Food groups and metabolic risk factors: a systematic review and network meta-analysis of randomized trials

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Supplemental Appendix 1: Full search strategy

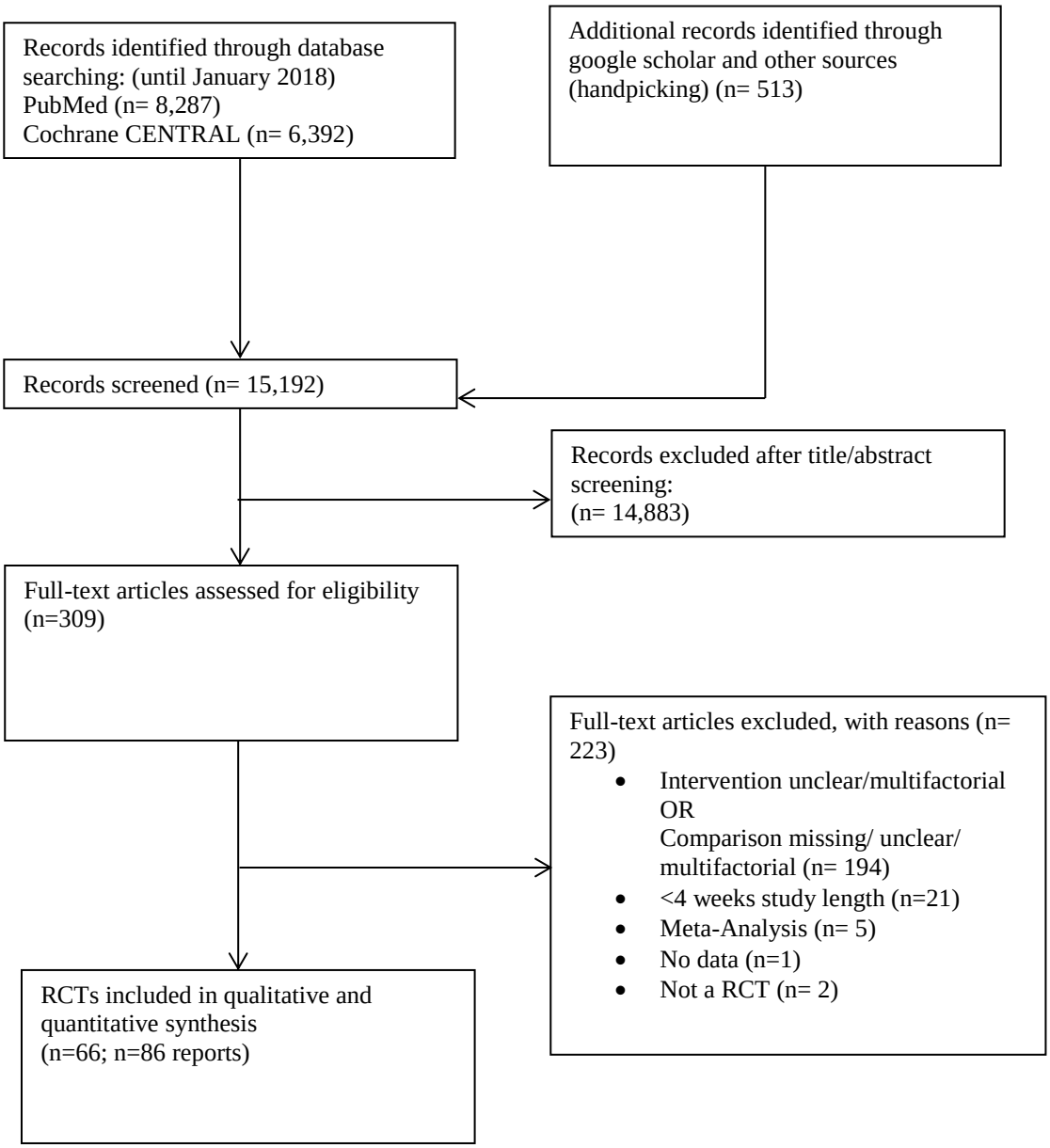
PubMed:

(food*[tiab] OR whole grain*[tiab] OR refined grain*[tiab] OR cereal*[tiab] OR pasta*[tiab] OR rice*[tiab] OR potato*[tiab] OR vegetable*[tiab] OR fruit*[tiab] OR nut*[tiab] OR legume*[tiab] OR bean*[tiab] OR egg*[tiab] OR dairy[tiab] OR dairies[tiab] OR milk[tiab] OR yogurt[tiab] OR cheese[tiab] OR fish[tiab] OR seafood[tiab] OR meat[tiab] OR processed meat[tiab] OR sugar sweetened beverage*[tiab])

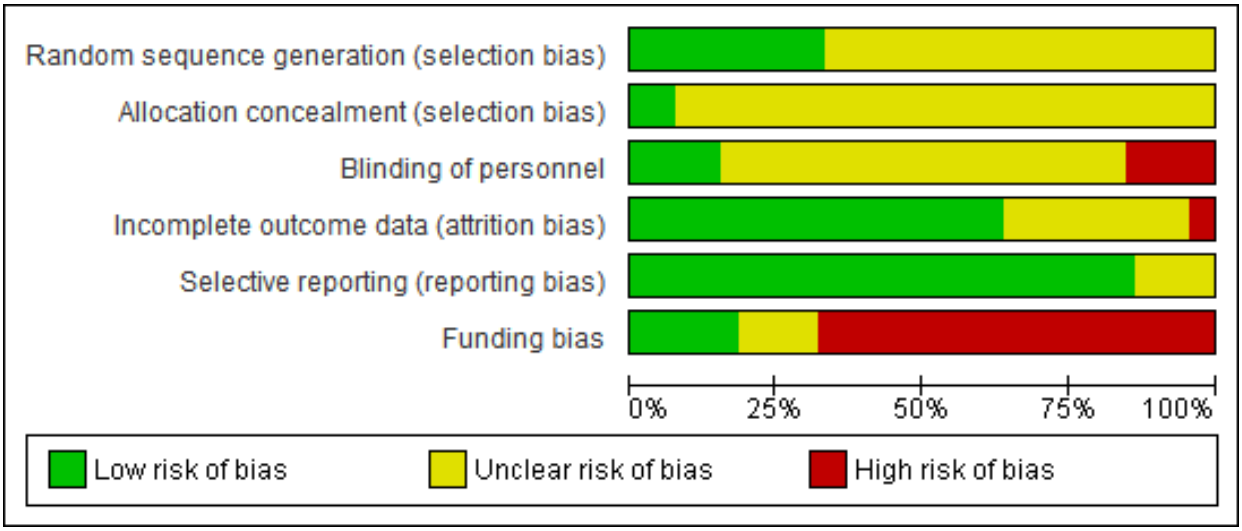
AND (triglyceride[tiab] OR triacylglycerol[tiab] OR "insulin resistance" [tiab] OR homeostasis model assessment[tiab] OR HOMA[tiab] OR HOMA-IR[tiab] OR quantitative insulin sensitivity check index[tiab] OR QUICKI[tiab] OR Matsuda[tiab] OR glucose tolerance[tiab] OR hyperinsulinemic[tiab] OR hyperinsulinaemic[tiab] OR glucose[tiab] OR glycaemic[tiab] OR glyemic[tiab] OR glycemia[tiab] OR HbA1c[tiab] OR haemoglobin[tiab] OR A1c[tiab] OR diabetes[tiab] OR glycated[tiab] OR glycosylated[tiab] OR hyperinsulinism[tiab] OR cholesterol[tiab] OR lipids[tiab] OR low density lipoprotein[tiab] OR LDL[tiab] OR high density lipoprotein[tiab] OR HDL[tiab] OR lipemia[tiab] OR lipaemia[tiab] OR dyslipidemia[tiab] OR visceral[tiab] OR CRP[tiab] OR C-Reactive Protein[tiab] OR hs-CRP[tiab] OR high sensitivity C-reactive protein[tiab])

AND

(randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR placebo [tiab] OR clinical trials as topic [mesh: noexp] OR randomly [tiab] OR trial [ti]) NOT (animals [mh] NOT humans [mh])



Supplemental Figure 1: Flow diagram for study selection



Supplemental Figure 2: Risk of bias graph: judgements about each risk of bias item presented as percentages across all included studies.

Supplemental Table 1: Full-text articles excluded

Reason for exclusion	**Supplemental References**
<4 weeks	Anderson 1984 (1), Jenkins 2001 (2), Nestel 1984 (3), Enright 2010 (4), Broekmans 2001 (5), Dragsted 2004 (6), Kim 2015 (7), Anderson 1990 (8), Bodinham 2011 (9), Costabile 2008 (10), De Oliveira e Silva 1996 (11), Weickert 2006 (12), Stephen 1995 (13), Edwards 1999 (14), Giacco 2010 (15), Karlstrom 1984 (16), Kerckhoffs 2003 (17), Kirby 1981 (18), Luhovyy 2014 (19), Ross 2011 (20), Soerensen 2014 (21)
Intervention unclear/multifactorial Comparison missing/unclear/multifactorial	Mackay 1992 (22), Davidson 1991 (23), Vander Wal 2008 (24), van Houwelingen 1990 (25), Whyte 1992 (26), Arora 1991 (27), Bell 1990 (28), Brownlee 2010 (29), Oosthuizen 2000 (30), Van Horn 1988 (31), Van Horn 1991 (32), Roberts 1981 (33), Scott 1994 (34), Gascon 1996 (35), Liljeberg 1996 (36), Agren 1996 (37), Behall 1999 (38), Morgan 2002 (39), Jenkins 2000 (40), Wong 2010 (41), John 2002 (42), Sacks 1984 (43), Birketvedt 2002 (44), Liao 2007 (45), Hermsdorff 2011 (46), Johansson-Persson 2014 (47), Chang 2013 (48), Maskarinec 1999 (49), Smith-Warner 2000 (50), Sheridan 2007 (51), Rock 1997 (52), Pecis 1994 (53), Prescott 1988 (54), Singh 1994 (55), Mori 1994 (56), Dunstan 1997 (57), Njike 2010 (58), Christensen 2013 (59), Rideout 2013 (60), Ramprasath 2014 (61), Kondo 2014 (62), Jang 2001 (63), Wallace 2013 (64), Cox 1998 (65), Neville 2013 (66), Onning 1999 (67), Surai 2000 (68), Berg 2003 (69), Meyer 2004 (70), Roberts 1994 (71), Poulter 1994 (72), Kazemzadeh 2014 (73), Weerts 2011 (74), Smith 2002 (75), Bradbury 2006 (76), Ros 2004 (77), Aadland 2015 (78), Abdullah 2015 (79), Abete 2009 (80), Abete 2009 (81), Adamsson 2015 (82), Mori 1999 (83), Davy 2002 (84), Jenkins 2002 (85), Keogh 2003 (86), Hall 2005 (87), Laaksonen 2005 (88), Watzl 2005 (89), de Mello 2006 (90), Hall 2006 (91), Wennersberg 2009 (92), Liu 2010 (93), Foster 2012 (94), Azadbakht 2013 (95), Bakhtiary 2012 (96), Balfego 2016 (97), Baumgartner 2013 (98), Behall 2006 (99), Behall 2004 (100), Azadbakht 2003 (101), Bento 2014 (102), Berry 2010 (103), Jaceldo-Siegl 2004 (104), Ghadirian 1995 (105), Bahr 2015 (106), Bird 2008 (107), Blesso 2013 (108), Blesso 2013 (109), Brennan 2010 (110), Knopp 2003 (111), Campos 2015 (112), Casas-Agustench 2011 (113), Cha 2014 (114), Hill 2015 (115), Chen 2004 (116), Colpo 2014 (117), Jenkins 1999 (118), Daniels 2014 (119), Davidi 2011 (120), de Mello 2009 (121), Dhillon 2016 (122), Djuric 2006 (123), Drouin-Chartier 2015

	(124), Dugan 2016 (125), Durazzo 2014 (126), Ebrahimi-Mamaghani 2014 (127), Gross 2002 (128), Noakes 1996 (129), Wofford 2012 (130), Mercanligil 2007 (131), Mukuddem-Petersen 2007 (132), Pearce 2011 (133), Errazuriz 2017 (134), Dunstan 1999 (135), Fuller 2015 (136), Gardner 2005 (137), Gilbert 2011 (138), Gulati 2014 (139), Harder 2004 (140), Hartman 2010 (141), Hernandez-Alonso 2014 (142), Hunninghake 2000 (143), Geelen 2004 (144), Welty 2007 (145), Duane 1997 (146), Hilpert 2005 (147), Finley 2007 (148), Goodrow 2006 (149), Griel 2008 (150), Mutungi 2008 (151), Tey 2013 (152), Labonte 2014 (153), McEvoy 2015 (154), Jarvi 2016 (155), Jung 2014 (156), Jones 2013 (157), Magnusdottir 2014 (158), Lee 2016 (159), West 2005 (160), Kasliwal 2015 (161), Kim 2008 (162), Kim 2017 (163), Kwak 2012 (164), Lacaille 2000 (165), Lee 2014 (166), Li 2011 (167), Lowndes 2015 (168), de Simone 2011 (169), Lukaczer 2006 (170), Ma 2010 (171), Mah 2017 (172), Maki 2010 (173), McGeoch 2013 (174), McKiernan 2010 (175), Melanson 2006 (176), Mutungi 2010 (177), Sabate 1993 (178), Chandalia 2000 (179), Gilhooly 2008 (180), Rebholz 2013 (181), Rueda 2013 (182), Whittaker 2015 (183), Campos 2017 (184), Kim 2017 (185), Beck 2010 (186), Palacios 2011 (187), Shidfar 2009 (188), Pick 1996 (189), Ratliff 2009 (190), Rave 2007 (191), Parham 2014 (192), Carvalho 2015 (193), Saraf-Bank 2015 (194), Saraf-Bank 2016 (195), Nadeem 2014 (196), Simao 2014 (197), Spiller 1998 (198), St-Onge 2007 (199), Tapsell 2004 (200), Tapsell 2009 (201), Tapsell 2014 (202), Chakrabarty 2004 (203), Thompson 2005 (204), Thorp 2008 (205), van Nielen 2014 (206), Vanegas 2017 (207), Vazquez 2014 (208), Weickert 2011 (209), Whybrow 2006 (210), Wiebe 1984 (211), Wien 2003 (212), Wien 2010 (213), Wien 2014 (214), Zhang 2014 (215)
Meta-analysis	Pol 2013 (216), Mohammadifard 2015 (217), Ye 2012 (218), Kaiser 2014 (219), Mytton 2014 (220)
No data	Keenan 2002 (221)
Not RCT	Jenkins 1983 (222), Orem 2013 (223)

Supplemental Table 2: General study characteristics of the included trials investigating the effects of different food groups on various metabolic risk factors

Reference	Country, Study Design	Comparison Food groups	Sample size	Mean age	Mean baseline BMI[1]	T2D[2] diabetic (%)	Female (%)	Duration, weeks	Food group 1	Food group 2	Energy restricted	Drop out	Results	Conflict of interest
Agebratt, 2016	Sweden, RCT[3], parallel	F&V[4] vs. Nuts	30	24	22	0%	40%	8	F&V: 7 kcal per kg body weight/d of fruit (e.g. 7 apples)	Nuts: 7 kcal per kg body weight/d of nuts (70 g/d)	NR[5]	F & V: 0% Nut: 0%	TC[6] (mmol/l) F&V: 4.38 ± 0.91 Nuts: 3.95 ± 0.45 LDL-C[7] (mmol/l) F&V: 2.43 ± 0.69 Nuts: 2.20 ± 0.42 HDL-C[8] (mmol/l) F&V:1.55 ± 0.43 Nuts: 1.39 ± 0.22 TG[9] (mmol/l) F&V: 0.84 ± 0.38 Nuts: 0.80 ± 0.33 SBP[10] (mmHg) F&V: 104.2 ± 7.1 Nuts: 111.7 ± 6.9 DBP[11] (mmHg) F&V: 64.3 ± 8.0 Nuts: 64.9 ± 6.4	No conflict of interest
Ampatzoglou, 2015 Ampatzoglou, 2016	UK[12], RCT, crossover (washout: 4 wk[13])	Whole grains vs. Refined grains	33	48.8	27.9	0%	64%	6	Whole grains: >80 g/d	Refined grains: <16 g/d of whole grains	NR	NR	TC (mmol/l) Whole grains: 5.30±1.15 Refined grains: 5.30±1.15 LDL-C (mmol/l) Whole grains: 3.60 ±0.57 Refined grains: 3.60±0.57 HDL-C (mmol/l) Whole grains: 1.30±0.57 Refined grains: 1.20 ±0.57 TG (mmol/l)	Supported by Cereal Partners Worldwide

													Whole grains: 1.40 ±0.57 Refined grains: 1.40 ±0.57 CRP[14] (mg/l) Whole grains: 1.60 ±2.30 Refined grains: 1.80 ±1.72	
Andersson, 2007	Sweden, RCT, crossover (washout: 6-8 wk)	Whole grains vs. Refined grains	30	59	28	0%	73%	6	Whole grains: 50% whole grain per dry substance. The total amount of whole grain in was 112 g/d	Refined grains: 6 g/d dietary fiber	NR	13%	TC (mmol/l) Whole grains: 5.50 ±0.70 Refined grains: 5.50±0.70 LDL-C (mmol/l) Whole grains: 3.70±0.70 Refined grains: 3.60±0.70 HDL-C (mmol/l) Whole grains: 1.20±0.30 Refined grains: 1.20 ±0.30 TG (mmol/l) Whole grains: 1.50 ±0.80 Refined grains: 1.60 ±1.0 CRP (mg/l) Whole grains: 2.38 ±2.29 Refined grains: 2.34 ±1.57 SBP (mmHg) Whole grains: 129 ±15 Refined grains: 130 ±15 DBP (mmHg) Whole grains: 81±8.0 Refined grains: 81±9.0 FG[15] (mmol/l) Whole grains: 5.30±0.80 Refined grains: 5.20 ±0.80	Supported by food products from Lantmannen Food R&D AB, Wasa Bröd AB and ICA AB
Ashton, 2000	AUS[16], RCT, crossover (washout: 2 wk)	Legumes vs. Red meat	45	46	26	0%	0%	4	Legumes: Tofu diet was designed to replace 90-100% of the animal protein with 290 g/d of tofu	Red meat: 150 g/d (raw weight) of cooked lean red meat, with all visible fat removed	NR	7%	TC (mmol/l) Legumes: 5.42 ±1.02 Red meat: 5.65±0.93 LDL-C (mmol/l) Legumes: 3.48±0.92 Red meat: 3.56±0.90 HDL-C (mmol/l) Legumes: 1.24±0.27 Red meat: 1.32±0.34	Not reported

													TG (mmol/l) Legumes: 1.62±0.99 Red meat: 1.77±0.95	
Azadbakht, 2007 a Azadbakht, 2007 b	Iran, RCT, crossover (washout: 4 wk)	Legumes vs. Red meat	42	NR	NR	0%	100%	8	Legumes: 30 g/d of soy nuts	Red meat: One serving/d	NR	0%	TC (mmol/l) Legumes: 5.41 ±0.10 Red meat: 5.90±0.15 LDL-C (mmol/l) Legumes: 3.06±0.5 Red meat: 3.47 ±0.55 HDL-C (mmol/l) Legumes: 0.86 ±0.07 Red meat: 0.86±0.12 TG (mmol/l) Legumes: 2.39 ±0.12 Red meat: 2.40±0.10 CRP (mg/l) Legumes: 3.1 ±0.32 Red meat: 3.4±0.32 SBP (mmHg) Legumes: 131 ± 6.49 Red meat: 131 ± 7.78 DBP (mmHg) Legumes: 85 ± 3.2 Red meat: 84 ± 3.2 FG (mmol/l) Legumes: 5.72 ± 0.18 Red meat: 6.22 ± 0.36 HOMA-IR[17] Legumes: 3.3 ± 0.19 Red meat: 3.9 ± 0.26	No conflict of interest
Beauchesne-Rondeau, 2003	Canada, RCT, crossover (washout: 6 wk)	Fish vs. Red meat	17	50.1	26.5	0%	0%	4	Fish: Pollack, cod, sole, and haddock with < 1% fat for diet	Red meat: Lean beef (lean ground beef, exterior round, sirloin tip)	NR	NR	TC (mmol/l) Fish: 5.60 ±0.82 Red meat: 5.40±0.82 LDL-C (mmol/l) Fish: 4.20±0.82 Red meat: 4.00±0.82 HDL-C (mmol/l)	Canadian Beef Information Centre with funds obtained from the Beef Industry Development Fund

													Fish: 0.98±0.21 Red meat: 0.95±0.20 TG (mmol/l) Fish: 1.20±0.41 Red meat: 1.30±0.41	
Berryman, 2015	USA[18], RCT, crossover (no washout)	Refined grains vs. Nuts	48	50	26.2	0%	46%	6	Refined grains: 106 g/d banana muffin+ 2.7 g butter (273 kcal/d)	Nuts: 42.5 g/d unsalted, whole, natural almonds with skins (253 kcal/d)	NR	23%	TC (mmol/l) Refined grains: 5.46 ±0.69 Nuts: 5.33 ±0.69 LDL-C (mmol/l) Refined grains: 3.50 ±0.54 Nuts: 3.34±0.54 HDL-C (mmol/l) Refined grains: 1.26 ±0.35 Nuts: 1.31±0.35 TG (mmol/l) Refined grains: 1.55 ±0.62 Nuts: 1.48±0.62 CRP (mg/l) Refined grains: 1.64 ±2.56 Nuts: 1.00±1.11 FG (mmol/l) Refined grains: 4.87 ±0.5 Nuts:4.84±0.54	Almond Board of California
Burns-Whitmore, 2014	USA, RCT, crossover (washout: 4 wk)	Nuts vs. Eggs	20	38	23	0%	80%	8	Nuts: Walnuts 28.4 g, 6/wk	Eggs: Standard egg, 6/wk	NR	30%	TC (mmol/l) Nuts: 4.77 ±0.36 Eggs: 5.09 ±0.36 LDL-C (mmol/l) Nuts: 2.86 ±0.34 Eggs: 3.03 ±0.34 HDL-C (mmol/l) Nuts: 1.31 ±0.17 Eggs: 1.33 ±0.17 TG (mmol/l) Nuts: 0.92 ±0.19 Eggs: 1.12 ±0.26 CRP (mg/l) Nuts: 2.3 ±2.26 Eggs: 1.95 ±0.1.20	American Egg Board Fellowship, California Walnut Commission, Chino Valley Ranchers

Chen, 2006	USA, RCT, parallel	Whole grains vs. Refined grains	110	47.9	28.9	0%	60%	12	Whole grains: 60 g/d of Quaker oat bran concentrate as a muffin and 84 g/d of Quaker Oatmeal Squares	Refined grains: 93 g/d refined wheat as a muffin and 42 g/d of Kellogg's Corn Flakes	NR	7%	TC (mmol/l) Whole grains: -0.063±0.59 Refined grains: 0.0 ±0.47 LDL-C (mmol/l) Whole grains: -0.05 ±0.49 Refined grains: -0.017 ±0.43 HDL-C (mmol/l) Whole grains: 0.0 ±0.20 Refined grains: 0.04 ±0.21 TG (mmol/l) Whole grains: 0 ±0.40 Refined grains: -0.05±0.55 FG (mmol/l) Whole grains: -0.04 ±0.53 Refined grains: -0.04±0.68	No conflict of interest
Cobiac, 1990	AUS, RCT, crossover (no washout)	Refined grains vs. Legumes	20	29-65	NR	NR	0%	4	Refined grains: Canned spaghetti in tomato sauce and cheese	Legumes: Baked beans in tomato sauce	NR	NR	TC (mmol/l) Refined grains: 6.32 ±0.67 Legumes: 6.29 ±0.89 LDL-C (mmol/l) Refined grains: 4.63 ±0.54 Legumes: 4.61 ±0.85 HDL-C (mmol/l) Refined grains: 1.26 ±0.22 Legumes: 1.22 ±0.22 TG (mmol/l) Refined grains: 1.25 ±0.36 Legumes: 1.26 ±0.36 FG (mmol/l) Refined grains: 4.89 ±0.27 Legumes:4.86±0.18	Heinz Food Company
Cooper, 2017	USA, RCT,	Whole grains vs. Refined grains	46	25.8	23.4	0%	54%	6	Whole grains: Whole grain cookies, muffins and baking mixes; the others were commercially prepared items: bread, ready to eat cereals,	Refined grains: Refined grain cookies, muffins and baking mixes; the others were commercially prepared items: bread, ready to eat cereals,	NR	NR	HDL-C (mmol/l) Whole grains: -0.06 ±0.20 Refined grains: 0.04 ±0.13 TG (mmol/l) Whole grains: 0.07 ±0.6 Refined grains: 0.031±0.54 FG (mmol/l) Whole grains: -0.02 ±0.53	No conflict of interest

									couscous, crackers, pastas, rice, and tortillas	couscous, crackers, pastas, rice, and tortillas			Refined grains: 0.16±0.44	
Daly, 2014	AUS, RCT, parallel	Red meat vs. Refined grains	100	72.9	27.7	NR	100%	16	Red meat: ~220 g (raw weight) lean red meat to be consumed 6 d/wk	Refined grains: ≥1 serving carbohydrates (rice and pasta)/d	NR	9%	TC (mmol/l) Red meat: -0.25 ±0.76 Refined grains: -0.22±0.51 LDL-C (mmol/l) Red meat: -0.19 ±0.69 Refined grains: -0.20±0.51 HDL-C (mmol/l) Red meat: -0.01±0.15 Refined grains: -0.02±0.17 TG (mmol/l) Red meat: -0.11±0.69 Refined grains: 0.01±0.37 SBP (mmHg) Red meat: -6.6±15.6 Refined grains: -3.5±17.03 DBP (mmHg) Red meat: -3.5±8.7 Refined grains: -0.3±12.26	Grant from Meat and Livestock Australia Ltd
Engel, 2017 Bruun, 2015 Maersk, 2012	Denmark, RCT, parallel	Dairy vs. SSB[19]	29	37.8	31.1	0%	59%	24	Dairy: 1 L/d iso-caloric semi skim milk	SSB: 1 L/d of regular cola	NR	17%	TC (mmol/l) Dairy: 5.17 ±0.89 SSB: 5.25 ±1.05 LDL-C (mmol/l) Dairy: 3.21 ±0.77 SSB: 3.32 ±0.86 HDL-C (mmol/l) Dairy: 1.23 ±0.31 SSB: 1.21 ±0.34 TG (mmol/l) Dairy: 1.61 ±0.81 SSB: 1.60 ±0.86 SBP (mmHg) Dairy: 121.2 ±12.00 SSB: 125.9 ±10.85 DBP (mmHg) Dairy: 72.8 ±9.30	Some authors received research grants from Arla Foods and the Danish Dairy Research Foundation

													SSB: 77.5 ±7.48 FG (mmol/l) Dairy: 5.69 ±1.05 SSB: 5.62 ±0.67 HOMA-IR (mmol/l) Dairy: 1.76 ±1.47 SSB: 1.17 ±0.47	
Foerster, 2014	Germany, RCT, crossover (washout: 3 wk)	Whole grains vs. Red meat	20	40.1	24.4	0%	50%	10	Whole grains: Low intake of red meat products, i.e., not more than 30g/d, and high amounts of whole grains products resulting in a daily intake of approximately 40 g/d dietary fiber	Red meat: 200 g/d minimal amounts of dietary fiber	NR	0%	TC (mmol/l) Whole grains: 5.30 ±1.0 Red meat: 5.20±0.80 TG (mmol/l) Whole grains: 1.60 ±1.0 Red meat: 1.50±0.80 CRP (mg/l) Whole grains: 1.90 ±3.80 Red meat: 1.40±1.20	Not reported
Freese, 2002 Freese, 2004	Finland/ Sweden, RCT, parallel	F&V vs. Refined grains	77	25.1	22.6	0%	74%	6	F&V: All berries and apples as well as most vegetables were of Finnish origin and were included in the diet as such or as little processed as possible	Refined grains: Rich in sugar or starch (e.g., sugar, wheat bread, pasta, rice, and potatoes)	NR	4%	TC (mmol/l) F&V: -0.12 ±0.63 Refined grains: 0.07 ±0.54 LDL-C (mmol/l) F&V: -0.03 ±0.60 Refined grains: 0.12 ±0.50 HDL-C (mmol/l) F&V: -0.09 ±0.19 Refined grains: -0.07 ±0.19 TG (mmol/l) F&V: -0.02 ±0.40 Refined grains: 0.02 ±0.28 CRP (mg/l) F&V: -0.28 ±6.37 Refined grains: -3.15 ±9.9	Not reported
Gebauer, 2008 Holligan, 2014	USA, RCT, crossover (washout/ compliance break: 2 wk)	Nuts vs. Refined grains	28	48	26.8	0%	64%	4	Nuts: Pistachio doses ranged from 32-63g/d and from 63-126g/d	Refined grains: Pretzels and baked potato chips	2100 kcal	4%	TC (mmol/l) Nuts: 4.97 ±0.53 Refined grains: 5.42 ±0.53 LDL-C (mmol/l) Nuts: 3.03±0.53 Refined grains: 3.42 ±0.26	California Pistachio Commission

													HDL-C (mmol/l) Nuts: 1.46 ±0.52 Refined grains: 1.43 ±0.16 TG (mmol/l) Nuts: 1.24 ±0.53 Refined grains: 1.40 ±0.53 FG (mmol/l) Nuts: 5.08 ±0.31 Refined grains: 5.11 ±0.31 HOMA-IR Nuts: 1.84 ±5.98 Refined grains: 1.94 ±5.98	
Giacco, 2013 Giacco, 2014 Vetrani, 2016	Italy/ Finland, RCT, parallel	Whole grains vs. Refined grains	123	40-65	31.5	0%	53%	12	Whole grains: Wheat bread (plus some endosperm rye bread), whole wheat pasta, barley kernels, wholegrain oat biscuits and breakfast cereals (all bran sticks and flakes)	Refined grains: Wheat bread, rice, pizza, cornmeal porridge, and breakfast cereals (rice krispies)	NR	16%	TC (mmol/l) Whole grains: 5.25 ±1.14 Refined grains: 5.31±0.90 LDL-C (mmol/l) Whole grains: 3.31 ±0.98 Refined grains: 3.41±0.78 HDL-C (mmol/l) Whole grains: 1.16±0.34 Refined grains: 1.16±0.31 TG (mmol/l) Whole grains: 1.65 ±0.86 Refined grains: 1.56 ±0.65 CRP (mg/l) Whole grains: 1.36 ±2.01 Refined grains: 1.74 ±1.41 SBP (mmHg) Whole grains: 128 ±15 Refined grains: 130 ±17 DBP (mmHg) Whole grains: 81±9.0 Refined grains: 82±9.0 FG (mmol/l) Whole grains: 5.94±0.56 Refined grains: 6.00±0.61	Barilla G&R F.lli. SpA, Parma, Italy and Raiso Nutrition Ltd

Grieger, 2014	AUS, RCT, parallel	Fish vs. Red meat	83	69.6	26.4	0%	NR	8	Fish: Eight servings of mixed fish per fortnight	Red meat: Eight servings of red meat per fortnight	NR	4%	TC (mmol/l) Fish: 5.60 ±0.66 Red meat: 5.40±1.21 LDL-C (mmol/l) Fish: 3.40 ±0.66 Red meat: 3.40±0.61 HDL-C (mmol/l) Fish: 1.80 ±0.66 Red meat: 1.70±0.61 TG (mmol/l) Fish: 1.00 ±0.66 Red meat: 1.30±0.61 CRP (mg/l) Fish: 1.00 ±0.97 Red meat: 0.80±0.90 SBP (mmHg) Fish: 124 ±19.67 Red meat: 126±18.24 DBP (mmHg) Fish: 68 ±13.11 Red meat: 66±6.08	Australian Seafood Corporate Research Centre
Gormley, 1979	Ireland, RCT, parallel	Legumes vs. Refined grains	53	30-50	24.8	0%	11%	6	Legumes: Freeze dried peas (30 g/d)	Refined grains: Cornflakes (20 g/d)	NR	NR	TC (mmol/l) Legumes: 5.98±0.46 Refined grains: 6.40±0.49	Irish Sugar and Becton Dickinson supplied foods
Harris-Jackson, 2014	USA, RCT, parallel	Whole grains vs. Refined grains	50	46.1	33.3	0%	50%	12	Whole grains: 163 and 301 g/d whole grains	Refined grains: 0 g/d whole grains	Isocaloric (first 6 wk) Hypo-caloric (reduced by -500 kcal second 6 wk)	17%	LDL-C (mmol/l) Whole grains: -0.31±0.47 Refined grains: -0.33±0.47 HDL-C (mmol/l) Whole grains: -0.13 ±0.12 Refined grains: -0.06±0.12 TG (mmol/l) Whole grains: -0.023 ±0.50 Refined grains: -0.19 ±0.51 CRP (mg/l) Whole grains: -0.60 ±2.06 Refined grains: -0.60±2.0 SBP (mmHg)	Bell Institute of Health and Nutrition (General Mills, Inc)

													Whole grains: -7.20 ±9.50 Refined grains: -9.20±9.50 DBP (mmHg) Whole grains: -2.40±7.0 Refined grains: -5.90±7.0 FG (mmol/l) Whole grains: -0.24±0.30 Refined grains: -0.05±0.31 HOMA-IR Whole grains: -0.20±0.96 Refined grains: -0.20±1.0	
Haub, 2005	USA, RCT, parallel	Legumes vs. Red meat	21	65	28.2	0%	0%	12	Legumes: Soy-based products that provided 0.6 g protein/kg/d	Red meat: 0.6 g protein/kg/d from beef-containing foods (cube steak, ground beef, and beef tips)	NR	NR	TC (mmol/l) Legumes: -0.06 ±0.70 Red meat: 0.30±0.30 LDL-C (mmol/l) Legumes: -0.08 ±0.60 Red meat: 0.30±0.40 HDL-C (mmol/l) Legumes: -0.10±0.10 Red meat: 0.08±0.10 TG (mmol/l) Legumes: 0.27 ±0.60 Red meat: -0.16±0.50	National Cattlemen's Beef Association and the Cattlemen's Beef Board
Hodgson, 2006 Hodgson, 2007	AUS, RCT, parallel	Refined grains vs. Red meat	60	58.6	27.7	0%	37%	8	Refined grains: Carbohydrate-rich foods including bread, pasta, rice, potatoes, and breakfast cereals	Red meat: ~215 g/d raw weight, depending on usual energy intake	NR	18%	TC (mmol/l) Refined grains: 4.90 ±0.80 Red meat: 4.90±0.80 LDL-C (mmol/l) Refined grains: 2.70 ±0.80 Red meat: 3.00±0.70 HDL-C (mmol/l) Refined grains: 1.48 ±0.44 Red meat: 1.42±0.41 TG (mmol/l) Refined grains: 1.35 ±0.76 Red meat: 1.31±1.16 CRP (mg/l) Refined grains: 1.59 ±1.60 Red meat: 1.30±0.92	Red Meat and Human Nutrition grant provided by Meat and Livestock Australia Limited

													SBP (mmHg) Refined grains: 139.7 ±11.90 Red meat: 131.8±12.80 DBP (mmHg) Refined grains: 77.9 ±7.40 Red meat: 77.6±9.0 FG (mmol/l) Refined grains: 5.10 ±0.80 Red meat: 4.70±0.60 HbA1c[20] (%) Refined grains: 5.20 ±0.50 Red meat: 5.40±0.40 HOMA-IR Refined grains: 1.58 ±1.02 Red meat: 2.77±2.99	
Hosseinpour-Niazi, 2014 Hosseinpour-Niazi, 2015	Iran, RCT, crossover (washout: 4 wk)	Legumes vs. Red meat	31	58.1	27.8	100%	77%	8	Legumes: Two servings of red meat were replaced by different types of cooked legumes such as lentils, chickpeas, peas and beans for 3 d per wk; half a cup of cooked legumes was considered as one serving of red meat.	Red meat: Two servings/d of red meat	Not energy restricted	23%	TC (mmol/l) Legumes: 4.04 ±0.89 Red meat: 4.18±1.00 LDL-C (mmol/l) Legumes: 2.05 ±0.72 Red meat: 2.31±0.75 HDL-C (mmol/l) Legumes: 1.24 ±0.37 Red meat: 1.21±0.37 TG (mmol/l) Legumes: 1.38 ±0.67 Red meat: 1.41±0.67 CRP (mg/l) Legumes: 2.20 ±4.60 Red meat: 2.90±5.00 SBP (mmHg) Legumes: 120 ±16.70 Red meat: 132±16.70 DBP (mmHg) Legumes: 75 ±16.70 Red meat: 77±11.13	No conflict of interest

													FG (mmol/l) Legumes: 6.36 ±2.28 Red meat: 7.12±2.73	
Jenkins, 2002 Jenkins, 2008 a/b	Canada, RCT, crossover (washout: 2 wk)	Nuts vs. Refined grains	27	64	25.7	0%	44%	4	Nuts: Level of supplement intake was based on subjects' estimated daily energy requirement (<1600 kcal: 50 g/d almonds)	Refined grains: Level of supplement intake was based on subjects' estimated daily energy requirement (<1600 kcal: 100 g/d muffins)	NR	37%	TC (mmol/l) Nuts: 6.21±0.78 Refined grains: 6.44±0.78 LDL-C (mmol/l) Nuts: 4.01±0.62 Refined grains: 4.22±0.68 HDL-C (mmol/l) Nuts: 1.45±0.47 Refined grains: 1.43±0.47 TG (mmol/l) Nuts: 1.64±0.57 Refined grains: 1.80±0.62 CRP (mg/l) Nuts: 2.27±3.58 Refined grains: 2.37±2.34 SBP (mmHg) Nuts: 121±15.59 Refined grains: 121±10.39 DBP (mmHg) Nuts: 76.0±10.39 Refined grains: 76.0±10.39 FG (mmol/l) Nuts: 4.91±0.10 Refined grains: 4.77±0.10	funding from the California Almond Board
Jenkins, 2002	Canada, RCT, crossover (washout: 8 wk)	Whole grains vs. Refined grains	23	63	26.7	100%	30%	12	Whole grains: High wheat bran bread and breakfast cereal were provided at the same caloric intake as in the control phase, with 5.9% energy as fat, 18.8% protein, and 75.4% available carbohydrate,	Refined grains: White bread and a low-fibre breakfast cereal, equivalent to ~24% of their total caloric intake	NR	48%	TC (mmol/l) Whole grains: 4.97±0.82 Refined grains: 4.87±0.72 LDL-C (mmol/l) Whole grains: 3.00±0.72 Refined grains: 2.99±0.67 HDL-C (mmol/l) Whole grains: 1.23±0.22 Refined grains: 1.17±0.14 TG (mmol/l)	Loblaw Brands Limited, Kraft Canada

									with 19 g/d dietary fiber				Whole grains: 1.63 ±0.96 Refined grains: 1.53 ±0.86 CRP (mg/l) Whole grains: 3.79 ±7.14 Refined grains: 4.8±9.21 SBP (mmHg) Whole grains: 129 ±14.40 Refined grains: 131±14.40 DBP (mmHg) Whole grains: 75±4.8 Refined grains: 76±4.8 FG (mmol/l) Whole grains: 7.5±1.44 Refined grains: 7.8±1.92 HbA1c (%) Whole grains: 7.2±0.96 Refined grains: 7.4±1.44	
Jenkins, 2012	Canada, RCT, parallel	Legumes vs. Whole grains	121	59.5	30.7	100%	50%	12	Legumes: The target legume consumption was 1 cup/d (approximately 190 g/d, or 2 servings/d) of cooked beans, chickpeas or lentils	Whole grains: A high wheat fiber diet was achieved by consumption of whole wheat and whole grain carbohydrate foods (whole wheat breakfast cereals, breads, brown rice)	NR	7%	TC (mmol/l) Legumes: 3.86 ±1.00 Whole grains: 4.17±1.11 LDL-C (mmol/l) Legumes: 2.10 ±0.70 Whole grains: 2.33±0.90 HDL-C (mmol/l) Legumes: 1.11 ±0.31 Whole grains: 1.24±0.27 TG (mmol/l) Legumes: 1.44 ±0.93 Whole grains: 1.29±0.82 SBP (mmHg) Legumes: 118 ±11.61 Whole grains: 118±11.71 DBP (mmHg) Legumes: 69 ±11.61 Whole grains: 70±7.8 FG (mmol/l) Legumes: 7.33 ±1.27	ABIP through the PURENet and the Saskatchewan Pulse Growers

													Whole grains: 7.05±1.29 HbA1c (%) Legumes: 6.90 ±0.77 Whole grains: 6.90±0.39	
Johnston, 1998	USA, RCT, parallel	Whole grains vs. Refined grains	124	40-70	NR	0%	40%	12	Whole grains: 90 g/d of a whole grain ready-to-eat cereal	Refined grains: 90 g/d of corn flakes	NR	8%	TC (mmol/l) Whole grains: 6.04±0.61 Refined grains: 6.23±0.54 LDL-C (mmol/l) Whole grains: 3.93±0.49 Refined grains: 4.15±0.42 HDL-C (mmol/l) Whole grains: 1.29±0.33 Refined grains: 1.25±0.28 TG (mmol/l) Whole grains: 1.81 ±0.71 Refined grains: 1.85 ±0.84	General Mills
Juntunen, 2003	Finland, RCT, crossover (washout: 8 wk)	Whole grains vs. Refined grains	20	59	27.5	0%	100%	8	Whole grains: High-fiber rye bread (~17% dietary fiber) was prepared by increasing the content of rye bran in the bread	Refined grains: White-wheat breads (~2.8% dietary fiber) produced from refined wheat flour were offered during the wheat bread period	NR	NR	FG (mmol/l) Whole grains: 5.41±0.34 Refined grains: 5.43±0.34	Fazer Bakeries Ltd, Vaasan & Vaasan Oy
Karl, 2017	USA, RCT, parallel	Whole grains vs. Refined grains	81	54.5	25.7	0%	40%	6	Whole grains: Primary whole grain in the whole grain–rich diet was wheat, but oats and brown rice were also included	Refined grains: Low –dietary fiber diet	NR	NR	FG (mmol/l) Whole grains: -0.11±0.34 Refined grains: 0.05±0.66 HOMA-IR Whole grains: -0.20±1.25 Refined grains: 0.02±1.31	Bell Institute of Health and Nutrition, General Mills Inc., Kraft Foods Inc.
Karmally, 2005	USA, RCT, parallel	Whole grains vs. Refined grains	152	46.3-51.5	28.4-30.2	0%	NR	6	Whole grains: 45g/d portions whole grain cereals	Refined grains: 45 g/d portions corn cereals	NR	4%	TC (mmol/l) Whole grains: -0.28±0.56 Refined grains: 0.03±0.47 LDL-C (mmol/l) Whole grains: -0.24±0.53 Refined grains: 0.03±0.45 HDL-C (mmol/l) Whole grains: 0.0±0.1	Supported by General Mills

													Refined grains: 0.01±0.1 TG (mmol/l) Whole grains: -0.07±0.50 Refined grains: 0.02 ±0.36	
Katcher, 2008	USA, RCT, parallel	Whole grains vs. Refined grains	50	46	35.8	0%	50%	12	Whole grains: Given a target number of daily whole-grain servings 4, 5, 6, or 7 servings/d based on the number of grain servings recommended in the 2005 dietary guidelines for Americans for their energy needs	Refined grains: Avoid wholegrain foods	Energy restricted (reduced by 500 kcal)	6%	TC (mmol/l) Whole grains: -0.28±0.47 Refined grains: -0.15±0.45 LDL-C (mmol/l) Whole grains: -0.21±0.39 Refined grains: -0.09±0.41 HDL-C (mmol/l) Whole grains: -0.05±0.09 Refined grains: 0.013±0.08 TG (mmol/l) Whole grains: -0.043±0.42 Refined grains: -0.1±0.69 CRP (mg/l) Whole grains: -2.40±5.10 Refined grains: 0.20±2.90 SBP (mmHg) Whole grains: -2.60±7.90 Refined grains: -6.70±8.50 DBP (mmHg) Whole grains: -2.50±7.0 Refined grains: -3.10±5.90 FG (mmol/l) Whole grains: -0.08±0.37 Refined grains: -0.07±0.26	General Mills Bell Institute of Health and Human Nutrition
Katz, 2005	USA, RCT, crossover (washout: 4 wk)	Whole grains vs. Eggs	49	56	28.8	0%	40%	6	Whole grains: 60 g/d uncooked whole oats	Eggs: Two eggs/d	NR	2%	TC (mmol/l) Whole grains: 5.03 ±0.79 Eggs: 5.32±0.92 LDL-C (mmol/l) Whole grains: 3.02 ±0.80 Eggs: 3.34±0.84 HDL-C (mmol/l) Whole grains: 1.38 ±0.43 Eggs: 1.33±0.39	American Egg Board*Egg Nutrition Centre

													TG (mmol/l) Whole grains: 1.38 ±0.85 Eggs: 1.43±0.82 SBP (mmHg) Whole grains: 124.1 ±12.5 Eggs: 124.9±10.9 DBP (mmHg) Whole grains: 77.5 ±8.7 Eggs: 77.4±7.0	
Katz, 2015	USA, RCT, crossover (washout: 4 wk)	Refined grains vs. Eggs	32	67	30	0%	19%	6	Refined grains: High-carbohydrate breakfast consisted of any of the following choices during each day of the treatment period: bagel, waffles, pancakes, or cereal	Eggs: Two eggs/d	NR	6%	TC (mmol/l) Refined grains: 4.05 ±0.71 Eggs: 4.10±0.74 LDL-C (mmol/l) Refined grains: 2.10 ±0.66 Eggs: 2.08±0.69 HDL-C (mmol/l) Refined grains: 1.41 ±0.43 Eggs: 1.46±0.47 TG (mmol/l) Refined grains: 1.20 ±0.33 Eggs: 1.24±0.43 SBP (mmHg) Refined grains: 135.5 ±14.9 Eggs: 132.8±14.1 DBP (mmHg) Refined grains: 76.7±6.9 Eggs: 77.2±6.1	Not reported
Kirwan, 2016 Malin, 2018	USA, RCT, crossover (washout: 10 wk)	Whole grains vs. Refined grains	33	39	33	0%	82%	8	Whole grains: 50 g/1000 kcal in each diet	Refined grains: 50 g/1000 kcal in each diet	NR	18%	TC (mmol/l) Whole grains: -0.52±1.11 Refined grains: -0.31±0.59 LDL-C (mmol/l) Whole grains: -0.37 ±1.03 Refined grains: -0.19±0.54 HDL-C (mmol/l) Whole grains: -0.09 ±0.20 Refined grains: -0.06±0.15 TG (mmol/l) Whole grains: -0.12 ±0.42	Investigator-initiated grant from Nestle

													Refined grains: -0.11±0.31 CRP (mg/l) Whole grains: 0.80±5.36 Refined grains: -2.3±7.05 FG (mmol/l) Whole grains: -0.17 ±0.65 Refined grains: 0.07±0.54 HbA1c (%) Whole grains: -0.13 ±0.36 Refined grains: -0.07±0.20	
Kondo, 2017	Japan, RCT, parallel	Whole grains vs. Refined grains	28	66.7	24	100%	36%	8	Whole grains: Brown rice as a staple food for 10 out of 21 meals/wk	Refined grains: Instructed to consume white rice as a staple food for 10 out of 21 meals/wk	28-30 kcal/kg	3%	TC (mmol/l) Whole grains: 4.89±0.81 Refined grains: 4.90±0.78 LDL-C (mmol/l) Whole grains: 2.91±0.67 Refined grains: 2.98±0.62 HDL-C (mmol/l) Whole grains: 1.54 ±0.35 Refined grains: 1.40±0.31 CRP (mg/l) Whole grains: 5.0±5.0 Refined grains: 5.0±6.0 SBP (mmHg) Whole grains: 119±12.40 Refined grains: 120.1±12.50 DBP (mmHg) Whole grains: 68.4±8.30 Refined grains: 69.0±7.8 FG (mmol/l) Whole grains: 6.35 ±0.86 Refined grains: 6.98±1.54 HbA1c (%) Whole grains: 6.50 ±0.40 Refined grains: 6.70±0.60 HOMA-IR Whole grains: 1.83±3.02 Refined grains: 2.09±1.34	Sunstar

Kristensen, 2012	Denmark, RCT, parallel	Whole grains vs. Refined grains	79	59.7	30.2	0%	100%	12	Whole grains: Foods provided 105 g/d whole grains	Refined grains: 62 g/d of refined bread, 60 g/d refined pasta, and 28 g/d biscuits	NR	9%	TC (mmol/l) Whole grains: 5.59±0.98 Refined grains: 5.91±0.99 LDL-C (mmol/l) Whole grains: 3.73±0.93 Refined grains: 3.96±0.87 HDL-C (mmol/l) Whole grains: 1.27 ±0.31 Refined grains: 1.34±0.23 TG (mmol/l) Whole grains: 1.29 ±0.62 Refined grains: 1.33±0.70 CRP (mg/l) Whole grains: 0.85±1.66 Refined grains: 1.07±1.83 SBP (mmHg) Whole grains: 132±12.32 Refined grains: 132±17.49 DBP (mmHg) Whole grains: 83.8 ±9.86 Refined grains: 84.6±8.16 FG (mmol/l) Whole grains: 5.70±0.55 Refined grains: 5.55±0.41 HbA1c (%) Whole grains: 5.72±0.18 Refined grains: 5.71±0.17 HOMA-IR Whole grains: 1.80 ±1.05 Refined grains: 1.80±0.99	Barilla and Nestle
Lankinen, 2011 Lankinen, 2014	Finland, RCT, parallel	Whole grains vs. Refined grains	69	58.5	31.2	0%	49%	12	Whole grains: Participants replaced their habitually used cereal products with breads having a low postprandial glucose and	Refined grains: Participants replaced their habitually used breads with refined wheat breads (dietary fiber 3–4.3 g/100 g) and other	NR	26%	TC (mmol/l) Whole grains: 5.30±1.10 Refined grains: 5.40±1.0 LDL-C (mmol/l) Whole grains: 3.20±0.90 Refined grains: 3.40±0.80 HDL-C (mmol/l)	Fazer bakeries Oy, Vaasan & Vaasan Oy, KE Leipa Oy, Leipomo Ruistahka, Leipomo Koskelonseutu, Raisio Oyj,

									insulin response, contributing up to 20–25% of total energy intake + whole grain oat biscuits: 8–8.5 g/100 g of dietary fiber	cereal products, e.g. porridge or pasta, with low fiber products (<6 g/100 g dietary fiber)			Whole grains: 1.20±0.4 Refined grains: 1.30±0.3 TG (mmol/l) Whole grains: 1.70±1.0 Refined grains: 1.60±0.70 CRP (mg/l) Whole grains: 1.20±1.72 Refined grains: 1.3±1.14 SBP (mmHg) Whole grains: 133±15 Refined grains: 135±13 DBP (mmHg) Whole grains: 84±7.0 Refined grains: 86±6.0 FG (mmol/l) Whole grains: 6.10±0.50 Refined grains: 6.20±0.50 HOMA-IR Whole grains: 3.70±2.30 Refined grains: 3.70±1.90	Pakkasmarja Oy and Joswola Oy are commercial companies
Leaf, 2009	USA, RCT, crossover (no washout)	Fish vs. Red meat	10	46	28.2	NR	40%	4	Fish: 276 g/2000 kcal of lean fish	Red meat: 276 g/2000 kcal of ground beef	NR	NR	TC (mmol/l) Fish: 6.18 ±0.92 Red meat: 6.55±1.24 LDL-C (mmol/l) Fish: 4.45 ±0.94 Red meat: 4.30±0.88 HDL-C (mmol/l) Fish: 1.06 ±0.26 Red meat: 1.14±0.25 TG (mmol/l) Fish: 2.60 ±1.00 Red meat: 2.97±0.87	No conflict of interest
Leinonen, 2000	Finland, RCT, crossover (washout: 4 wk)	Whole grains vs. Refined grains	40	43	24.7	0%	55%	4	Whole grains: 15g/d higher intake of dietary fiber compared to refined grains	Refined grains: 15g/d lower intake of dietary fiber compared to whole grains	NR	7%	TC (mmol/l) Whole grains: 6.20±0.49 Refined grains: 6.45±0.45 LDL-C (mmol/l) Whole grains: 4.35±0.88 Refined grains: 4.55±0.88	Fazer Bakeries Ltd., Vaasan & Vaasan Ltd

													HDL-C (mmol/l) Whole grains: 1.35±0.47 Refined grains: 1.40±0.49 TG (mmol/l) Whole grains: 1.10±0.46 Refined grains: 1.15±0.47	
Li, 2003	Japan, RCT, crossover (washout: 4 wk)	Whole grains vs. Refined grains	10	20.4	19.2	0%	100%	4	Whole grains: Replacing 30% of the carbohydrates in the standard diet with barley (0.58 g/d dietary fiber kg body weight)	Refined grains: 0.39 g/d dietary fiber per kg body weight	40 kcal kg per body weight	0%	TC (mmol/l) Whole grains: 3.06±0.54 Refined grains: 3.57±0.60 LDL-C (mmol/l) Whole grains: 1.08±0.22 Refined grains: 1.37±0.24 HDL-C (mmol/l) Whole grains: 1.58±0.28 Refined grains: 1.65±0.31 TG (mmol/l) Whole grains: 0.85±0.14 Refined grains: 0.99±0.11 FG (mmol/l) Whole grains: 4.94±0.77 Refined grains: 5.44±0.77 HbA1c (%) Whole grains: 5.10±0.80 Refined grains: 5.40±0.70	Haku-Baku Company
Li, 2010	USA, RCT, parallel	Nuts vs. Refined grains	59	46.4	30.5	0%	81	12	Nuts: 53 g/d salted pistachios	Refined grains: 56 g/d pretzels	Hypo-caloric (energy restricted by 500 kcal)	10%	TC (mmol/l) Nuts: 4.96±1.00 Refined grains: 4.74±1.06 LDL-C (mmol/l) Nuts: 3.06±0.54 Refined grains: 3.57±0.60 HDL-C (mmol/l) Nuts: 1.11±0.34 Refined grains: 1.02±0.32 TG (mmol/l) Nuts: 0.99±0.40 Refined grains: 1.49±0.99 FG (mmol/l)	Not reported

													Nuts: 4.65±0.69 Refined grains: 4.94±0.64	
Li, 2016	USA, RCT, parallel	Legumes vs. Red meat	34	53.5	30.85	0%	68%	4	Legumes: Soy/legume products	Red meat: Lean beef/pork	Energy restricted (reduced by 750 kcal/d)	28%	TC (mmol/l) Legumes: 3.77±0.64 Red meat: 4.05±0.74 LDL-C (mmol/l) Legumes: 2.12 ±0.50 Red meat: 2.37±0.57 HDL-C (mmol/l) Legumes: 1.14 ±0.20 Red meat: 1.09±0.20 TG (mmol/l) Legumes: 1.17±0.42 Red meat: 1.29±0.42 SBP (mmHg) Legumes: 112±13.74 Red meat: 110±9.62 DBP (mmHg) Legumes: 70±8.24 Red meat: 68.7±6.87 FG (mmol/l) Legumes: 5.06±0.38 Red meat: 5.00±0.46 HOMA-IR Legumes: 1.46 ±0.78 Red meat: 2.00±1.59	Beef Checkoff and the National Pork Board
Maki, 2010	USA, RCT, parallel	Whole grains vs. Refined grains	144	48.8	32	0%	78%	12	Whole grains: Either two portions/d of whole-grain oat cereal	Refined grains: Low-fiber breakfast/ snack foods (e.g., corn cereals, white toast, plain bagels and English muffins, pretzels, soda crackers, or rice cakes)	Energy restricted (reduced by 500 kcal/d)	25%	TC (mmol/l) Whole grains: -0.32±0.44 Refined grains: -0.17±0.45 LDL-C (mmol/l) Whole grains: -0.35±0.31 Refined grains: -0.17±0.37	General Mills Bell Institute of Health and Nutrition
Maki, 2015	USA, RCT, crossover	SSB vs. Dairy	43	53.8	32.2	0%	50%	6	SSB: 710 mL/d non-diet soda and 108 g/d non-dairy	Dairy: 474 mL/d 2% milk and 170 g/d low-fat yogurt	NR	23%	TC (mmol/l) SSB: 5.02±1.08 Dairy: 5.02±0.92	Funded by the Dairy Research Institute/ National Dairy

	(washout: 2 wk)								pudding				LDL-C (mmol/l) SSB: 3.19±0.83 Dairy: 3.19±0.74 HDL-C (mmol/l) SSB: 1.10±0.26 Dairy: 1.16±0.29 TG (mmol/l) SSB: 1.64±0.61 Dairy: 1.47±0.51 FG (mmol/l) SSB: 5.72±0.65 Dairy: 5.61±0.55	Council
McIntosh, 2003	AUS, RCT, crossover (no washout)	Whole grains vs. Refined grains	28	40-65	30	0%	0%	4	Whole grains: 32 g/d dietary fiber, including wheat test foods as 140 g/d whole-meal bread, 40 g/d whole-meal wheat crispbread, and 50 g/d whole-wheat breakfast cereal. The high-fiber rye diet provided 32 g/d dietary fiber including rye test foods as 140 g/d whole-grain rye bread	Refined grains: 19 g/d dietary fiber, including low-dietray-fiber test foods as 140 g/d white bread, 40 g/d refined-wheat crispbread	NR	10%	FG (mmol/l) Whole grains: 5.60±0.79 Refined grains: 5.64±0.90	George Weston Foods Ltd
Navas-Carretero, 2009	Spain, RCT, crossover (no washout)	Fish vs. Red meat	25	18-30	22.1	0%	100%	8	Fish: Two portions of salmon, two cans of water-packed tuna (56 g each), one can of sardines in olive oil, one portion of lean fish per wk	Red meat: Five portions of red meat/wk	NR	NR	TC (mmol/l) Fish: -0.10±0.06 Red meat: -0.09±0.07 LDL-C (mmol/l) Fish: -0.19±0.07 Red meat: -0.13±0.07 HDL-C (mmol/l) Fish: 0.12±0.034 Red meat: 0.02±0.024 TG (mmol/l) Fish: -0.02±0.04	No conflict of interest to declare

													Red meat: 0.06±0.03	
Pereira, 2002	USA, RCT, crossover (washout: 6-9 wk)	Whole grains vs. Refined grains	11	41.6	30.2	0%	50%	6	Whole grains: Bran, germ, and considerable dietary fiber, but were mostly ground to flour	Refined grains: Refined grains, which contained no bran or germ and little dietary fiber	NR	8%	TG (mmol/l) Whole grains: 5.20±0.27 Refined grains: 5.30±0.27	Gift from General Mills
Pins, 2002	USA, RCT, parallel	Whole grains vs. Refined grains	88	47.6	30.9	0%	49%	12	Whole grains: 60 g/d quaker whole-grain oatmeal, and 77 g/d Quaker Oat Squares	Refined grains. 65 g/d Malt-O-Meal Hot Wheat Cereal and 81 g/d Kellogg's Crispix	Isocaloric	0%	TC (mmol/l) Whole grains: 4.66±0.87 Refined grains: 5.34±1.11 LDL-C (mmol/l) Whole grains: 3.03±0.74 Refined grains: 3.41±0.79 HDL-C (mmol/l) Whole grains: 1.16±0.30 Refined grains: 1.12±0.26 TG (mmol/l) Whole grains: 1.95±0.47 Refined grains: 2.08±0.46 SBP (mmHg) Whole grains: -7.0±8.0 Refined grains: -1.0±9.0 DBP (mmHg) Whole grains: -4.0±5.0 Refined grains: 1.0±6.0 FG (mmol/l) Whole grains: 5.89±1.57 Refined grains: 6.66±2.0	Quaker Oats Company
Pittaway, 2006 Pittaway, 2007 Nestel, 2004	AUS, RCT, crossover (no washout)	Legumes vs. Whole grains	47	53	27.6	NR	NR	5	Legumes: 140 g/d of canned, drained chickpeas, chickpea bread, and chickpea shortbread biscuits	Whole grains: Whole-meal (wheat) bread, high-fiber (wheat) breakfast cereals, and shortbread biscuits that the participants purchased from their usual grocery suppliers	NR	NR	TC (mmol/l) Legumes: 5.75±1.19 Whole grains: 5.98±1.22 LDL-C (mmol/l) Legumes: 3.71±1.02 Whole grains: 3.89±1.06 HDL-C (mmol/l) Legumes: 1.39±0.41 Whole grains: 1.41±0.41	Australian Grains Research & Development Corporation

													TG (mmol/l) Legumes: 1.46±1.06 Whole grains: 1.50±0.75 FG (mmol/l) Legumes: 4.90±0.40 Whole grains: 5.10±0.50	
Rajaram, 2009 Chiang, 2012	USA, RCT, crossover (no washout)	Nuts vs. Fish	25	23-65	24.8	0%	44%	4	Nut: 42.5 g walnuts/ (2400 kcal), 6 d/wk)	Fish: 113 g salmon, twice/wk)	2400 kcal	7%	TC (mmol/l) Nuts: 4.87 ±0.90 Fish: 5.33 ±0.90 LDL-C (mmol/l) Nuts: 2.77 ±0.75 Fish: 3.20 ±0.75 HDL-C (mmol/l) Nuts: 1.18 ±0.25 Fish: 1.23 ±0.25 TG (mmol/l) Nuts: 1.11 ±0.55 Fish: 1.00 ±0.55 CRP (mg/l) Nuts: 2.22 ±1.36 Fish: 2.44 ±1.50	California Walnut Commission
Reynolds, 2000	USA, RCT, crossover (washout: 4 wk)	Whole grains vs. Refined grains	43	27-68	NR	0%	NR	4	Whole grains: Whole grain oats (43-64 g/d)	Refined grains: Country Corn Flakes (43-64 g/d)	NR	NR	TC (mmol/l) Whole grains: 5.87±0.56 Refined grains: 5.83±0.60 LDL-C (mmol/l) Whole grains: 3.98±0.52 Refined grains: 3.96±0.55 HDL-C (mmol/l) Whole grains: 1.29±0.31 Refined grains: 1.19±0.28 TG (mmol/l) Whole grains: 1.30 ±0.47 Refined grains: 1.48 ±0.78	General Mills
Roager, 2017	Denmark, RCT, crossover (washout: ≥6 wk)	Whole grains vs. Refined grains	50	48.6	28.9	0%	64%	8	Whole grains: ≥75 g/d of whole grains	Refined grains: <10 g/d of whole grains during the refined grain intervention	NR	17%	TC (mmol/l) Whole grains: 5.20 ±1.00 Refined grains: 5.40±0.90 LDL-C (mmol/l) Whole grains: 3.10 ±0.70 Refined grains: 3.10 ±0.80	One author supported by unrestricted grants from Cereal Partners Worldwide, a joint venture

													HDL-C (mmol/l) Whole grains: 1.30 ±0.30 Refined grains: 1.30 ±0.30 TG (mmol/l) Whole grains: 1.30 ±0.70 Refined grains: 1.40 ±0.80 CRP (mg/l) Whole grains: 4.20 ±6.80 Refined grains: 5.0 ±5.80 SBP (mmHg) Whole grains: 124 ±12.60 Refined grains: 124.1±12.4 DBP (mmHg) Whole grains: 79.80 ±8.90 Refined grains: 79.4±9.30 FG (mmol/l) Whole grains: 5.60 ±0.60 Refined grains: 5.70 ±0.60 HbA1c (%) Whole grains: 5.4±0.30 Refined grains: 5.5±0.30 HOMA-IR Whole grains: 2.90±1.50 Refined grains: 3.20 ±1.80	between Nestle SA and General Mills Ltd
Saltzman, 2001	USA, RCT, parallel	Whole grains vs. Refined grains	43	44.6	26.4	0%	53%	8	Whole grains: Whole grains oats (45 g dry weight/ 1000 kcal)	Refined grains: Mixed refined grains	First 2 wk weight mainte-nance, followed by a 6-wk weight-loss phase (phase 2)	NR	TC (mmol/l) Whole grains: -0.87±0.47 Refined grains: -0.34±0.50 LDL-C (mmol/l) Whole grains: -0.60 ±0.41 Refined grains: -0.20±0.41 HDL-C (mmol/l) Whole grains: 0.09 ±0.13 Refined grains: -0.04±0.14 TG (mmol/l) Whole grains: -0.36 ±0.36 Refined grains: -0.22±0.23	Quaker Oats Company

													SBP (mmHg) Whole grains: -6.0 ±7.0 Refined grains: -1.0±10.0 DBP (mmHg) Whole grains: -4.0±6.0 Refined grains: -3.0±5.0 FG (mmol/l) Whole grains: -0.21±0.29 Refined grains: 0.0±0.90 HOMA-IR Whole grains: -1.10 ±1.20 Refined grains: -0.50±2.10	
Sauder, 2014 Sauder, 2015	USA, RCT, crossover (washout: 2 wk)	Nuts vs. Refined grains	30	56.1	31.2	100%	NR	4	Nuts: Roasted pistachios that provided 20% of daily energy (range: 59-128g/d)	Refined grains: Low-fat or fat-free snacks pretzels, string cheese	NR	12%	TC (mmol/l) Nuts: 4.00 ±0.33 Refined grains: 4.15 ±0.33 LDL-C (mmol/l) Nuts: 2.39±0.33 Refined grains: 2.43 ±0.33 HDL-C (mmol/l) Nuts: 1.06 ±0.06 Refined grains: 1.04 ±0.06 TG (mmol/l) Nuts: 1.56 ±0.55 Refined grains: 1.84 ±0.55 CRP (mg/l) Nuts: 1.98 ±0.88 Refined grains: 2.16 ±0.88 SBP (mmHg) Nuts: 112.3 ±10.41 Refined grains: 112.1±12.05 DBP (mmHg) Nuts: 69.2±6.02 Refined grains: 69.2±4.93 FG (mmol/l) Nuts: 5.90 ±0.55 Refined grains: 5.90 ±0.55 HbA1c (%)	American Pistachio Growers

													Nuts: 6.00 ±0.55 Refined grains: 6.10 ±0.55 HOMA-IR Nuts: 11.60 ±0.55 Refined grains: 1.70 ±0.55	
Shimabukuro, 2014	Japan, RCT, crossover (no washout)	Whole grains vs. Refined grains	27	NR	26.7	0%	0%	8	Whole grains: Brown rice	Refined grains: White rice	NR	NR	TC (mmol/l) Whole grains: 5.43±0.48 Refined grains: 5.47±0.69 LDL-C (mmol/l) Whole grains: 3.28±0.49 Refined grains: 3.30±0.52 HDL-C (mmol/l) Whole grains: 1.29±0.21 Refined grains: 1.35±0.25 TG (mmol/l) Whole grains: 1.56±0.59 Refined grains: 1.70±0.61 CRP (mg/l) Whole grains: 1.20±0.89 Refined grains: 1.52±1.37 SBP (mmHg) Whole grains: 133±11.81 Refined grains: 139.5±18.40 DBP (mmHg) Whole grains: 87±8.43 Refined grains: 88.5±10.47 FG (mmol/l) Whole grains: 6.1±1.72 Refined grains: 6.34±1.91 HbA1c (%) Whole grains: 5.95±1.13 Refined grains: 5.87±1.47 HOMA-IR Whole grains: 2.28±1.37 Refined grains: 3.15±5.62	No conflict of interest
Thongoun, 2014	Thailand, RCT,	Whole grains vs. Refined	24	51	26.8	0%	92%	4	Whole grains: 100% whole grain oatmeal	Refined grains: White rice flakes (70 g/d)	NR	NR	TC (mmol/l) Whole grains: 5.93 ±0.60 Refined grains: 6.37±0.76	No conflict of interest

	crossover (washout: 1 wk)	grains							(70 g/d)				LDL-C (mmol/l) Whole grains: 4.04±0.60 Refined grains: 4.39±0.82 HDL-C (mmol/l) Whole grains: 1.50±0.32 Refined grains: 1.52±0.33 TG (mmol/l) Whole grains: 1.08 ±0.32 Refined grains: 2.37±0.77	
Tighe, 2010	UK, RCT, parallel	Whole grains vs. Refined grains	226	51.9	27.7	0%	45%	12	Whole grains: Whole-wheat foods (70–80 g/d whole-meal bread + 30–40 g/d whole-grain cereals) or with 1 serving of whole wheat foods and 2 servings of oats	Refined grains: Refined cereals and white bread	NR	9%	TC (mmol/l) Whole grains: 5.59 ±0.87 Refined grains: 5.75±0.87 LDL-C (mmol/l) Whole grains: 3.42±0.85 Refined grains: 3.50±0.87 HDL-C (mmol/l) Whole grains: 1.62±0.40 Refined grains: 1.60±0.40 TG (mmol/l) Whole grains: 1.21±0.55 Refined grains: 1.45±0.55 FG (mmol/l) Whole grains: 5.44±0.55 Refined grains: 5.70±0.63 HOMA-IR (mmol/l) Whole grains: 1.85±1.94 Refined grains: 2.29±1.83	Oat cakes were provided by Paterson Arran Ltd
Tucker, 2010 MacKay, 2012	Canada, RCT, crossover (washout: 4-5 wk)	Whole grains vs. Refined grains	27	53.1-57.4	26.5-35.7	0%	29%	6	Whole grains: Consisted predominantly of whole grain wheat flour (37% dry weight) and also contained other ingredients	Refined grains: White bread	NR	4%	TC (mmol/l) Whole grains: 5.12 ±0.87 Refined grains: 5.04±0.92 LDL-C (mmol/l) Whole grains: 3.20 ±1.05 Refined grains: 3.15±0.84 HDL-C (mmol/l) Whole grains: 1.19±0.39 Refined grains: 1.19 ±0.35 TG (mmol/l)	Stonemill Bakehouse Ltd

													Whole grains: 1.48 ±0.83 Refined grains: 1.39 ±0.72 FG (mmol/l) Whole grains: 4.88 ±0.40 Refined grains: 4.91 ±0.49 HOMA-IR Whole grains: 1.98 ±0.85 Refined grains: 1.89 ±0.85	
Turner, 2015 Turner, 2017	AUS, RCT, crossover (washout: 2 wk)	Dairy vs. Red meat	47	47.8	31.1	0%	62%	4	Dairy: 4–6 servings of primarily low-fat dairy (from milk, yogurt, or custard) and cheese/d	Red meat: ≥200 g red meat/d for 6 d/wk	NR	29%	TC (mmol/l) Dairy: 5.63±1.10 Red meat: 5.61±1.10 LDL-C (mmol/l) Dairy: 3.54±0.92 Red meat: 3.56±0.94 HDL-C (mmol/l) Dairy: 1.49±0.43 Red meat: 1.51±0.43 TG (mmol/l) Dairy: 1.29±0.66 Red meat: 1.20±0.65 CRP (mg/l) Dairy: 5.30±8.10 Red meat: 5.25±7.95 FG (mmol/l) Dairy: 5.23±0.60 Red meat: 5.24±0.60 HOMA-IR Dairy: 1.55±1.0 Red meat: 1.30±0.70	No conflict of interest
Turpeinen, 2000	Finland, RCT, crossover (washout: 4 wk)	Whole grains vs. Refined grains	40	43	24.7	0%	55%	4	Whole grains: Whole-meal rye bread (20% of daily energy intake)	Refined grains: Low-dietary-fiber wheat bread (20% of daily energy intake)	NR	7%	TG (mmol/l) Whole grains: 1.20±0.63 Refined grains: 1.10±0.63	Fazer Bakeries Ltd, Lahti Finland; Vaasan & Vaasan Ltd
Vitaglione, 2015	Italy, RCT, parallel	Whole grains vs. Refined grains	80	38.5	29.8	0%	NR	8	Whole grains: 70 g/d (3 biscuits/d) of whole grains product	Refined grains: 1 package (33 g/d) of crackers and 3 slices of toasted bread	NR	15%	TC (mmol/l) Whole grains: 4.58 ±1.08 Refined grains: 4.72±0.68 HDL-C (mmol/l)	General Mills Bell Institute of Health and Nutrition

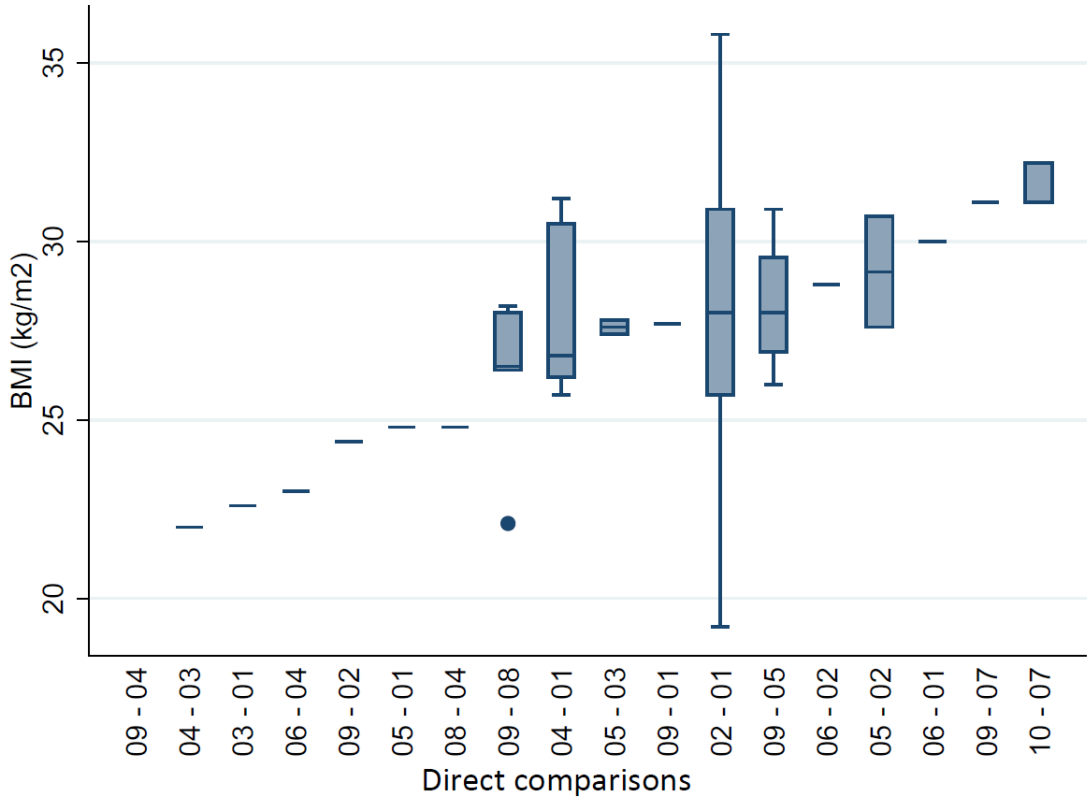
										(~27 g)/d			Whole grains: 1.26±0.36 Refined grains: 1.28±0.28 TG (mmol/l) Whole grains: 1.12 ±0.66 Refined grains: 0.99±0.45 FG (mmol/l) Whole grains: 5.55±0.73 Refined grains: 5.24±0.57	
Winham, 2007a	USA, RCT, crossover (washout: 2 wk)	Legumes vs. F&V	23	45.9	27.4	0%	57%	8	Legumes: Baked beans	F&V: Canned carrots	NR	21%	TC (mmol/l) Legumes: 5.26±0.62 F&V: 5.52±0.62 LDL-C (mmol/l) Legumes: 3.29±0.48 F&V: 3.42±0.62 HDL-C (mmol/l) Legumes: 1.45±0.37 F&V: 1.45±0.37 TG (mmol/l) Legumes: 1.37±0.54 F&V: 1.69±0.87 CRP (mg/l) Legumes: 2.50±2.40 F&V: 2.50±2.88 FG (mmol/l) Legumes: 5.50±0.53 F&V: 5.78±0.53 HbA1c (%) Legumes: 5.60±0.38 F&V: 5.50±0.38 HOMA-IR Legumes: 5.10±2.40 F&V: 5.40±2.87	Bush Brothers & Company
Winham, 2007b	USA, RCT, crossover (washout: 2 wk)	Legumes vs. F&V	16	43	27.8	0%	56%	8	Legumes: Pinto beans & black eyed pea	F&V: Canned carrots	NR	30%	TC (mmol/l) Legumes: 5.26±0.72 F&V: 5.39±0.73 LDL-C (mmol/l) Legumes: 3.32±0.62 F&V: 3.42±0.73	Beans for Health Alliance

													HDL-C (mmol/l) Legumes: 1.32±0.31 F&V: 1.32±0.21 TG (mmol/l) Legumes: 1.59±0.71 F&V: 1.73±0.68 CRP (mg/l) Legumes: 2.95±2.77 F&V: 3.70±3.60 FG (mmol/l) Legumes: 5.33±0.77 F&V: 5.56±0.44 HbA1c (%) Legumes: 5.55±0.32 F&V: 5.5±0.32 HOMA-IR Legumes: 5.05±2.31 F&V: 5.6±2.16	
Wolmarans, 1991	South Africa, RCT, crossover (washout: 12 wk)	Fish vs. Red meat	28	29.9-35.8	<30	0%	57%	6	Fish: Fatty fish, canned pilchards, sardines, salmon, and fresh snook	Red meat: Beef, mutton	NR	NR	LDL-C (mmol/l) Fish: 3.06±0.76 Red meat: 3.36±0.85 HDL-C (mmol/l) Fish: 1.77±0.36 Red meat: 1.71±0.37 TG (mmol/l) Fish: 0.73±0.81 Red meat: 0.94±0.81	Irvin and Johnson, Ltd. supplied the red-meat and fish rations
Zhang, 2011	China, RCT, parallel	Whole grains vs. Refined grains	202	49.7	25.7	23%	47%	16	Whole grains: 225 g/d servings cooked brown rice	Refined grains: 225 g/d servings cooked white rice	Ad libitum	4%	TC (mmol/l) Whole grains: -0.1 ±1.16 Refined grains: -0.4±1.11 LDL-C (mmol/l) Whole grains: -0.03±0.91 Refined grains: -0.33±0.96 HDL-C (mmol/l) Whole grains: -0.03±0.25 Refined grains: -0.12±0.30 TG (mmol/l)	No conflict of interest

													Whole grains: -0.16±0.86 Refined grains: -0.04±0.71 SBP (mmHg) Whole grains: -5.39±10.64 Refined grains: -4.78±10.64 DBP (mmHg) Whole grains: -3.92±6.70 Refined grains: -3.82±6.64 FG (mmol/l) Whole grains: -0.01±1.11 Refined grains: -0.16±1.47 HbA1c (%) Whole grains: 0.13±0.51 Refined grains: 0.20±0.81 HOMA-IR Whole grains: 0.03±0.96 Refined grains: 0.07±1.92	
Zhang, 2012	China, RCT, parallel	Whole grains vs. Refined grains	166	53.2	25.5	0%	61%	6	Whole grains: Replacing a portion of a staple food product (rice, steamed bread, noodles) with the whole grain oats product. Participants receiving the oatmeal were instructed to prepare ½ a package (~100 g/d dry weight, providing approximately 3.6 g/d soluble fiber)	Refined grains: Wheat noodles ("Shengchu" brand processed wheat flour based noodles) were purchased in 450g packages at the local grocery store and distributed to participants on a wk basis. Participants were instructed to prepare and consume 100g/d	NR	10%	TC (mmol/l) Whole grains: 5.85±0.78 Refined grains: 5.94±0.78 LDL-C (mmol/l) Whole grains: 3.91±0.75 Refined grains: 4.00±0.75 HDL-C (mmol/l) Whole grains: 1.43±0.30 Refined grains: 1.41±0.30 TG (mmol/l) Whole grains: 1.91±0.99 Refined grains: 1.85±0.99 SBP (mmHg) Whole grains: 125.7±15.21 Refined grains: 129.9±15.21 DBP (mmHg) Whole grains: 80.1±8.94 Refined grains: 80.4±9.0 FG (mmol/l) Whole grains: 5.34±0.81	Pepsi Co china Foods

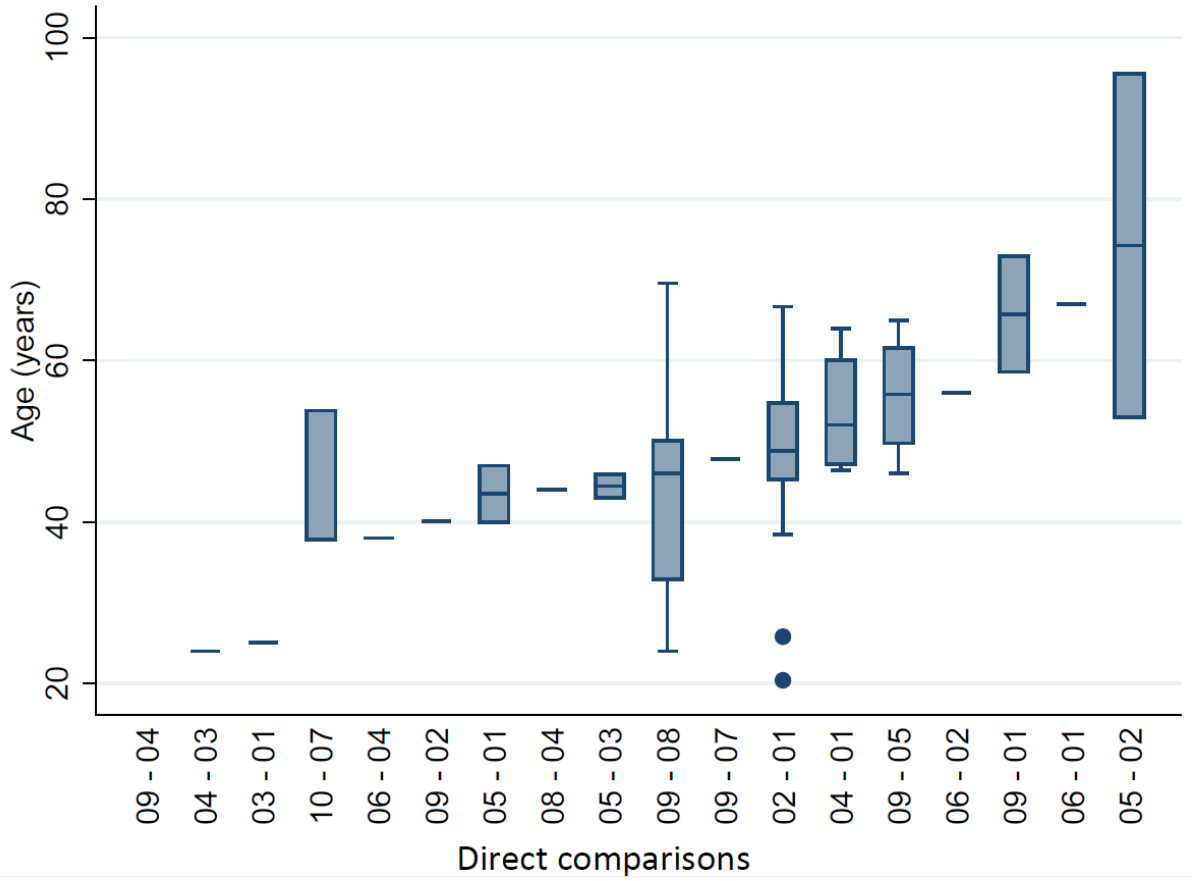
													Refined grains: 5.29±0.81	

[1]Body Mass Index; [2]type 2 diabetes mellitus; [3]randomized controlled trials; [4]fruit & vegetables; [5]not reported; [6]total cholesterol; [7]LDL-cholesterol; [8]HDL-cholesterol; [9]triacyglycerols; [10]systolic blood pressure; [11]diastolic blood pressure; [12]United Kingdom; [13]week; [14]C-reactive-protein; [15]fasting glucose; [16]Australia; [17]Homeostasis model assessment insulin resistance; [18]United States; [19]SSB: sugar sweetened beverages; [20]glycosylated haemoglobin



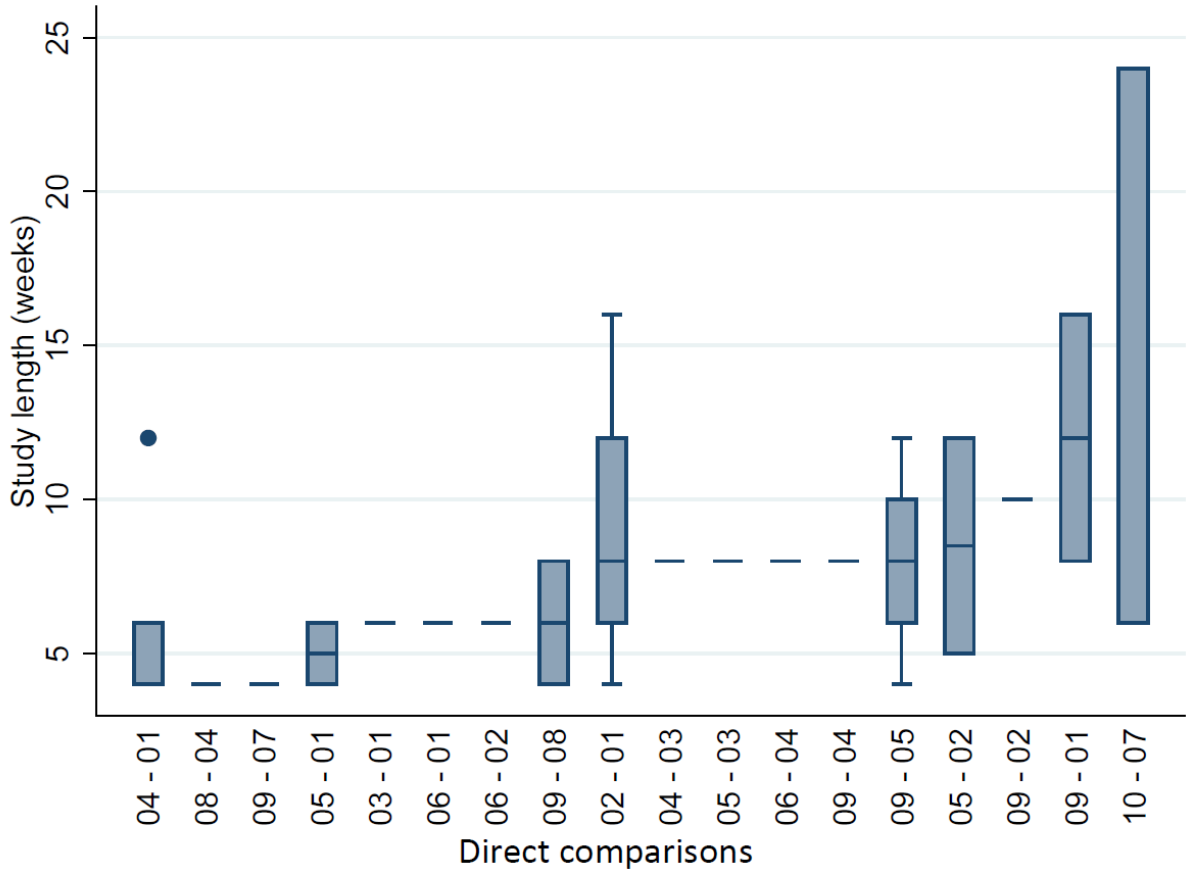
Supplemental Figure 3: Box plots showing the distribution of the mean BMI of the trials across the available direct comparisons. For the comparison red meat vs. nuts, BMI was not reported across the included trials.

[01=Refined grains, 02=Whole grains, 03=Fruit and Vegetables, 04=Nuts, 05=Legumes, 06=Eggs, 07=Dairy, 08=Fish, 09=Red meat, 10=SSB].



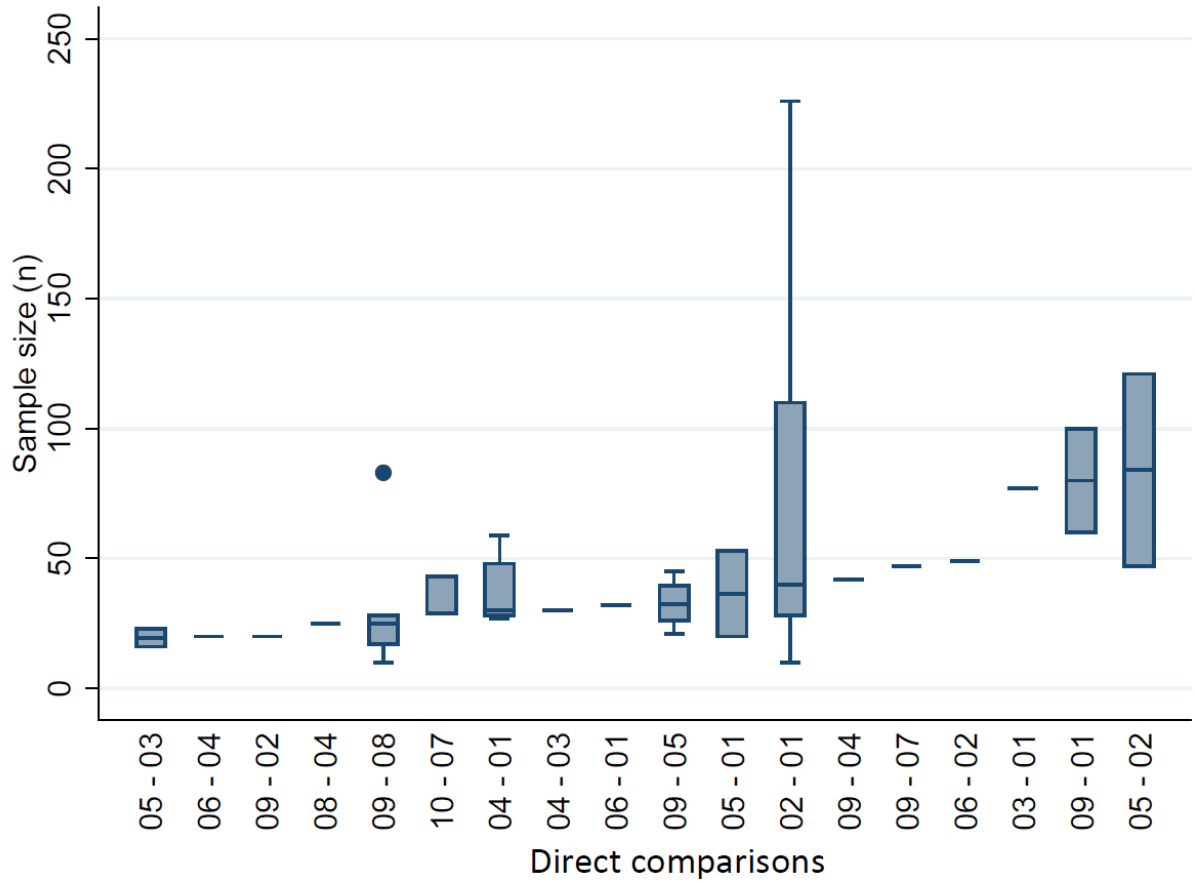
Supplemental Figure 4: Box plots showing the distribution of the mean age of the trials across the available direct comparisons. For the comparison red meat vs. nuts, age was not reported across the included trials.

[01=Refined grains, 02=Whole grains, 03=Fruit and Vegetables, 04=Nuts, 05=Legumes, 06=Eggs, 07=Dairy, 08=Fish, 09=Red meat, 10=SSB].



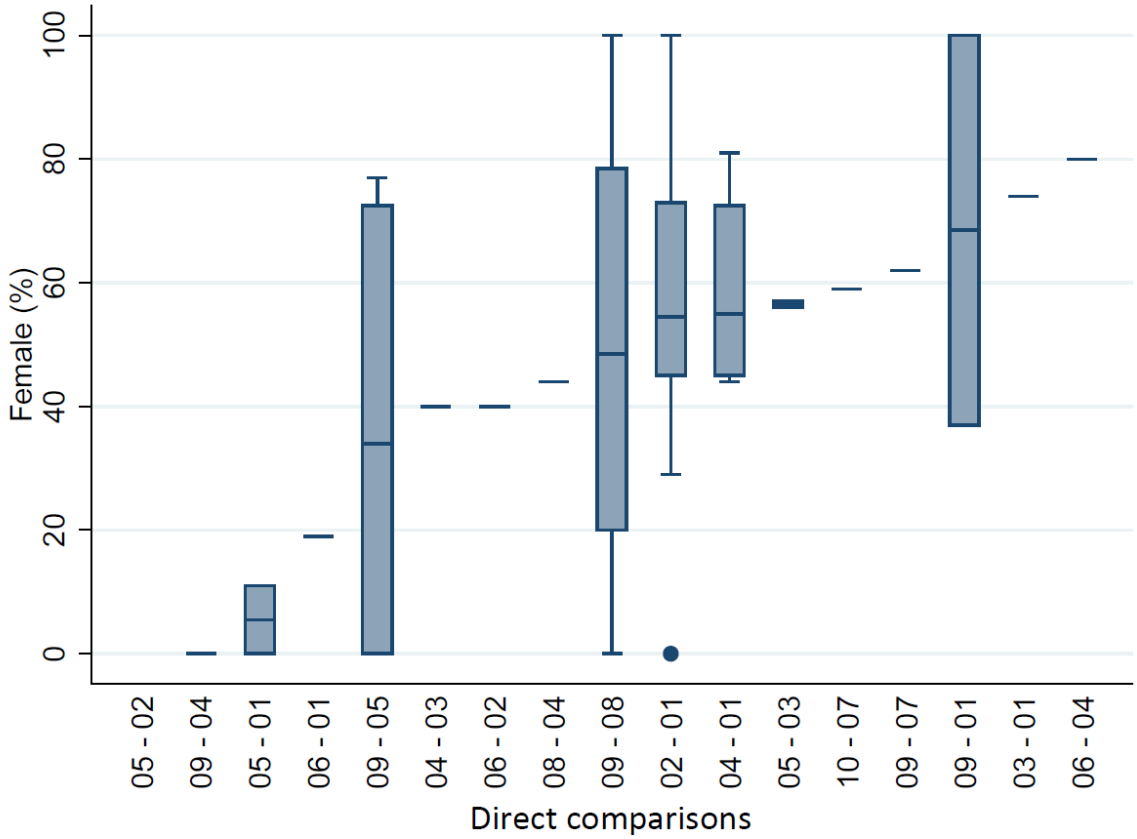
Supplemental Figure 5: Box plots showing the distribution of the mean study length (weeks) of the trials across the available direct comparisons.

[01=Refined grains, 02=Whole grains, 03=Fruit and Vegetables, 04=Nuts, 05=Legumes, 06=Eggs, 07=Dairy, 08=Fish, 09=Red meat, 10=SSB].



Supplemental Figure 6: Box plots showing the distribution of the sample size of the trials across the available direct comparisons.

[01=Refined grains, 02=Whole grains, 03=Fruit and Vegetables, 04=Nuts, 05=Legumes, 06=Eggs, 07=Dairy, 08=Fish, 09=Red meat, 10=SSB].



Supplemental Figure 7: Box plots showing the distribution of the % female participants in the trials across the available direct comparisons. For the comparison legumes vs. whole grains, % female was not reported across the included trials.

[01=Refined grains, 02=Whole grains, 03=Fruit and Vegetables, 04=Nuts, 05=Legumes, 06=Eggs, 07=Dairy, 08=Fish, 09=Red meat, 10=SSB].

Supplemental Table 3: Percentage contribution of each direct estimate derived from direct and indirect comparisons[1]

LDL-C																			
Nuts		0	100	0	100	75	25	23	77	55	45	0	100	17	83	34	66	0	100
0	100	Legumes		39	61	12	88	51	49	0	100	0	100	0	100	61	39	0	100
0	100	27	73	Whole grains		96	4	0	100	29	71	0	100	0	100	0	100	0	100
44	56	29	71	96	4	Refined grains		48	52	26	74	0	100	0	100	42	58	0	100
31	69	26	74	0	100	63	37	Fruit and Vegetables		0	100	0	100	0	100	0	100	0	100
64	36	0	100	14	86	39	61	0	100	Eggs		0	100	0	100	0	100	0	100
0	100	0	100	0	100	0	100	0	100	0	100	Dairy		0	100	100	0	100	0
3	97	0	100	0	100	0	100	0	100	0	100	0	100	Fish		94	6	0	100
91	9	49	51	3	97	21	79	0	100	0	100	100	0	99	1	Red meat		0	100
0	100	0	100	0	100	0	100	0	100	0	100	100	0	0	100	0	100	SSB	
TG																			

[1]Direct comparisons are depicted in blue and indirect comparisons in red (the color corresponds to the percentage of contribution). The values above the food groups correspond to the percentage contribution of direct and indirect comparisons between the row and columns for LDL-cholesterol (e.g., the percentage contribution of direct comparisons for LDL-C between Nuts and Eggs is 55% and for the indirect comparisons 45%). The values below the food groups correspond to the percentage contribution of direct and indirect comparisons between the column and the rows for triacylglycerol (e.g., the percentage contribution of direct comparisons for triacylglycerol between Nuts and Eggs is 64% and for the indirect comparisons 36%).

Supplemental Table 4: League table for total cholesterol (mmol/l)

Nuts									
-0.00[1] (-0.18, 0.18)	Legumes								
-0.14 (-0.28, -0.00)	-0.14 (-0.30, 0.03)	Whole grains							
-0.30 (-0.42, -0.17)	**-0.29 (-0.45, -0.13)**	**-0.16 (-0.22, -0.09)**	Refined grains						
-0.20 (-0.44, 0.04)	-0.20 (-0.43, 0.03)	-0.06 (-0.30, 0.17)	0.09 (-0.13, 0.32)	Fruit and Vegetables					
-0.36 (-0.56, -0.15)	**-0.35 (-0.61, -0.10)**	-0.22 (-0.43, -0.00)	-0.06 (-0.27, 0.15)	-0.15 (-0.45, 0.15)	Eggs				
-0.38 (-0.88, 0.12)	-0.38 (-0.89, 0.13)	-0.24 (-0.75, 0.27)	-0.08 (-0.59, 0.42)	-0.18 (-0.72, 0.37)	-0.02 (-0.56, 0.51)	Dairy			
-0.39 (-0.59, -0.18)	**-0.39 (-0.62, -0.16)**	**-0.25 (-0.47, -0.03)**	-0.09 (-0.30, 0.12)	-0.19 (-0.48, 0.11)	-0.03 (-0.31, 0.25)	-0.01 (-0.51, 0.50)	Fish		
-0.36 (-0.51, -0.21)	**-0.36 (-0.54, -0.18)**	**-0.22 (-0.39, -0.06)**	-0.06 (-0.22, 0.09)	-0.16 (-0.41, 0.10)	-0.00 (-0.25, 0.24)	0.02 (-0.46, 0.50)	0.03 (-0.13, 0.19)	Red meat	
-0.41 (-1.06, 0.25)	-0.40 (-1.06, 0.26)	-0.27 (-0.92, 0.39)	-0.11 (-0.76, 0.54)	-0.20 (-0.89, 0.48)	-0.05 (-0.73, 0.63)	-0.03 (-0.44, 0.39)	-0.02 (-0.67, 0.64)	-0.05 (-0.68, 0.59)	SSB

[1] The value below the food groups correspond to the difference in mean in total cholesterol (mmol/l) between the column and the row.

Supplemental Table 5: League table for HDL-cholesterol (mmol/l)

Nuts									
0.08[1] **(0.01, 0.15)**	Legumes								
0.02 (-0.04, 0.07)	-0.06 (-0.13, -0.00)	Whole grains							
0.01 (-0.04, 0.07)	-0.07 (-0.13, -0.00)	-0.00 (-0.03, 0.02)	Refined grains						
0.03 (-0.07, 0.13)	-0.05 (-0.15, 0.04)	0.01 (-0.08, 0.10)	0.01 (-0.08, 0.10)	Fruit and Vegetables					
0.00 (-0.10, 0.10)	-0.08 (-0.19, 0.04)	-0.01 (-0.11, 0.09)	-0.01 (-0.11, 0.09)	-0.03 (-0.16, 0.11)	Eggs				
0.03 (-0.17, 0.22)	-0.05 (-0.25, 0.14)	0.01 (-0.19, 0.21)	0.01 (-0.19, 0.21)	-0.00 (-0.22, 0.21)	0.02 (-0.19, 0.24)	Dairy			
-0.06 (-0.13, 0.02)	**-0.13 (-0.22, -0.05)**	-0.07 (-0.15, 0.01)	-0.07 (-0.15, 0.01)	-0.08 (-0.20, 0.03)	-0.06 (-0.18, 0.06)	-0.08 (-0.28, 0.12)	Fish		
0.01 (-0.05, 0.06)	**-0.07 (-0.13, -0.01)**	-0.01 (-0.07, 0.05)	-0.01 (-0.06, 0.05)	-0.02 (-0.12, 0.08)	0.00 (-0.10, 0.11)	-0.02 (-0.21, 0.17)	0.06 (-0.00, 0.12)	Red meat	
0.07 (-0.16, 0.31)	-0.00 (-0.24, 0.23)	0.06 (-0.18, 0.30)	0.06 (-0.18, 0.30)	0.05 (-0.20, 0.30)	0.07 (-0.18, 0.33)	0.05 (-0.08, 0.18)	0.13 (-0.11, 0.37)	0.07 (-0.16, 0.30)	SSB

[1] The value below the food groups correspond to the difference in mean in HDL-cholesterol (mmol/l) between the column and the row.

Supplemental Table 6: League table for fasting glucose (mmol/l)

Nuts							
-0.19[1] (-0.42, 0.05)	Legumes						
0.00 (-0.20, 0.20)	0.19 (-0.01, 0.39)	Whole grains					
-0.04 (-0.22, 0.14)	0.15 (-0.05, 0.35)	-0.04 (-0.14, 0.05)	Refined grains				
-0.43 (-0.70, -0.16)	-0.24 (-0.54, 0.06)	**-0.43 (-0.73, -0.14)**	**-0.39 (-0.68, -0.10)**	Fruit and Vegetables			
-0.38 (-0.92, 0.16)	-0.20 (-0.74, 0.35)	-0.38 (-0.93, 0.16)	-0.34 (-0.88, 0.20)	0.05 (-0.54, 0.63)	Dairy		
-0.39 (-0.68, -0.11)	-0.21 (-0.50, 0.09)	**-0.39 (-0.69, -0.10)**	**-0.35 (-0.64, -0.07)**	0.04 (-0.33, 0.40)	-0.01 (-0.47, 0.45)	Red meat	
-0.44 (-1.11, 0.23)	-0.25 (-0.93, 0.42)	-0.44 (-1.12, 0.24)	-0.40 (-1.07, 0.27)	-0.01 (-0.72, 0.70)	-0.06 (-0.46, 0.35)	-0.05 (-0.66, 0.56)	SSB

[1] The value below the food groups correspond to the difference in mean in fasting glucose (mmol/l) between the column and the row.

Supplemental Table 7: League table for HbA1c (%)

Whole grains					
-0.02[1] (-0.39, 0.36)	Refined grains				
-0.32 (-0.68, 0.04)	-0.30 (-0.66, 0.06)	Red meat			
-0.12 (-0.39, 0.16)	-0.10 (-0.38, 0.17)	0.20 (-0.03, 0.43)	Nuts		
-0.07 (-0.34, 0.19)	-0.06 (-0.34, 0.23)	0.25 (0.00, 0.49)	0.05 (-0.02, 0.12)	Legumes	
-0.07 (-0.23, 0.08)	-0.06 (-0.41, 0.29)	0.24 (-0.08, 0.57)	0.04 (-0.18, 0.27)	-0.00 (-0.22, 0.22)	Fruit and Vegetables

[1] The value below the food groups correspond to the difference in mean in HbA1c (%) between the column and the row.

Supplemental Table 8: League table for HOMA-IR

Whole grains							
-0.22[1] **(-0.40, -0.05)**	Refined grains						
-0.15 (-0.49, 0.19)	0.07 (-0.22, 0.37)	Nuts					
-0.42 (-1.38, 0.54)	-0.19 (-1.14, 0.75)	-0.27 (-1.17, 0.63)	Red meat				
-0.06 (-0.58, 0.46)	0.17 (-0.36, 0.70)	0.09 (-0.46, 0.65)	0.36 (-0.68, 1.40)	Legumes			
-0.48 (-1.69, 0.73)	-0.26 (-1.47, 0.96)	-0.33 (-1.56, 0.89)	-0.06 (-1.57, 1.45)	-0.42 (-1.52, 0.67)	Fruit and Vegetables		
-1.01 (-1.54, -0.47)	**-0.78 (-1.29, -0.28)**	**-0.86 (-1.27, -0.44)**	-0.59 (-1.39, 0.21)	**-0.95 (-1.63, -0.28)**	-0.53 (-1.81, 0.76)	Eggs	
-0.76 (-1.14, -0.38)	**-0.53 (-0.87, -0.19)**	**-0.61 (-0.79, -0.43)**	-0.34 (-1.22, 0.54)	**-0.70 (-1.26, -0.14)**	-0.28 (-1.51, 0.95)	0.25 (-0.13, 0.63)	Dairy

[1] The value below the food groups correspond to the difference in mean in HOMA-IR between the column and the row.

Supplemental Table 9: League table for systolic blood pressure (mmHg)

Whole grains							
-1.79[1] **(-3.55, -0.03)**	Refined grains						
0.51 (-3.67, 4.68)	2.30 (-1.65, 6.25)	Red Meat					
-0.67 (-5.22, 3.88)	1.12 (-3.15, 5.39)	-1.18 (-5.42, 3.06)	Nuts				
2.40 (-2.43, 7.24)	4.20 (-0.73, 9.12)	1.90 (-3.07, 6.86)	3.07 (-2.86, 9.01)	Legumes			
6.82 (-1.17, 14.81)	**8.61 (0.78, 16.45)**	6.31 (-1.50, 14.13)	**7.49 (0.92, 14.06)**	4.42 (-4.43, 13.27)	Fruit and Vegetables		
2.50 (-7.72, 12.72)	4.29 (-5.84, 14.42)	1.99 (-7.34, 11.32)	3.17 (-7.08, 13.42)	0.10 (-10.47, 10.66)	-4.32 (-16.49, 7.85)	Fish	
-0.18 (-5.22, 4.86)	1.61 (-3.51, 6.74)	-0.68 (-7.09, 5.72)	0.49 (-6.15, 7.14)	-2.58 (-9.49, 4.33)	-7.00 (-16.34, 2.34)	-2.68 (-13.99, 8.64)	Eggs

[1] The value below the food groups correspond to the difference in mean in systolic blood pressure (mmHg) between the column and the row.

Supplemental Table 10: League table for diastolic blood pressure (mmHg)

Whole grains							
-0.74[1] (-1.71, 0.23)	Refined grains						
0.75 (-1.68, 3.18)	1.49 (-0.80, 3.77)	Red Meat					
-0.44 (-2.90, 2.02)	0.30 (-2.01, 2.60)	-1.19 (-3.24, 0.86)	Nuts				
0.83 (-2.33, 3.99)	1.57 (-1.63, 4.76)	0.08 (-3.16, 3.32)	1.27 (-2.27, 4.81)	Legumes			
0.16 (-5.89, 6.21)	0.89 (-5.09, 6.88)	-0.59 (-6.49, 5.30)	0.60 (-4.93, 6.13)	-0.67 (-7.23, 5.89)	Fruit and Vegetables		
-1.25 (-6.61, 4.11)	-0.51 (-5.81, 4.79)	-2.00 (-6.78, 2.78)	-0.81 (-6.01, 4.40)	-2.08 (-7.85, 3.70)	-1.41 (-9.00, 6.18)	Fish	
-0.55 (-3.20, 2.09)	0.18 (-2.47, 2.84)	-1.30 (-4.78, 2.18)	-0.11 (-3.61, 3.39)	-1.38 (-5.46, 2.70)	-0.71 (-7.25, 5.83)	0.70 (-5.22, 6.61)	Eggs

[1] The value below the food groups correspond to the difference in mean in diastolic blood pressure (mmHg) between the column and the row.

Supplemental Table 11: League table for CRP (mg/l)

Nuts								
-0.50[1] (-2.55, 1.55)	Legumes							
-0.13 (-0.55, 0.29)	0.37 (-1.71, 2.44)	Whole grains						
-0.35 (-0.67, -0.03)	0.15 (-1.91, 2.21)	-0.22 (-0.51, 0.07)	Refined grains					
-0.99 (-3.19, 1.20)	-0.50 (-1.71, 0.72)	-0.86 (-3.08, 1.35)	-0.64 (-2.84, 1.56)	Fruit and Vegetables				
0.35 (0.10, 0.59)	0.84 (-1.22, 2.91)	0.48 (-0.00, 0.95)	**0.70 (0.30, 1.09)**	1.34 (-0.87, 3.55)	Eggs			
-0.33 (-3.58, 2.91)	0.17 (-3.67, 4.00)	-0.20 (-3.47, 3.07)	0.02 (-3.24, 3.28)	0.66 (-3.25, 4.58)	-0.68 (-3.93, 2.58)	Dairy		
-0.43 (-0.81, -0.05)	0.07 (-2.01, 2.15)	-0.30 (-0.85, 0.26)	-0.08 (-0.56, 0.41)	0.57 (-1.65, 2.79)	**-0.77 (-1.23, -0.32)**	-0.09 (-3.36, 3.17)	Fish	
-0.28 (-0.42, -0.15)	0.22 (-1.83, 2.26)	-0.15 (-0.58, 0.27)	0.07 (-0.26, 0.40)	0.71 (-1.48, 2.90)	**-0.63 (-0.91, -0.35)**	0.05 (-3.19, 3.29)	0.14 (-0.22, 0.51)	Red meat

[1] The value below the food groups correspond to the difference in mean in CRP (mg/l) between the column and the row.

Supplemental Table 12: Side-splitting approach for inconsistency for LDL-cholesterol

Side	Direct		Indirect		Difference		
	Coefficient	SE[1]	Coefficient	SE	Coefficient	SE	p
01 02	-0.12	0.03	-0.08	0.14	-0.04	0.14	0.79
01 03	-0.15	0.15	-0.04	0.14	-0.10	0.21	0.61
01 04	-0.23	0.07	-0.27	0.11	0.04	0.13	0.77
01 05	-0.02	0.24	-0.22	0.09	0.20	0.26	0.44
01 06	-0.02	0.19	0.03	0.12	-0.05	0.22	0.83
01 09	0.11	0.12	0.10	0.10	0.002	0.16	0.99
02 05	-0.21	0.14	0.01	0.11	-0.22	0.17	0.19
02 06	0.32	0.18	0.05	0.12	0.27	0.22	0.23
03 04	-0.23	0.22	-0.12	0.13	-0.11	0.26	0.67
03 05	-0.12	0.15	-0.08	0.16	-0.04	0.22	0.86
04 06	0.17	0.14	0.35	0.15	-0.18	0.20	0.37
04 08	0.43	0.23	0.31	0.11	0.12	0.26	0.65
04 09	0.41	0.14	0.31	0.10	0.10	0.17	0.59
05 09	0.24	0.11	0.39	0.14	-0.16	0.17	0.36
07 09[2]	0.02	0.21	0.11	66.72	-0.09	66.7	0.99
07 10[2]	0.03	0.17	-0.13	143.8	0.17	143.2	0.99
08 09	0.01	0.07	-0.10	0.24	0.12	0.25	0.65

[1]standard error; [2]all the evidence about these contrasts comes from the trials which directly compare them.

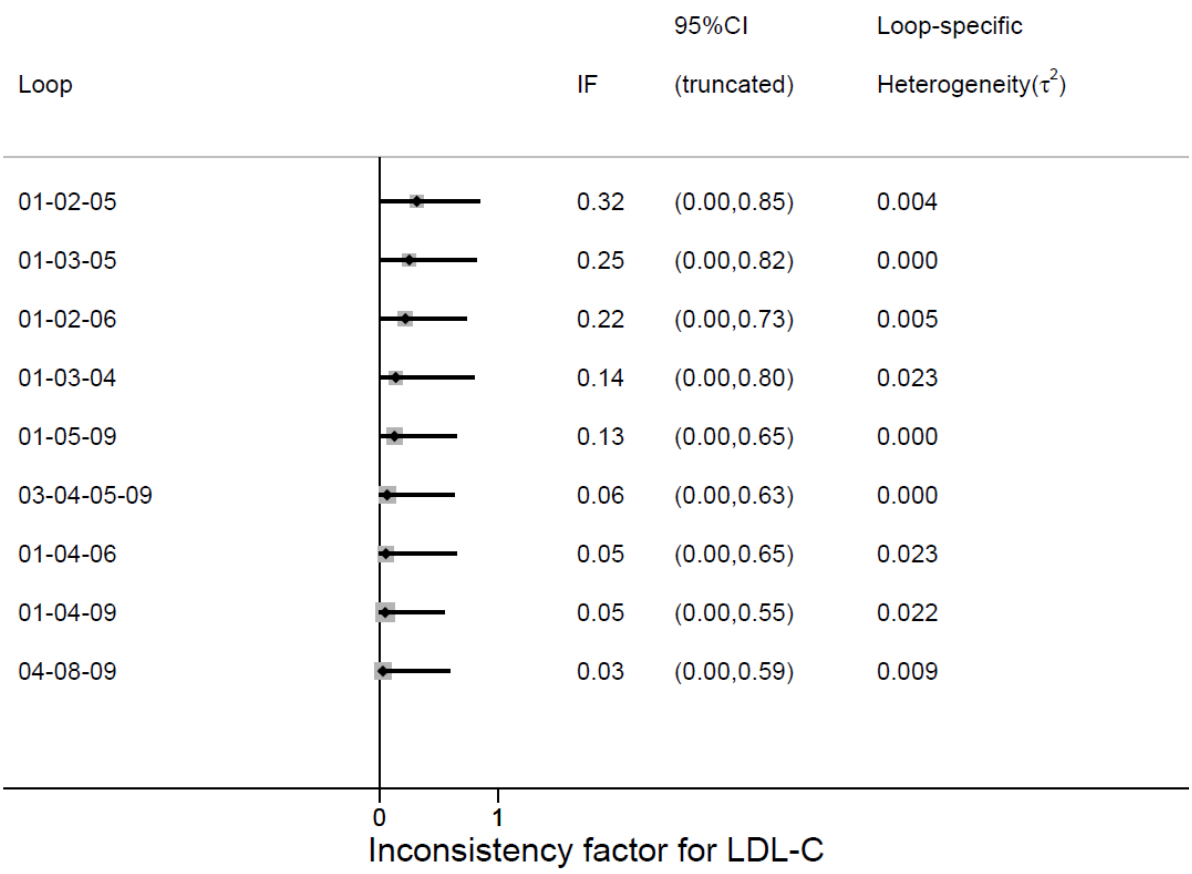
[01=Refined grains, 02=Whole grains, 03=Fruit and Vegetables, 04=Nuts, 05=Legumes, 06=Eggs, 07=Dairy, 08=Fish, 09=Red meat, 10=SSB].

Supplemental Table 13: Side-splitting approach for inconsistency for triacylglycerol

Side	Direct		Indirect		Difference		
	Coefficient	SE[1]	Coefficient	SE	Coefficient	SE	P
01 02	-0.07	0.02	-0.11	0.11	0.037	0.11	0.74
01 03	-0.04	0.09	-0.00	0.11	-0.04	0.14	0.78
01 04	-0.20	0.07	-0.11	0.06	-0.09	0.09	0.32
01 05	0.01	0.11	-0.14	0.07	0.15	0.14	0.28
01 06	0.04	0.10	0.04	0.80	-0.00	0.13	0.99
01 09	-0.11	0.10	-0.14	0.06	0.03	0.12	0.81
02 05	0.07	0.12	-0.05	0.08	0.12	0.14	0.39
02 06	0.05	0.17	0.13	0.07	-0.08	0.18	0.67
02 09	-0.10	0.29	-0.05	0.05	-0.05	0.29	0.87
03 04	-0.04	0.13	-0.16	0.09	0.12	0.16	0.46
03 05	-0.24	0.16	-0.00	0.10	-0.24	0.19	0.21
04 06	0.20	0.07	0.16	0.10	0.04	0.12	0.77
04 08	-0.11	0.16	-0.07	0.04	-0.04	0.16	0.80
04 09	0.01	0.03	0.06	0.08	-0.05	0.09	0.55
05 09	0.02	0.09	-0.10	0.09	0.12	0.13	0.36
07 09[2]	-0.09	0.14	-0.13	66.79	0.04	66.71	0.99
07 10[2]	0.13	0.15	0.21	141.0	-0.08	141.0	1.00
08 09	0.09	0.04	0.13	0.16	-0.04	0.16	0.80

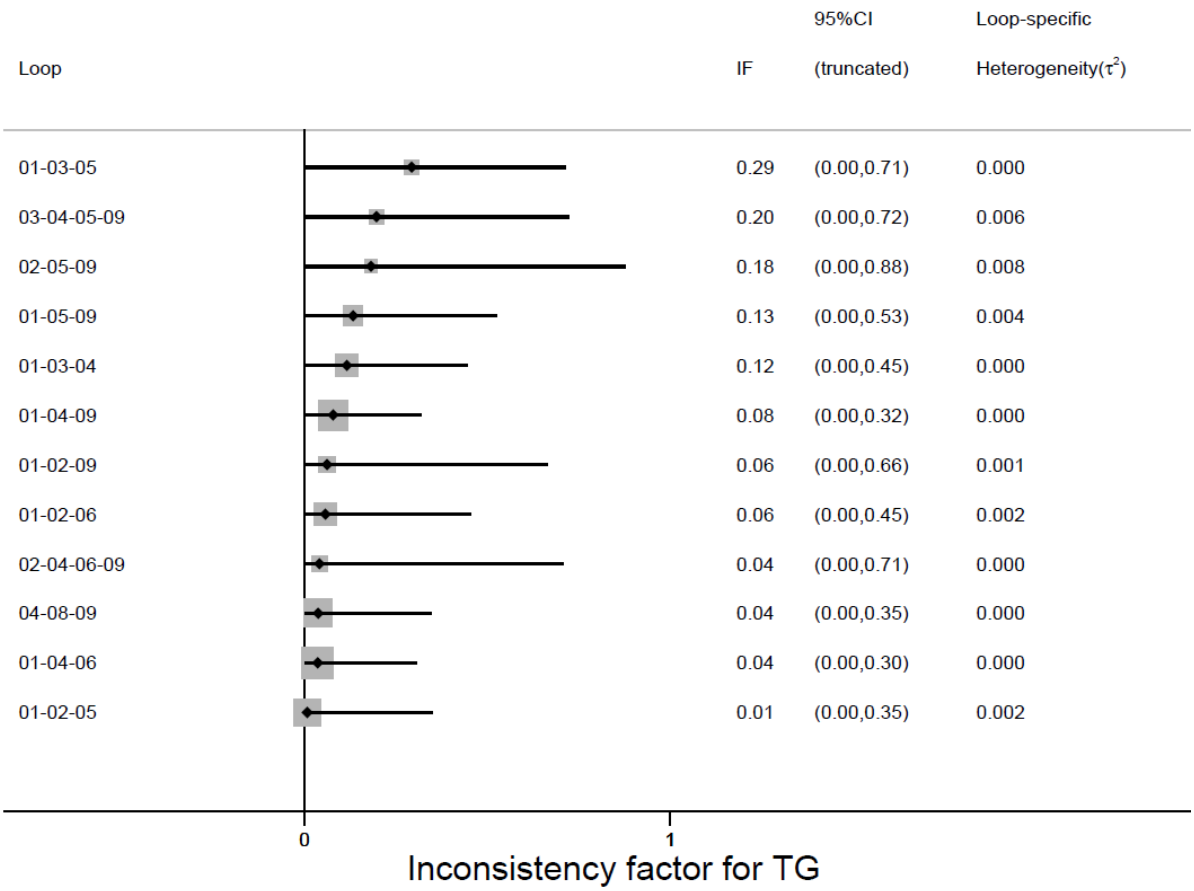
[1]standard error; [2]all the evidence about these contrasts comes from the trials which directly compare them.

[01=Refined grains, 02=Whole grains, 03=Fruit and Vegetables, 04=Nuts, 05=Legumes, 06=Eggs, 07=Dairy, 08=Fish, 09=Red meat, 10=SSB].



Supplemental Figure 8: Loop-specific approach for inconsistency for LDL-cholesterol

[01=Refined grains, 02=Whole grains, 03=Fruit and Vegetables, 04=Nuts, 05=Legumes, 06=Eggs, 07=Dairy, 08=Fish, 09=Red meat, 10=SSB].



Supplemental Figure 9: Loop-specific approach for inconsistency for triacylglycerol

[01=Refined grains, 02=Whole grains, 03=Fruit and Vegetables, 04=Nuts, 05=Legumes, 06=Eggs, 07=Dairy, 08=Fish, 09=Red meat, 10=SSB].

Supplemental Table 14: League table (sensitivity analysis excluding high risk of bias RCTs) for LDL-cholesterol (mmol/l)

Nuts								
-0.11[1] (-0.34, 0.12)	Legumes							
-0.10 (-0.24, 0.04)	0.01 (-0.21, 0.23)	Whole grains						
-0.24 (-0.36, -0.12)	-0.13 (-0.34, 0.09)	**-0.14 (-0.20, -0.07)**	Refined grains					
-0.13 (-0.40, 0.14)	-0.02 (-0.36, 0.31)	-0.03 (-0.30, 0.24)	0.10 (-0.16, 0.36)	Fruit and Vegetables				
-0.25 (-0.46, -0.05)	-0.14 (-0.43, 0.15)	-0.15 (-0.36, 0.06)	-0.01 (-0.22, 0.19)	-0.12 (-0.44, 0.21)	Eggs			
-0.35 (-0.80, 0.11)	-0.24 (-0.70, 0.22)	-0.25 (-0.70, 0.21)	-0.11 (-0.56, 0.34)	-0.21 (-0.73, 0.30)	-0.10 (-0.59, 0.39)	Dairy		
-0.37 (-0.58, -0.15)	**-0.26 (-0.49, -0.02)**	**-0.26 (-0.48, -0.04)**	-0.13 (-0.34, 0.08)	-0.23 (-0.56, 0.10)	-0.12 (-0.40, 0.17)	-0.02 (-0.46, 0.43)	Fish	
-0.37 (-0.54, -0.19)	**-0.26 (-0.44, -0.07)**	**-0.27 (-0.44, -0.09)**	-0.13 (-0.30, 0.04)	-0.23 (-0.54, 0.07)	-0.12 (-0.37, 0.13)	-0.02 (-0.44, 0.40)	-0.00 (-0.15, 0.14)	Red meat

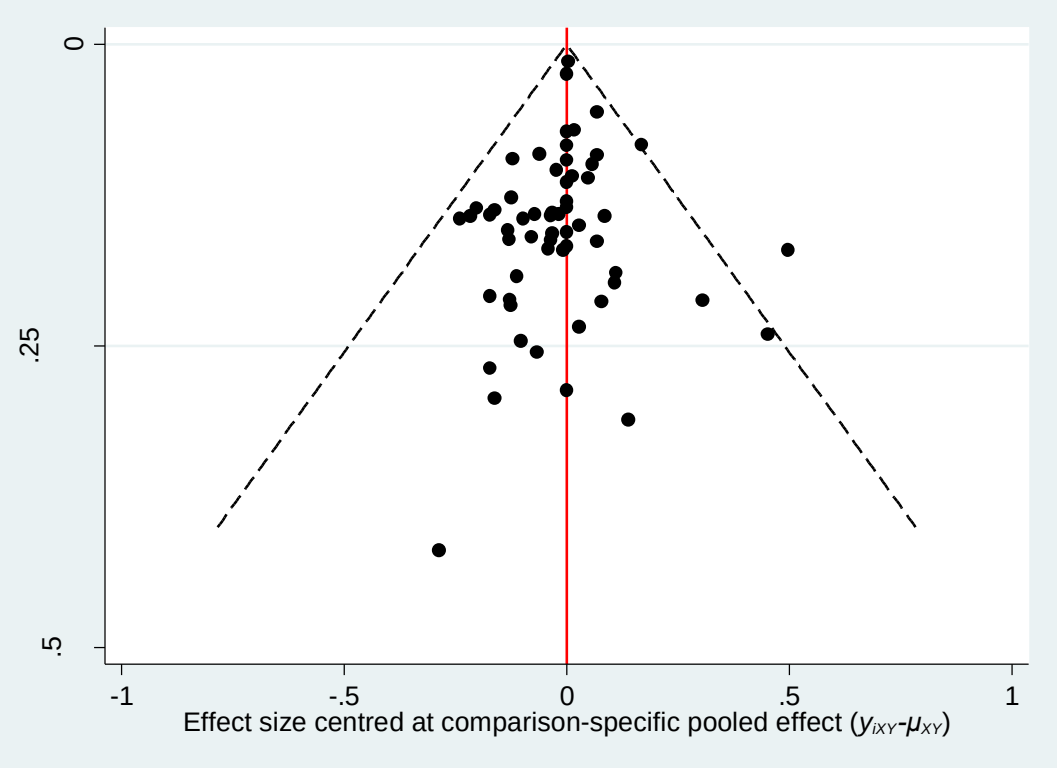
[1] The value below the food groups correspond to the difference in mean in LDL-cholesterol (mmol/l) between the column and the row.

Supplemental Table 15: League table (sensitivity analysis excluding high risk of bias RCTs) for triacylglycerol (mmol/l)

Nuts								
-0.06[1] (-0.20, 0.09)	Legumes							
-0.07 (-0.18, 0.03)	-0.02 (-0.17, 0.13)	Whole grains						
-0.15 (-0.24, -0.05)	-0.09 (-0.24, 0.05)	**-0.07 (-0.12, -0.03)**	Refined grains					
-0.09 (-0.25, 0.07)	-0.03 (-0.23, 0.17)	-0.01 (-0.17, 0.14)	0.06 (-0.08, 0.21)	Fruit and Vegetables				
-0.19 (-0.31, -0.07)	-0.13 (-0.31, 0.04)	-0.11 (-0.25, 0.02)	-0.04 (-0.16, 0.08)	-0.10 (-0.28, 0.08)	Eggs			
-0.11 (-0.39, 0.17)	-0.05 (-0.35, 0.25)	-0.03 (-0.32, 0.26)	0.04 (-0.25, 0.33)	-0.02 (-0.33, 0.30)	0.08 (-0.22, 0.38)	Dairy		
0.07 (-0.01, 0.16)	0.13 (-0.03, 0.29)	**0.15 (0.01, 0.29)**	**0.22 (0.10, 0.35)**	0.16 (-0.01, 0.34)	**0.26 (0.12, 0.40)**	0.18 (-0.10, 0.46)	Fish	
-0.02 (-0.09, 0.05)	0.04 (-0.10, 0.18)	0.06 (-0.05, 0.16)	**0.13 (0.03, 0.23)**	0.07 (-0.09, 0.24)	**0.17 (0.04, 0.30)**	0.09 (-0.18, 0.36)	-0.09 (-0.18, -0.00)	Red meat

[1] The value below the food groups correspond to the difference in mean in triacylglycerols (mmol/l) between the column and the row.

Supplemental Figure 10: Comparison-adjusted funnel plot for LDL-cholesterol involving all studies.



Supplemental Figure 11: Comparison-adjusted funnel plot for triacylglycerol involving all studies.

Supplemental Table 16: GRADE evaluation for LDL-cholesterol and all comparisons between the different food groups.

LDL-cholesterol (mmol/l)								
Comparison[1-10]	**Number of Studies**	**Study Limitations**	**Imprecision**	**Heterogeneity**	**Incoherence**	**Indirectness**	**Publication bias**	**Rating**
Mixed evidence								
1 vs 2	26	Some concerns	No concerns	Some concerns	No concerns	Some concerns	Suspected	**Low**
1 vs 3	1	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
1 vs 4	5	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
1 vs 5	1	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
1 vs 6	1	Some concerns	No concerns	Major concerns	No concerns	Some concerns	Suspected	**Very low**
1 vs 9	2	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
2 vs 5	2	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
2 vs 6	1	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
3 vs 4	1	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**

3 vs 5	2	Major concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
4 vs 6	1	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
4 vs 8	1	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
4 vs 9	1	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
5 vs 9	4	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
7 vs 9	1	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
8 vs 9	5	Some concerns	No concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
7 vs 10	2	Major concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
Indirect evidence								
1 vs 7	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
1 vs 8	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
1 vs 10	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**

2 vs 3	--	Some concerns	Some concerns	Some concerns	No concerns	Some concerns	Suspected	**Low**
2 vs 4	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
2 vs 7	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
2 vs 8	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
2 vs 9	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
2 vs 10	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
3 vs 6	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
3 vs 7	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
3 vs 8	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
3 vs 9	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
3 vs 10	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
4 vs 5	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**

4 vs 7	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
4 vs 10	--	Some concerns	Some concerns	Some concerns	No concerns	Some concerns	Suspected	**Low**
5 vs 6	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
5 vs 7	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
5 vs 8	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
5 vs 10	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
6 vs 7	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
6 vs 8	--	Some concerns	Some concerns	Some concerns	No concerns	Some concerns	Suspected	**Low**
6 vs 9	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
6 vs 10	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
7 vs 8	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
8 vs 10	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**

9 vs 10	--	Major concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**

[1]Refined grains; [2]Whole grains; [3]Fruit and Vegetables; [4]Nuts; [5]Legumes; [6]Eggs; [7]Dairy; [8]Fish; [9]Red meat; [10]SSB

Supplemental Table 17: GRADE evaluation for triacylglycerol and all comparisons between the different food groups.

Triacylglycerol (mmol/l)								
Comparison[1-10]	**Number of Studies**	**Study Limitations**	**Imprecision**	**Heterogeneity**	**Incoherence**	**Indirectness**	**Publication bias**	**Rating**
Mixed evidence								
1 vs 2	27	Some concerns	No concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
1 vs 3	1	Some concerns	No concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
1 vs 4	5	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
1 vs 5	1	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
1 vs 6	1	Some concerns	No concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
1 vs 9	2	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
2 vs 5	2	Some concerns	No concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
2 vs 6	1	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**

2 vs 9	1	Some concerns	No concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
3 vs 4	1	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
3 vs 5	2	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
4 vs 6	1	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
4 vs 8	1	Some concerns	No concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
4 vs 9	1	Some concerns	No concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
5 vs 9	4	Some concerns	No concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
7 vs 9	1	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
8 vs 9	5	Some concerns	No concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
7 vs 10	2	Major concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
Indirect evidence								
1 vs 7	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**

1 vs 8	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
1 vs 10	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
2 vs 3	--	Some concerns	No concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
2 vs 4	--	Some concerns	No concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
2 vs 7	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
2 vs 8	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
2 vs 10	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
3 vs 6	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
3 vs 7	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
3 vs 8	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
3 vs 9	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
3 vs 10	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**

4 vs 5	--	Some concerns	No concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
4 vs 7	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
4 vs 10	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
5 vs 6	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
5 vs 7	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
5 vs 8	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
5 vs 10	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
6 vs 7	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
6 vs 8	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
6 vs 9	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
6 vs 10	--	Some concerns	Major concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**
7 vs 8	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**

8 vs 10	--	Some concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Low**
9 vs 10	--	Major concerns	Some concerns	No concerns	No concerns	Some concerns	Suspected	**Very low**

[1]Refined grains; [2]Whole grains; [3]Fruit and Vegetables; [4]Nuts; [5]Legumes; [6]Eggs; [7]Dairy; [8]Fish; [9]Red meat; [10]SSB

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