 / 28	Fasting	8.5
				Low fat	16	57 (6.0)	0	28.0	6.0	65 / 13 / 14 / 13		
				Low fat, n-3 PUFA	16	57 (6.0)	0	28.0	5.8	62 / 15 / 16 / 16		
Chiu, 2014	Parallel	5	28	Control diet	31	38 (12.0)	25.8	33.9	5.2	55 / 7.3 / 13 / 7.2	Fasting	8.5

S1 Table. Characteristics of 102 randomized controlled feeding trials evaluated in the meta-analysis of effects of diets with different macronutrient compositions on glucose-insulin homeostasis.

Author, publication year, Location (Reference)	Design	N arms	Length days*	Dietary arms	N adults	Mean age (SD or range), years	Men, %	Mean BMI, kg/m ²	Glucose, mmol/L†	Macronutrient intake CHO/SFA/MUFA/PUFA % of energy‡	Measures §	Quality score
United States [50]				High protein, high SFA	32	38 (12.0)	25.0	33.9	5.2	35 / 15 / 9.8 / 7.1	IV	
				High protein, low SFA	36	38 (12.0)	44.4	33.9	5.2	35 / 7.4 / 18 / 7.6		
				Mod protein, high SFA	29	38 (12.0)	17.2	33.9	5.2	35 / 15 / 20 / 7.1		
				Mod protein, low SFA	30	38 (12.0)	33.3	33.9	5.2	35 / 7.5 / 29 / 7.4		
Filippou, 2014 Malaysia [100]	Crossover	3	42	High oleic sunflower oil	41	29.1 (7.6)	24.4	23.0	4.9	55 / 4.4 / 17 / 4.1	Fasting OTT	9.5
				Esterified palm olein	41	29.1 (7.6)	24.4	23.0	4.9	55 / 11 / 10 / 3.9		
				Palm olein	41	29.1 (7.6)	24.4	23.0	4.9	55 / 11 / 11 / 4.1		
Iggman, 2014 Sweden [51]	Parallel	2	49	PUFA	19	26.5 (4.6)	68.0	20.8	4.6	43 / 12 / 12 / 13	Fasting	10.5
				SFA	20	27.4 (3.8)	70.0	19.7	4.5	48 / 16 / 13 / 4.5		
Jordy, 2014 Denmark [127]	Parallel	2	3	High CHO	7	25.4 (3.2)	100	24.5	5.1	80 / 2.8 / 2.3 / 5.9	Fasting	4.0
				High fat	11	23.8 (3.0)	100	22.8	5.0	10 / 12 / 47 / 18		
Marina, 2014 United States [128]	Crossover	2	28	High fat	7	36 (2.9)	76.9	33.6	5.3	47 / 12 / 17 / 4.7	Fasting	7.5
				Low fat	7	36 (2.9)	76.9	33.6	5.3	62 / 7.7 / 7.7 / 3		
Rietman, 2014 Netherlands [129]	Crossover	2	14	High protein	9	22.8 (0.7)	19.0	21.5	5.2	37 / 12 / 12 / 12	Fasting	7.5
				Normal protein	8	22.8 (0.7)	19.0	21.5	5.2	45 / 12 / 14 / 12		
Sacks, 2014 United States [26]**	Crossover	2	35	High CHO, low GI	153	53 (11.0)	48.0	32.0	5.4	57 / 6 / 13 / 8	Fasting OTT	10.0
				Low CHO, low GI	153	53 (11.0)	48.0	32.0	5.4	40 / 7 / 19 / 10		
				High CHO, high GI	150	53 (11.0)	48.0	32.0	5.4	58 / 6 / 12 / 7		
				Low CHO, high GI	151	53 (11.0)	48.0	32.0	5.4	41 / 7 / 18 / 10		
Rozati, 2015 United States [101]	Parallel	2	90	Control diet	21	72 (4.6)	29.0	29.0	5.7	43 / 13 / 13 / 13	Fasting	8.5
				Olive oil	20	72 (4.5)	40.0	29.0	5.6	43 / 11 / 20 / 6.6		
Vafeiadou, 2015 United Kingdom [96]	Parallel	3	112	MUFA	64	43 (8.0)	42.2	26.3	5.0	49 / 8.1 / 19 / 5.7	Fasting	9.0
				PUFA	65	45 (8.1)	43.9	27.0	5.0	49 / 8 / 12 / 11		
				SFA	65	45 (8.1)	44.6	26.7	5.1	48 / 18 / 11 / 3.9		
Baril-Gravel, 2015 Canada [52]	Crossover	5	28	Canola + n-3 PUFA	130	46.5 (14.2)	46.2	29.8	5.4	50 / 6.0 / 10 / 16	Fasting	10.0
				Corn + safflower oil	130	46.5 (14.2)	46.2	29.8	5.4	50 / 6.8 / 9.6 / 16		
				Canola	130	46.5 (14.2)	46.2	29.8	5.4	50 / 6.6 / 18 / 9.1		
				Flax + safflower oil	130	46.5 (14.2)	46.2	29.8	5.4	50 / 6.5 / 19 / 6.9		
				Canola + oleic acid	130	46.5 (14.2)	46.2	29.8	5.4	50 / 6.9 / 18 / 8.0		
Trials of adults with diabetes												
Garg, 1988 United States [130]	Crossover	2	28	High MUFA	10	56 (6.3)	100	29.0	7.2	35 / 10 / 33 / 7	Fasting	7.5
				High CHO	10	56 (6.3)	100	29.0	7.2	60 / 9 / 9 / 6		
Coulston, 1989 United States [55]	Crossover	2	42	High CHO	8	66 (50-73)	62.5	25.5	10.5	40 / 12 / 17 / 12	Fasting	6.0
				Low fat	8	66 (50-73)	62.5	25.5	10.5	60 / 5.7 / 8.1 / 6.2		
Fuh, 1990 Taiwan [57]	Crossover	2	15	High CHO	11	58 (49-64)	100	25.8	7.9	60 / 5.2 / 7.5 / 7.3	Fasting	6.0
				High fat	11	58 (49-64)	100	25.8	7.6	40 / 10 / 15 / 15		
Garg, 1992 United States [61]	Crossover	2	21	High CHO	8	63 (6.0)	100	30.0	6.4	60 / 8 / 12 / 5	Fasting OTT	6.5
				Low CHO	8	63 (6.0)	100	30.0	6.1	35 / 11 / 32 / 7		
Vessby, 1992 Sweden [84]	Crossover	2	21	PUFA	14	63 (39-86)	33.3	26.1	11.9	56 / 8.5 / 10 / 12	Fasting	5.5
				SFA	14	63 (39-86)	33.3	26.1	11.9	56 / 16 / 10 / 5.1		

S1 Table. Characteristics of 102 randomized controlled feeding trials evaluated in the meta-analysis of effects of diets with different macronutrient compositions on glucose-insulin homeostasis.

Author, publication year, Location (Reference)	Design	N arms	Length days*	Dietary arms	N adults	Mean age (SD or range), years	Men, %	Mean BMI, kg/m ²	Glucose, mmol/L†	Macronutrient intake CHO/SFA/MUFA/PUFA % of energy‡	Measures §	Quality score
Garg, 1992 United States [131]	Crossover	2	28	High MUFA High CHO	10 10	61.5 (4.0) 61.5 (4.0)	100 100	27.7 27.7	7.2 6.6	38 / 5 / 31 / 10 65 / 3 / 11 / 6	Fasting	8.5
Parillo, 1992 Italy [89]	Crossover	2	15	High MUFA, low CHO Low MUFA, high CHO	10 10	52.7 (8.4) 52.7 (8.4)	70.0 70.0	26.7 26.7	6.6 6.6	40 / 7 / 29 / 4 60 / 5 / 13 / 2	Fasting	7.5
Rasmussen, 1993 Denmark [67]	Crossover	2	21	High MUFA High CHO	15 15	57 (7.7) 57 (7.7)	66.7 66.7	27.0 27.0	8.4 8.4	36 / 10 / 30 / 7 49 / 11 / 11 / 7	Fasting OTT	7.5
Lerman-Garber, 1994 Mexico [102]	Crossover	2	28	High MUFA High CHO	14 14	56 (8.0) 56 (8.0)	0 0	28.0 28.0	6.5 7.2	40 / 11 / 24 / 5 60 / 6.6 / 6.6 / 6.6	Fasting	5.0
Garg, 1994 United States [88]	Crossover	2	42	High MUFA High CHO	42 42	58 (10.0) 58 (10.0)	78.6 78.6	28.1 28.1	8.3 8.3	40 / 10 / 25 / 10 55 / 10 / 10 / 10	Fasting	6.5
Walker, 1995 Australia [82]	Crossover	2	90	High CHO, low fat Modified fat	24 24	58.3 (2.1) 58.3 (2.1)	37.5 37.5	29.2 29.2	8.5 9.6	50 / 9 / 10 / 4 40 / 11 / 20 / 5	Fasting	5.5
Lerman-Garber, 1995 Mexico [83]	Crossover	2	42	High MUFA High CHO	8 5	60 (7.0) 60 (7.0)	0 0	25.2 25.2	11.7 12.4	40 / 11 / 24 / 5 60 / 6.6 / 6.6 / 6.6	Fasting	7.0
Thomsen, 1995 Denmark [63]	Crossover	2	21	MUFA PUFA	16 16	59 (2.0) 59 (2.0)	62.5 62.5	28.0 28.0	8.2 8.4	37 / 10 / 30 / 7 36 / 9 / 10 / 27	Fasting	7.0
Katsilambros, 1996 Greece [104]	Crossover	2	120	Olive oil Sunflower oil	7 6	54.5 (7.4) 54.5 (7.4)	84.6 84.6	28.2 28.2	8.7 9.1	45 / 11 / 20 / 4 45 / 11 / 8 / 16	Fasting	6.5
Christiansen, 1997 Denmark [115]	Crossover	3	42	Cis-MUFA SFA Trans-MUFA	16 16 16	55 (12.0) 55 (12.0) 55 (12.0)	56.3 56.3 56.3	32.8 32.5 32.7	9.0 9.0 9.0	50 / 5 / 20 / 5 50 / 20 / 2.5 / 5 50 / 5 / 0 / 5	Fasting	6.5
Storm, 1997 Denmark [132]	Crossover	3	21	CHO Palmitic acid Stearic acid	15 15 15	53 (9.0) 53 (9.0) 53 (9.0)	53.3 53.3 53.3	29.7 29.7 29.7	7.7 7.8 7.9	51 / 9 / 11 / 5 40 / 21 / 16 / 6 40 / 19 / 17 / 6	Fasting	7.0
Georgopoulos, 1998 United States [35]	Crossover	2	28	High MUFA High CHO	17 17	32.2 (5.4) 32.2 (5.4)	52.9 52.9	23.5 23.5	8.4 9.3	45 / 9 / 25 / 6 61 / 9 / 9 / 6	Fasting	5.5
Brynes, 2000 United Kingdom [60]	Crossover	2	21	High MUFA High PUFA	9 9	56 (5.3) 56 (5.3)	55.6 55.6	29.8 29.8	8.0 7.9	47 / 8 / 20 / 4.2 47 / 9.2 / 12 / 13	Fasting OTT	7.5
Shige, 2000 Australia [65]	Parallel	3	84	High MUFA High SFA High CHO	13 10 12	58.7 (2.5) 58.9 (3.0) 57.5 (3.4)	15.4 30.0 25.0	33.6 33.3 32.6	8.1 7.4 8.6	50 / 6.8 / 15 / 9 52 / 17 / 9.9 / 2.1 73 / 3.5 / 3 / 2.1	Fasting OTT	7.5
Higashi, 2001 Japan [103]	Crossover	2	21	Linoleic acid Oleic acid	8 8	62 (6.9) 62 (6.9)	25.0 25.0	24.7 24.7	9.4 9.4	58 / 5 / 5 / 15 58 / 5 / 15 / 5	Fasting	6.0
Lovejoy, 2002 United States [25]**	Crossover	2	28	High fat, almond Low fat, almond	30 30	53.8 (10.4) 53.8 (10.4)	43.3 43.3	33.0 33.0	8.1 8.7	46 / 6.8 / 23 / 11 58 / 4.8 / 16 / 7.7	Fasting OTT	8.5
	Crossover	2	28	High fat Low fat	30 30	53.8 (10.4) 53.8 (10.4)	43.3 43.3	33.0 33.0	8.6 8.0	49 / 7.4 / 21 / 8.7 60 / 5.3 / 15 / 6.5	Fasting OTT	8.5
Rodriguez-Villar, 2003 Spain [90]	Crossover	2	14	CHO diet MUFA diet	22 22	61 (7.0) 61 (7.0)	54.5 54.5	28.3 28.3	9.0 9.0	52 / 6.4 / 14 / 4.3 41 / 7.3 / 25 / 5	Fasting	8.0
Gannon, 2004 United States [41]	Crossover	2	35	Control LoBAG	8 8	63.3 (51-82) 63.3 (51-82)	100 100	31.0 31.0	10.0 9.3	55 / 11 / 9.3 / 7.7 20 / 9.6 / 20 / 11	Fasting	7.5

S1 Table. Characteristics of 102 randomized controlled feeding trials evaluated in the meta-analysis of effects of diets with different macronutrient compositions on glucose-insulin homeostasis.

Author, publication year, Location (Reference)	Design	N arms	Length days*	Dietary arms	N adults	Mean age (SD or range), years	Men, %	Mean BMI, kg/m ²	Glucose, mmol/L†	Macronutrient intake CHO/SFA/MUFA/PUFA % of energy‡	Measures §	Quality score
Miyashita, 2004 Japan [133]	Parallel	2	28	High CHO Low CHO	11 11	52.4 (13.0) 52.4 (13.0)	72.7 72.7	27.0 27.0	11.1 11.5	62 / 3 / 4 / 3 39 / 11 / 14 / 11	Fasting	4.0
Papakonstantinou, 2010 Greece [134]	Crossover	2	28	High prot low fat Low prot high fat	17 17	46 (3.0) 46 (3.0)	29.4 29.4	33.0 34.0	7.1 7.5	50 / 6.3 / 9.1 / 3.4 50 / 6.7 / 21 / 5	Fasting OTT	10.0
Taylor, 2010 Canada [135]	Parallel	3	84	Control diet Flaxseed oil Milled flaxseed	9 12 13	52.4 (1.5) 52.4 (1.5) 52.4 (1.5)	50.0 50.0 50.0	32.4 32.4 32.4	7.7 6.9 6.6	45 / 14 / 15 / 5.3 46 / 11 / 12 / 7.1 48 / 12 / 13 / 8.7	Fasting	8.0
Gannon, 2011 United States [45]	Crossover	2	35	Control LoBAG	8 8	61 (5.9) 61 (5.9)	100 100	31.0 31.0	8.2 8.4	55 / 10 / 10 / 10 29 / 11 / 17 / 9	Fasting	6.5
Jenkins, 2011 Canada [136]	Parallel	3	90	Half dose Muffins Nuts	38 39 40	62 (8.0) 61 (10.0) 63 (9.0)	68.0 67.0 65.0	30.0 29.0 29.0	7.4 7.1 7.3	41 / 10 / 16 / 9.3 44 / 11 / 11 / 9.2 39 / 9.4 / 19 / 9.2	Fasting	9.5
Li, 2011 Taiwan [93]	Crossover	2	28	Almond Control	20 20	58 (2.0) 58 (2.0)	45.0 45.0	26.0 26.0	8.7 8.7	47 / 6.1 / 17 / 11 57 / 6.1 / 8.1 / 9.4	Fasting	8.0
Helge, 2012 Denmark [99]	Crossover	2	21	CHO rich Fat rich	11 11	58.7 (7.0) 58.7 (7.0)	100 100	28.1 28.1	7.5 7.5	59 / 28 / 21 / 9.5 22 / 25 / 19 / 15	Fasting	6.5
Tay, 2015 Australia [95]	Parallel	2	84	High CHO Low CHO	37 41	58 (7.0) 58 (7.0)	51.0 64.0	35.1 34.2	8.4 7.8	51 / 7.2 / 11 / 4.1 13 / 9.8 / 31 / 12	Fasting	10.0

The reference list is in S3 Text. Abbreviations: BMI, body mass index; CHO, carbohydrates; DHA, docosahexaenoic acid; EPA, eicosapentaenoic acid; GI, glycaemic index; LoBAG, Low biologically available glucose diet; MUFA, monounsaturated fatty acids; PHSO, partially hydrogenated soybean oil; OTT, oral tolerance test; PUFA, polyunsaturated fatty acids; SFA, saturated fatty acids.

* Duration of an intervention.

† Baseline measures of fasting glucose. Keogh et al (2005) did not report baseline glucose values [120] and was imputed. The uncertain of imputation was accounted for by undertaking multiple imputation using ten imputed datasets (S3 Text).

‡ All trials performed interventions of meals with caloric contents similar across arms (isocaloric intervention). Protein consumption (% energy) can be approximated by calculating 100 minus % energy from CHO, SFA, MUFA, plus PUFA.

§ Outcome measures varied across trials. Fasting indicates availability of any of the fasting blood measures (fasting glucose, fasting insulin, haemoglobin A1c, C-peptide, and homeostasis model assessment for insulin resistance); OTT, 2-hour glucose and 2-hour insulin from oral-glucose or oral-meal tolerance test; and IV, insulin sensitivity index or acute insulin response derived from IV assays.

|| The quality score was based on 11-point Jadad Scale [137]. Eleven components reflect different aspects of reporting quality: study objectives, inclusion/exclusion criteria, control definition, sample size/power calculation, randomisation, blinding, drop-out, outcome definition, exposure definition, assessment of adverse events, and statistical methods. Two reviewers independently assigned scores of these eleven components to each trial, average scores for the components were calculated and summed up (Table S2 for details). Inter-rater correlation for the total score was 0.61, consistent with that observed by Jadad et al. The most common reasons for lower scores were absence of information on adverse outcomes (% reported=13%); justification of sample size (22.6%); and blinding (34.5%).

** The publication reported estimates stratified by demographics (sex or race) or estimates which included non-comparable arms (e.g. low fat + high GI and high fat + low GI by Sacks et al. 2014 [26]). The number of trial was counted as one, but only comparable arms were pooled in meta-analysis (e.g. comparison between low fat + high GI and high fat + high GI and comparison between low fat + low GI and high fat + low GI). Lovejoy et al. [23] reported results for intravenous measures stratified by race (African American and White) and non-stratified results for fasting glucose and fasting insulin.