Online Supplemental Material

Supplemental Table 1: Study inclusion and exclusion criteria

Inclusion Criteria	
IC1	Randomised, controlled clinical trial with either a cross-over or parallel group design
IC2	Treatment period at least 2 weeks
IC3	Subjects in study populations can be free-living normocholesterolemic or hypercholesterolemic adults from the general population. Obese and overweight individuals or individuals with non-insulin dependent diabetes are acceptable
IC4	Oats are the only acceptable source of β-glucan
IC5	The amount of oat β-glucan or oat soluble fibre/NSP consumed must be declared/measured. It must be at least 3 g/day (Oat soluble fibre was considered to be 92.5% β-glucan
IC6	An appropriate control group with respect to the oat β-glucan treatment group. Appropriate control food is similar to the treatment food, but does not contain oat β-glucan or any soluble fibre, i.e. Is either a low fibre food product or a food product with insoluble fibre
IC7	Measurements on blood lipids, i.e. blood total, LDL and HDL cholesterol. Information about cholesterol levels can be either primary or secondary outcome of the study
IC8	Enough information provided to calculate the magnitude of the effect : the mean baseline and after-treatment cholesterol levels and/or change in cholesterol levels
IC9	A formal assessment of diet and body weight changes during the trial
Exclusion Criteria	
EC1	The soluble fibre not specifically oat β-glucan or a combination diet where the effect of oat β-glucan cannot be isolated
EC2	Not sufficiently or appropriately controlled: only baseline data provided and no control group during the treatment period or an inappropriate control group, e.g. another soluble fibre
EC3	Outcome measurement something else than blood lipids, e.g. postprandial lipidemia or glucose and insulin response, weight loss or bile acid synthesis
EC4	Any uncontrolled significant changes during the trial known to affect blood lipid level, e.g. a significant difference in total fat or saturated fat intake between control and intervention groups, diets contain other soluble fibres than soluble NSP from oats, uncontrolled significant body weight change (Note: only important if interventions are affected differently)
EC5	If the background diet is substantially different from the subjects's usual diet during the treatment period of the study, e.g. AHA step 1 and step 2 diet vs normal western diet, a lead-in period less than 2 weeks (Note: only important if does not apply to all interventions)
EC6	Treatment period less than 2 weeks
EC7	Insufficient information to estimate the magnitude of the effect: no measure or estimate of soluble fibre or oat β-glucan intake or limited amount of information on the outcome measures
EC8	Non-systematic review articles, editorials, commentary (secondary information)
EC9	Treatment period only 2 weeks, and no wash-out period in cross-over study design
EC10	Entirely irrelevant study in relation to the diet and health relationship under consideration
EC11	A duplicate publication: same study population as in one of the studies already included as evidence or pilot study for a bigger study included as evidence
EC12	The daily intake of oat β-glucan less than 3 g/day
EC13	Children as a study population
EC14	Studies with low molecular weight (<100 kDa)

Supplemental Table 2: Study quality assessment questions

Q1	Power calculations performed
Q2	Baseline characteristics of subjects reported
Q3	Subjects inclusion and exclusion criteria specified
Q4	Information on background dietary habits provided
Q5	Information on physical activity provided
Q6	Information on smoking/alcohol drinking provided
Q7	Information on medication use provided
Q8	Information on other risk factors provided
Q9	Randomisation (Were subjects randomised to intervention?)
Q9a	Random sequence generation (was allocation to intervention random i.e. not systematic such as ABABABAB?)
Q9b	Treatment allocation concealed (Trialists unable to manipulate randomised sequence)
Q10	Control and intervention groups comparable at baseline for relevant risk factors/outcome variables
Q11	Blinding of subjects
Q12	Blinding of care givers
Q13	Blinding of outcome assessors
Q14	Compliance of subjects with intervention reported
Q15	Duration of interventions greater than 2 weeks
Q16	Point estimates and variability of main outcome variable reported
Q17	Surrogate markers of the claimed effect validated analytically (e.g. measuring blood cholesterol)
Q18	Surrogate markers of the claimed effect validated biologically (e.g. change in cholesterol)
Q19	Analyses include an intention to treat analysis
Q20	Adjustment for potential confounders performed

Supplemental Methods: Formulae for calculation of estimates of treatment difference and variances and covariances

a. Parallel group studies

Let y_{ijkl} be the cholesterol level for subject l ($l = 1,\ldots, n_{ijk}$) at time k ($k = b$ for baseline and e for end-of-trial) on diet j ($j = c$ for control and t for oat β-glucan) in trial i ($i = 1,\ldots, r$). The cholesterol level is assumed to be normally distributed, so that

$$y_{ijkl} \sim N\left(\mu_{ijk}, \sigma^2_{ijk}\right)$$

Mean cholesterol levels for each time, diet arm and trial are estimated by

$$\bar{y}_{ijk.} = \frac{\sum_l y_{ijkl}}{n_{ijk}},$$

and these estimates are assumed to be normally distributed, so that

$$\bar{y}_{ijk.} \sim N\left(\mu_{ijk}, \frac{\sigma^2_{ijk}}{n_{ijk}}\right).$$

Let $\psi_{ie} = \mu_{ite} - \mu_{ice}$ represent the difference in the mean cholesterol level at the end of the trial between oat β-glucan and control for study i. The estimate of ψ_{ie} is given by $\bar{y}_{ite.} - \bar{y}_{ice.}$, which has variance

$$V\left(\bar{y}_{ite.} - \bar{y}_{ice.}\right) = V\left(\bar{y}_{ite.}\right) + V\left(\bar{y}_{ice.}\right) = \frac{\sigma^2_{ite}}{n_{ite}} + \frac{\sigma^2_{ice}}{n_{ice}} \quad (1)$$

Let $\phi_{ij} = \mu_{ije} - \mu_{ijb}$ represent the change in the mean cholesterol level from baseline for diet j in study i. The estimate of ϕ_{ij} is given by $\bar{y}_{ije.} - \bar{y}_{ijb.}$, which has variance

$$V\left(\bar{y}_{ije.} - \bar{y}_{ijb.}\right) = \frac{\sigma^2_{ije}}{n_{ije}} + \frac{\sigma^2_{ijb}}{n_{ijb}} - 2\frac{q_{ijejb}}{n_{ije}n_{ijb}}\rho_{ijejb}\sigma_{ije}\sigma_{ijb} \quad (2)$$

where q_{ijejb} is the number of subjects with observations at both times b and e, and ρ_{ijejb} is the correlation coefficient between times b and e for subjects on diet j in study i.

Let $\theta_i = \phi_{it} - \phi_{ip} = \left(\mu_{ite} - \mu_{itb}\right) - \left(\mu_{ipe} - \mu_{ipb}\right)$. This represents the difference in the change from baseline between the oat β-glucan diet and the control diet. The estimate of θ_i is given by $\left(\bar{y}_{ite.} - \bar{y}_{itb.}\right) - \left(\bar{y}_{ice.} - \bar{y}_{icb.}\right)$, which has variance

$$V\left\{\left(\bar{y}_{ite.} - \bar{y}_{itb.}\right) - \left(\bar{y}_{ice.} - \bar{y}_{icb.}\right)\right\} = \frac{\sigma^2_{ite}}{n_{ite}} + \frac{\sigma^2_{itb}}{n_{itb}} - 2\frac{q_{itetb}}{n_{ite}n_{itb}}\rho_{itetb}\sigma_{ite}\sigma_{itb} + \frac{\sigma^2_{ice}}{n_{ice}} + \frac{\sigma^2_{icb}}{n_{icb}} - 2\frac{q_{icecb}}{n_{ice}n_{icb}}\rho_{icecb}\sigma_{ice}\sigma_{icb}$$

(3)

For trials which include more than one dose of oat bet-glucan, the covariance between the estimates of the effect of each dose compared with the control diet is required.

$$Cov\left(\left(\bar{y}_{iue.}-\bar{y}_{ice.}\right),\left(\bar{y}_{ite.}-\bar{y}_{ice.}\right)\right)=V\left(\bar{y}_{ice.}\right)=\frac{\sigma_{ice}^2}{n_{ice}} \tag{4}$$

$$\begin{aligned} &Cov\left[\left\{\left(\bar{y}_{ise.}-\bar{y}_{isb.}\right)-\left(\bar{y}_{ice.}-\bar{y}_{icb.}\right)\right\},\left\{\left(\bar{y}_{ite.}-\bar{y}_{itb.}\right)-\left(\bar{y}_{ice.}-\bar{y}_{icb.}\right)\right\}\right]=V\left(\bar{y}_{ice.}-\bar{y}_{icb.}\right) \\ &=\frac{\sigma_{ice}^2}{n_{ice}}+\frac{\sigma_{icb}^2}{n_{icb}}-2\frac{q_{icecb}}{n_{ice}n_{icb}}\rho_{icecb}\sigma_{ice}\sigma_{icb} \end{aligned} \tag{5}$$

Trials may provide estimates, s_{ijk}, of the standard deviations σ_{ijk} of the cholesterol values for each diet at each time point. In this case the variance in formula (1) can be calculated. Some trials provide estimates of the variances given in formulae (2) and (3).

b. Cross-over studies

Let $\psi_{ie}=\mu_{ite}-\mu_{ice}$ represent the difference in the mean cholesterol level at the end of the trial between oat β-glucan and control for study *i*. The estimate of ψ_{ie} is given by $\bar{y}_{ite.}-\bar{y}_{ice.}$, which has variance

$$V\left(\bar{y}_{ite.}-\bar{y}_{ice.}\right)=\frac{\sigma_{ite}^2}{n_{ite}}+\frac{\sigma_{ice}^2}{n_{ice}}-2\frac{q_{itece}}{n_{ite}n_{ice}}\rho_{itece}\sigma_{ite}\sigma_{ice} \tag{6}$$

where q_{itece} is the number of subjects with observations at end of treatment periods in both the oat β-glucan and control periods, and ρ_{itece} is the correlation coefficient between the end of treatment periods times in both the oat β-glucan and control periods in study i.

Let $\phi_{ij}=\mu_{ije}-\mu_{ijb}$ represent the change in the mean cholesterol level from baseline for diet *j* in study *i*. The estimate of ϕ_{ij} is given by $\bar{y}_{ije.}-\bar{y}_{ijb.}$, which has variance

$$V\left(\bar{y}_{ije.}-\bar{y}_{ijb.}\right)=\frac{\sigma_{ije}^2}{n_{ije}}+\frac{\sigma_{ijb}^2}{n_{ijb}}-2\frac{q_{ijejb}}{n_{ije}n_{ijb}}\rho_{ijejb}\sigma_{ije}\sigma_{ijb}$$

which is formula (2) above.

Let $\theta_i=\phi_{it}-\phi_{ip}=\left(\mu_{ite}-\mu_{itb}\right)-\left(\mu_{ipe}-\mu_{ipb}\right)$. This represents the difference in the change from baseline between the oat β-glucan diet and the control diet. The estimate of θ_i is given by $\left(\bar{y}_{ite.}-\bar{y}_{itb.}\right)-\left(\bar{y}_{ice.}-\bar{y}_{icb.}\right)$, which has variance

$$V\left\{\left(\bar{y}_{ite.}-\bar{y}_{itb.}\right)-\left(\bar{y}_{ice.}-\bar{y}_{icb.}\right)\right\}=$$

$$\frac{\sigma_{ite}^2}{n_{ite}}+\frac{\sigma_{itb}^2}{n_{itb}}-2\frac{q_{itetb}}{n_{ite}n_{itb}}\rho_{itetb}\sigma_{ite}\sigma_{itb}+\frac{\sigma_{ice}^2}{n_{ice}}+\frac{\sigma_{icb}^2}{n_{icb}}-2\frac{q_{icecb}}{n_{ice}n_{icb}}\rho_{icecb}\sigma_{ice}\sigma_{icb}$$

$$-2\frac{q_{itece}}{n_{ite}n_{ice}}\rho_{itece}\sigma_{ite}\sigma_{ice}+2\frac{q_{itecb}}{n_{ite}n_{icb}}\rho_{itecb}\sigma_{ite}\sigma_{icb}+2\frac{q_{itbce}}{n_{itb}n_{ice}}\rho_{itbce}\sigma_{itb}\sigma_{ice}-2\frac{q_{itbcb}}{n_{itb}n_{icb}}\rho_{itbcb}\sigma_{itb}\sigma_{icb}$$

(7)

Trials may provide estimates of the variances given in formulae (2), (6) and (7).

Supplemental Table 3: Quality scores for included studies

First Author	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q9a	Q9b	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
Abrahamsson (38)	4	1	3	1	3	3	3	1	1	4	4	5	4	4	4	1	1	1	1	1	2	5
Amundsen (39)	1	1	1	1	3	2	1	3	1	4	4	5	1	3	3	1	1	1	1	1	3	5
Anderson (25)	4	1	1	1	3	3	2	2	1	4	4	4	4	4	4	1	1	1	1	1	4	4
Beck (16)	1	1	2	1	1	2	3	3	1	1	1	1	1	3	4	1	1	1	1	1	3	1
Berg (26)	4	1	2	3	2	3	2	2	1	4	4	2	3	4	4	1	1	1	1	1	1	3
Braaten (40)	4	1	1	1	3	2	3	2	1	4	4	5	2	3	4	1	1	1	1	1	3	5
Charlton (17)	1	1	1	1	1	2	2	3	1	1	4	1	1	3	4	1	1	1	1	1	1	1
Chen (27)	4	1	1	1	2	1	2	1	1	1	1	1	3	1	1	1	1	1	1	1	1	2
Davidson (28)	1	2	1	1	3	3	2	2	1	4	4	1	3	3	4	2	1	1	1	1	3	1
Davy (29)	4	1	1	1	1	2	2	2	1	4	4	1	3	4	1	1	1	1	1	1	1	1
Donazzolo (up)	1	1	1	1	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gerhardt (30)	4	1	1	1	1	2	1	1	1	4	4	1	1	1	1	1	1	1	1	1	3	2
Kabir (23)	4	1	1	2	2	3	1	1	1	4	4	5	3	4	4	2	1	1	1	1	1	5
Karmally (31)	4	1	1	1	2	2	2	2	1	4	4	1	3	3	4	1	1	1	1	1	4	1
Kerckhoffs (41)	1	1	1	1	2	1	1	1	1	4	4	5	4	4	4	1	1	1	1	1	1	5
Kestin (42)	4	1	1	1	2	2	3	2	1	4	4	5	1	4	4	2	1	1	1	1	3	5
Kristensen (43)	4	1	3	1	2	2	1	3	1	4	4	1	1	1	1	1	1	1	1	1	5	5
Liatis (32)	4	1	1	3	3	3	2	2	1	1	1	1	1	1	4	1	1	1	1	1	3	1
Maki (24)	1	1	1	1	1	2	2	1	1	4	4	1	3	4	4	1	1	1	1	1	2	1
Pick (44)	4	1	1	1	1	3	2	2	1	1	1	5	4	4	4	2	1	1	1	1	1	5
Pins (33)	2	1	1	2	2	3	2	1	1	4	4	1	3	1	4	1	1	1	1	1	1	1
Queenan (34)	4	1	1	2	2	2	2	1	1	4	4	1	2	4	4	3	1	1	1	1	3	1
Saltzman (35)	4	1	1	1	2	2	2	1	1	4	4	1	3	3	4	2	1	1	1	1	1	1
Theuwissen (45)	2	1	1	1	3	2	1	2	1	4	5	5	1	1	1	1	1	2	1	1	3	5
Uusitupa (36)	4	1	1	1	3	2	1	1	1	4	1	1	1	3	4	1	1	1	1	1	3	1
Whyte (46)	4	1	1	1	2	2	2	3	1	4	4	5	4	4	4	1	1	1	1	1	3	5
Wolever (12)	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Zhang (37)	4	1	1	1	3	1	2	3	1	4	4	1	3	3	1	2	1	1	1	1	3	5

Key: 1 = Yes, 2 = Partially, 3 = No, 4 = unknown, 5 = Not applicable

Supplemental Table 4: Meta-regressions for LDL- and total-cholesterol

LDL-cholesterol				
Effect	**Estimate**	**Std Error**	**p-value**	**p-value (all levels)**
Dose	0.0035	0.0113	0.76	
Duration	0.0049	0.0079	0.53	
Baseline LDL	-0.1092	0.0529	0.039	
Baseline TC	-0.0683	0.0383	0.074	
Age	-0.0070	0.0040	0.081	
% male	-0.0020	0.0011	0.054	
Design (|| vs X-over)	0.0147	0.0516	0.78	
Diet (low fat vs standard)	-0.0821	0.0772	0.29	0.56
Diet(restricted vs standard)	-0.0205	0.0745	0.78	
Health (hyperchol vs healthy)	-0.0880	0.0502	0.079	0.015
Health(diabetic vs healthy)	-0.4185	0.1684	0.013	
Q9a,b randomisation (yes vs rest)	0.081	0.053	0.13	
Q11 blinding of subjects (yes vs rest)	0.063	0.050	0.20	
Q12 blinding of care givers (yes vs rest)	0.063	0.049	0.20	
Q13 blinding of outcome assessors (yes vs rest)	0.108	0.048	0.024	
Q14 reporting of subject compliance (yes vs rest)	0.096	0.071	0.18	
Total-cholesterol				
Effect	**Slope Estimate**	**Std Error**	**p-value**	**p-value (all levels)**
Dose	-0.0081	0.0137	0.55	
Duration	-0.0034	0.0098	0.73	
Baseline LDL	-0.0055	0.0552	0.92	
Baseline TC	0.0266	0.0464	0.57	
Age	-0.0002	0.0046	0.97	
% male	-0.0016	0.0012	0.21	
Design (|| vs X-over)	0.0579	0.0629	0.36	
Diet (low fat vs standard)	-0.0063	0.0855	0.94	0.84
Diet(restricted vs standard)	-0.0534	0.0916	0.56	
Health (hyperchol vs healthy)	-0.0416	0.0530	0.43	0.016
Health(diabetic vs healthy)	-0.396	0.1380	0.004	
Q9a,b randomisation (yes vs rest)	0.113	0.063	0.072	
Q11 blinding of subjects (yes vs rest)	0.062	0.060	0.30	
Q12 blinding of care givers (yes vs rest)	0.067	0.058	0.24	
Q13 blinding of outcome assessors (yes vs rest)	0.128	0.055	0.021	
Q14 reporting of subject compliance (yes vs rest)	0.100	0.076	0.19	

Supplemental Figure 1: LDL estimates by dose, duration, age, %male, baseline LDL- and total-cholesterol