**Supplementary Table 1** Key study characteristics of military training exercises involving continual combat ration use for periods of 3–34 days

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| Reference  Study location | Study design | Participant characteristics  Mean age | n | Environmental conditions | Duration & task | CR name & number provided/day | Total energy provided by CR  (MJ/day) (% CR consumption) | Intended use of CR | Details of additional foods | Total energy provided by CR, SF & PR (MJ/day) | Outcomes reported |
| Margolis *et al.*(5)  Norway | Before- after | Male Norwegian conscripted Soldiers  20 (SD 1) years | 21 | Cold  Average -15 ± 4°C, low -26°C, high -6.2°C | 3-day ski march (54 km) carrying ~ 45kg | Norwegian military arctic CRs x 4 | ~21.3 (~68%) | General purpose (arctic) | None provided (only rations were provided & consumed) | ~21.3 | BW |
| Owen *et al.*(34)  UK | Before- after | Male RAF Regiment Further Training course participants  26.4 (SD 1.1) years | 18 | Not stated | 4-day simulated combat mission (three x 8-hour combat missions/day) | ORP x 1 | NR | General purpose | Subjects were permitted to bring snacks (contributed to 12% of energy intake) | NR | BW |
| Margolis *et al.(35)*  Norway | RCT | Male (n=71) and female (n=2) Norwegian army soldiers  Group 1= 20 (SD 1) years  Group 2= 20 (SD 1) years  Group 3= 19 (SD 2) years | Group 1= 28  Group 2= 27  Group 3= 18 | Cold | 4-days artic military training exercise. Participants  performed cross-country skiing while carrying an ~ 45kg pack for  a total distance of ~13 km/day. The total distance  covered was ~ 51 km. | Group 1= Norwegian arctic CRs x 3  Group 2= Norwegian arctic CRs x 3  Group 3= Norwegian arctic CRs x 3 | 14.6 (~56%)  14.6 (~64%)  14.6 (~72%) | General purpose (arctic) | Group 1= 4 whey-protein based snacks (4.4MJ)  Group 2= carbohydrate based products (4.4MJ)  No other food was permitted | Group 1= 19.0  Group 2= 19.0  Group 3= 14.6 | BW, initial BC (%BF, FM, FFM) |
| Jacobs *et al.*(36)  Canada | Non-RCT | Male Special Services Force, Airborne Regiment  Age not reported | 29 | Not stated | 5 day continuously physically demanding mission, carrying >30 kg during marches | Group 1= IMP x 1  Group 2= IMP x 1 | ~15.1 (~71%)  ~15.1 (~64%) | General purpose | Group 2 were provided with starch candies and instructed that eating them was mandatory. No other food provided or permitted | Group 1= ~15.1  Group 2= ~19.1 | BW |
| Jones *et al.(1)*  Washington (U.S.) | Before- after | Male Special Forces soldiers  32 (SD 5) years | 10 | Cold, snow, high altitude, 2134–3353m | 6-day surveillance and reconnaissance training (e.g.- ski mountaineering, small unit and advanced unit skills, and survival techniques) carrying 25.9-40.7 kg | RLW x 2 | 17.7 (45-64%) | Special purpose | Maltodextrin beverage powder supplement (1.3MJ) x 4 packets/day  Accessory pack (ice tea mix, sugar, coffee, utensils, etc.) x 1 for the 6-day period | 22.7 | BW, % BF |
| Lester *et al.(26)* Hawaii (U.S.) | Non-RCT | Male Infantry (Light) Soldiers  Group 1= 25.0 (SD 6.5) years  Group 2= 24.0 SD 4.8) years | MRE VIII group= 34  SEP MRE group= 39 | 21°C during day and 4–10°C during night | 7-day field training | Group 1= MRE VIII  Group 2= SEP MRE | 16.5 (~50%)  16.6 (~67%) | MRE VIII= general purpose  SEP MRE= general purpose | No other food provided or permitted | Group 1= 16.5  Group 2= 16.6 | BW |
| Edwards *et al.* (6, 54)  Alaska (U.S.) | Non-RCT | Male Infantry (Light), cold acclimatized  Group 1= 23.0 (SE 0.46)  Group 2= 23.0 (SE 0.55) | Group 1= 72  Group 2= 68 | Cold  Minimum of -48°C, maximum of -3°C | 8-day field combat training (defensive & assault activities) | Group 1= MRE VIII x 3    Group 2= RCW x 1 | 16.2 (~56%)  19.1 (~64%) | MRE VIII= general purpose  RCW= special purpose | Group 1 received a supplemental pack (3.1MJ). No other food permitted. | Group 1= 19.3  Group 2= 19.1 | BW |
| Alemany *et al.(9)*  Virginia (U.S.) | RCT | Male US Marine Corps Infantry Officer candidates  24.5 (SD 0.3) years | Group 1= 18  Group 2= 17 | 19.3–29.6°C | 8-day infantry officer candidates field training course. Near continuous activity. | Group 1= MREs which contained marginal amounts of protein (0.5g/kg)  Group 2 = MREs with higher amounts of protein (0.9g/kg) | NR  NR | Both groups=  general purpose | Group 1= chocolate drink and a chocolate flavoured bar (lower protein content)  Group 2= chocolate drink and a chocolate flavoured bar (higher protein content) | Group 1= 6.3  Group 2=  6.3 | BW, FFM, FM, % BF |
| Tanskanen *et al.*(24)  Finland | RCT | Male Finnish conscripts  Group 1= 20.2 (SD 1.6) years  Group 2= 19.6 (SD 0.5) years | Group 1= 12,  Group 2= 14 | Cold  Average of -4°C, minimum of -16°C, maximum of -1°C | 8-day strenuous field training, involving tasks and skills  training and sustained  aerobic exercise from  skiing and patrolling  activities carrying  60–70 kg | Both groups= Finnish field rations, number NR | Group 1=17.9 (~61%)  Group 2= 17.9 (~56%) | General purpose | Group 2 advised to eat 5 commercial energy bars per day (totalling 4.1 MJ/day) | Group 1= 17.9  Group 2= 22.0 | BW, FFM, FM, % BF |
| Viswanathan *et al.*(37)  India | Non-RCT | Male Infantry Soldiers  Group=1= 21.8 (SD 5.7) years  Group 2= 21.7 (SD 5.7) years | Group 1= 15  Group 2= 15 | During the monsoon months in a jungle terrain | 8-day simulated combat training (2nd phase of 16-day field exercise). | Group 1= normal energy pack ready-to-eat ration x 1  Group 2= low energy pack ready-to-eat ration x 1 | Group 1= 14.8 (100%)  Group 2= 8.9 (100%) | Group 1= general purpose ration  Group 2= special purpose | None provided | Group 1=14.8  Group 2= 8.9 | BW |
| O'Brien *et al.*(38)California (U.S.) | Before- after | Male Marines  21.4 (SD 1.44) years | 24 | Cold, 1-3°C, elevation 2800m | 8-day cold weather field training exercise (skiing, hiking and mountaineering tasks) | RCW x 1 | 18.8 (~74%) | Special purpose | Consumption of non-military foods was strongly discouraged | 18.8 | BW, % BF, FFM |
| Shippee *et al.*(39)  Georgia (U.S.) | Before- after | Male trainees (soldiers, airmen, marines), Ranger Training Program  Age not reported | Not stated | Mountainous terrain | 3rd phase of a 65-day Ranger course (mountain phase). 8 days, non-stop field training | LRP x 1 | 6.6 (assumed all CR eaten) | Special purpose | None provided | 6.6 | BW, % BF |
| Nindl *et al.*(40, 55)  U.S. | Before- after | Male Marine Infantry Officer candidates  Age range= 22–30 years | 34 | Not stated | Infantry Officer Course- 8-day field exercise characterized by near-continuous physical activity (4 days dismounted infantry training, 3 days mechanized infantry training, 1-day amphibious assault training) | MRE x 1 | NR | General purpose | Chocolate beverage x 1 (0.8MJ) and a chocolate sports bar x 1 (1.2MJ) | 7.1 ± 0.1 | BW, % BF, FFM |
| Edwards *et al.* (41, 56)  Alaska (U.S.) | RCT | Male Infantry (Light) Soldiers  Overall mean age: 24.6 years | Group 1= 32  Group 2= 31  Group 3= 30  Group 4= 34 | Cold    Minimum of -42°C, maximum of -2°C | 10-day winter field exercise | Group 1= MRE VI x 4  Group 2= MRE VIII x 3.5  Group 3= MRE VI x 3  Group 4= MRE VIII x 3 | Group 1= 20.2 (NR)  Group 2=19.1 (NR)  Group 3= 15.1 (NR)  Group 4= 16.4 (NR) | All groups= general purpose | Group 3 and Group 4 subjects received 1 x supplemental pack/day (740 kcal) | Group 1= 20.2  Group 2= 19.1  Group 3= 18.2  Group 4= 19.5 | BW |
| Consolazio *et al.*(28)  Panama | RCT | Male Infantry Soldiers  Age not reported | Group 1= 18 (subset group 1=10)  Group 2= 18 (subset group 2 =11)  Group 3= 16 (subset group 3=7) | Jungle environment during wet season, 30–34°C | 10 days (military training exercises and jungle manoeuvers) | Group 1= Ration module x 3  Group 2= Ration module x 4  Group 3= Ration module x 6 | Group 1= 2.5 (~98%)  Group 2= 4.2 (~95%)  Group 3= 6.3 (~91%) | Special purpose | None provided | Group 1= 2.5  Group 2= 4.2  Group 3= 6.3 | BW, FM, FFM |
| Hoyt *et al.*(42)  Virginia (U.S.) | Before- after | Male IOC class Marine Officers  25 (SD 3) years | Energy intake= 14 subjects  BW (pre and post) = 9 subjects | Cold (rain and snow) | 10-day combat field exercise. Average load carried = 42.6 ± 3.2 kg | MRE (versions 18 & 19) x 1 (5 MREs given for the 1st 5 days, then another 5 given for the next 5 days) | ~5.65 (99%) | General purpose | Almost exclusively MREs as only source of food | ~5.65 | BW |
| Popper *et al.*(43)  Hawaii (U.S.) | Non-RCT | Male Infantry (Light) Soldiers  Group 1= 22.8 (SE 0.42) years  Group 2= 22.8 (SE 0.43) years  Group 3= 22.4 (SE 0.36) years | Group 1= 129  Group 2= 117  Group 3= 126 | Elevations of 1219–1372m at 1st site, 21-27°C during the day, 2-7°C at night. 2nd site was at an elevation of 1829m, similar temperatures though cooler at night. | 11 days (company and platoon level training. Deployed to training area simulating an air assault). MRE VII group conducted night operations on certain days. | Group 1=IMRE x 1  Group 2= MRE VII x1  Group 3= MRE IV x1 | Group 1= 16.5 (~72%)  Group 2= 16.8 (~63%)  Group 3= 15.4 (~69%) | All rations= general purpose | None provided (other sources of food were forbidden). | Group 1= 16.5  Group 2=16.8  Group 3= 15.4 | BW |
| Morgan *et al.*(44)  California (U.S.) | Cluster randomized trial | Male Marines  Group 1= 28.8 (SD 1.9) years  Group 2= 25.8 0.9 years  Group 3= 27.0 ± 0.7 years | Group 1= 8  Group 2= 9  Group 3= 10 | Moderate altitude, cold  Minimum of -15°C, maximum of 13°C | 11-day observation period. Ration test conducted during the 2nd 2 weeks of a 6-week Winter Marine Mountain Leaders course. Technical & tactical training for operations in cold weather/mount-ainous environment. | Group 1= IMRE x 4  Group 2= RCW x 1  Group 3= RLW x 2 | Group 1= 21.7 (~62%)  Group 2=  18.7 (~65%)  Group 3=  17.7 (~76%) | IMRE= general purpose  RCW= special purpose  RLW= special purpose | RLW group received one accessory packet every 4 days. | Group 1= 21.7  Group 2=  18.7  Group 3= 17.7 | BW, % BF |
| Crowdy *et al.*(45)  West Malaysia (Malaysia) | Non-RCT | Male Infantry Soldiers  Group 1= 20.5 (SE 0.6) years  Group 2= 21.8 (SE 0.6) years | Group 1= 15  Group 2= 14 | Jungle, tropical | 12 days. Activities (e.g.- 11.8 km march daily, tactical exercise over rough terrain, rifle range shooting, cross-country competition) | Group 1= low-energy ration pack (1 main meal with assorted snacks) x 1  Group 2= augmented Army 'Assault' ration pack x 1 | Group 1= 7.8 (~95%)  Group 2= 15.0 (~86%) | Group 1= special purpose  Group 2= special purpose | Group 2 were issued a daily supplement of 36g almonds & 42g raisins | Group 1= 7.8  Group 2= 15.0 \* | BW |
| Siegel *et al.*(46)  Arkansas (U.S.) | Non-RCT | Male Infantry  Age not reported | Group 1= 19  Group 2= 7  Group 3= 8  Group 4= 15  Group 5= 17 | Not stated | 12 days.  Patrol groups conducted surveillance and reconnaissance missions in the field (Groups 1, 2 and 3). Command and control groups remained stationary (Groups 4 and 5). | Group 1= RLW-30 x 1  Group 2= FPA x 1  Group 3= MRE components, other ration components, and commercial products.  Group 4= RLW-30 x 1  Group 5= FPA x 1 | Group 1= 8.2 (~96%)  Group 2= 7.4 (~97%)  Group 3= NR  Group 4= 8.2 (~85%)  Group 5= 7.4 (~88%) | Groups 1, 2, 4 and 5= special purpose  Group 3= general purpose | Groups 1, 2, 4 and 5 were instructed not to bring additional foods into the field.  Group 3 were allowed to take additional foods/rations + MREs | Group 1= 8.2  Group 2= 7.4  Group 3= NR  Group 4= 8.2  Group 5= 7.4 | BW, % BF |
| Johnson *et al.* (47)  Florida (U.S.) | Before- after | Male Ranger trainees  23.94 (SD 3.92) years | 135 | Jungle | 12 days, caloric restriction to simulate combat situations. | MCI - participants were provided with 13 MCIs for 12 days | 5.4 (assumed all CR eaten) | General purpose | None permitted | 5.4 | BW |
| Booth *et al.*(2); Booth(57)  Far North Queensland (Australia) | Cluster randomized trial | Male Air Field Defence Guards  22 years (18–32 years) | Group 1= 10  Group 2= 10 | Tropical, average temperature mid-afternoon was 33°C | 12 days- 10-day patrol exercise & 2-day hostage and evacuation drill. | Group 1= CRP x 1  Group 2= CRP x 0.5 | Group 1= 15.1 (~61%)  Group 2=  7.5 (~88%) | Both groups= general purpose | None provided | Group 1= 15.1  Group 2=  7.5 | BW, % BF |
| Kyröläinen *et al.*(48)  Finland | Before- after | Male Soldiers  24 (SD 2) years | 7 | Not stated | 20 days of military training activities, walking 5-25km/day carrying loads 30-50kg. | Norwegian artic combat rations (number not stated) | NR | General purpose (arctic) | None provided | NR | BW, FFM, % BF |
| von Restorff *et al.*(49)  Germany | Non-RCT | Male Long Range Reconnaissance Troops  Group 1= 22.8 (SD 3.6) years  Group 2= 21.8 (SD 2.0) years | Group 1= 24  Group 2= 12 | Springtime, sea level | 20-day field exercise (long distance marching, observing and reporting, shooting and a parachute jump) | Group 1= SLR (number not stated)  Group 2= GFR (number not stated) | Group 1= 8.8 (NR)  Group 2=  8.8 (NR) | SLR= special purpose  GFR= general purpose | No additional food | Group 1= NR  Group 2=  NR | BW, FFM, %BF |
| Booth *et al.*(3, 23)  Saba (Malaysia) | Before- after | Male Soldiers (Engineer Regiment)  27 years  (range: 19–32 years) | 20 | Tropics | 23-day adventurous military training- construction tasks in steep mountainous terrain | CR1M- participants were able to eat one or more CR1M per day. | ~15.0 (NR) | General purpose | High carbohydrate bar and drink | NR | BW, %BF |
| Gomez-Merino *et al.*(50)  Pyrenees (France) | Before- after | Male Cadets in Commando training  21 (SD 2) years | 26 | 18–25°C, rough, mountainous terrain | 26 days- 3-week realistic combat training program followed by a 5-day combat course (most of the physical activities were at night), 10-15km/day. | Commando ration x 1 | 13.4 (virtually no food wastage) | Special purpose | None provided | 13.4 | BW |
| Thomas *et al.* (51)  Arkansas (U.S.) | RCT | Male Soldiers (Engineer Company)  25.5 (SD 4.5) years | 34 | Temperature range 2–13°C | 30-day field training exercise (e.g. road marches, bridging exercises, bay & night rafts) | MRE XII x 3 and MRE pouch bread x 2 | 18.6 (~55%) | General purpose | None provided | 18.6 | BW |
| Schoeller *et al.(29);* DeLany *et al.*(58)  Massachusetts (U.S.) | Non-RCT | Male Special Operations Soldiers  Group 1= 25 (SD 5) years  Group 2= 28 (SD 5) years | Group 1= 18  Group 2= 18 | Terrain was hilly, ranging from sea level to 1219m elevation. Temperatures ranged from -1.1–16.1°C | 30 days (including 28-day field training exercise). Activities included reconnaissance, surveillance, and electronic warfare. | Group 1= MRE x 3  Group 2= RLW-30 X 1 | Group 1= 16.8 (~71-77%)  Group 2=  8.3 (~95-99%) | MRE= general purpose  RLW-30= special purpose | No other food items or foraging was permitted | Group 1= 16.8  Group 2=  8.3 | BW, FFM |
| Askew *et al.*(52); Lieberman *et al.(59)*; Shukitt-Hale *et al.*(60) Vermont (U.S.) | Cluster randomized trial | Male Special Forces  Soldiers  27 (SD 4.7) years | Group 1 = 17  Group 2 = 17 | Rain, cold, snow, minimum of -4°C, maximum of 16°C | 30-day field exercise (surveillance, patrol- reconnaissance, infiltration-exfiltration) | Group 1= MRE VI x 3  Group 2= RLW- 30 x 1 | Group 1= 16.8 (~69%)  Group 2=  8.3 (~98%) | MRE VI = general purpose  RLW- 30 = special purpose | None provided | Group 1= 16.8  Group 2=  8.3 | BW, % BF |
| Hirsch *et al.*(53); Lichton *et al.*(61)  Hawaii (U.S.) | Non-RCT | Male Infantry (25th Division) Soldiers  Age not reported | 71 | Elevation of 1829m, 21–29°C during day and 4–16°C at night. Rugged, dry and dusty terrain except for heavy morning mist at elevations higher than base camp. | 34-day field exercise consisting of simulated combat activities. Day and night artillery practice and walking. | MRE x 3 (provided at beginning of day, free to consume components during course of day as time permitted) | NR | General purpose | No access to outside food | NR | BW, % BF |

CR, combat ration; SF, supplemental food; PR, personal rations; SD, standard deviation; BW, body weight; ORP, Operational Ration Pack; RCT, randomised control trial; RLW, Ration, Lightweight; % BF, percentage body fat; MRE, Meal, Ready-To-Eat, SEP MRE, Soldier Enhancement Program Meal, Ready-To-Eat; SE, standard error; RCW, Ration, Cold Weather; FFM, fat-free mass; FM, fat mass; LRP, Long Range Patrol Ration; IMRE, Improved Meal, Ready-To-Eat; FPA, Food Packet Assault; MCI, Meal, Combat, Individual; CRP, Combat Ration Pack; SLR, Special Lightweight Ration; GFR, German Field Rations; CR1M, Combat Ration One Man; RLW-30, Ration, Lightweight-30 days; \* Plus supplemental food (energy content NR)

Supplementary Table 2 Included studies quality and level of evidence assessment

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| Study | Study design & level of evidence(32) | | Quality Rating(32) | Validity Items | | | | | | | | | | | | | | | | | | | Comments |
| **1** | | **2** | | **3** | | **4** | | **5** | | **6** | | **7** | | **8** | | **9** | | **10** |  |
| Margolis *et al.*(5) | | Before- after  IV | Positive | ✓ | ✓ | | NA | | ✓ | | U | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | |  |
| Owen *et al.*(34) | | Before-after  IV | Neutral | ✓ | X | | NA | | ✓ | | U | | X | | ✓ | | ✓ | | ✓ | | ✓ | | Participants only fasted for one hour prior to BM measurements. |
| Margolis *et al.(35)* | | RCT  II | Neutral | ✓ | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | U | | ✓ | | ✓ | | ✓ | | Time of day that BM measurements were taken not reported, not reported whether subjects had fasted |
| Jacobs *et al.*(36) | | Non-RCT  III-2 | Neutral | ✓ | U | | ✓ | | ✓ | | X | | X | | U | | ✓ | | ✓ | | ✓ | | Time of day that BM measurements were taken not reported, no control of food intake after field exercise before BM measurement, unclear if some participants had eaten prior to post trial testing |
| Jones *et al.(1)* | | Before-after  IV | Neutral | ✓ | ✓ | | NA | | ✓ | | X | | X | | U | | ✓ | | ✓ | | ✓ | | Time of day that BM measurements were taken not reported, no dietary control / fasting controls imposed, unclear if these factors varied among participants |
| Lester *et al.(26)* | | Non-RCT  III-2 | Neutral | ✓ | X | | X | | X | | X | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | Management of withdrawals not described, selection method of 40 subjects for weighing not described |
| Edwards *et al.*(6, 54) | | Non-RCT  III-2 | Neutral | ✓ | ✓ | | X | | X | | X | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | Groups not randomly assigned ration type, exact number of initial test subjects not reported (“approximately 80”), not all test subjects accounted for |
| Alemany *et al.(9)* | | RCT  II | Neutral | ✓ | ✓ | | ✓ | | ✓ | | X | | U | | U | | ✓ | | ✓ | | ✓ | | BM and BC procedure not described sufficiently |
| Tanskanen *et al.*(24) | | RCT  II | Positive | ✓ | ✓ | | ✓ | | ✓ | | X | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | |  |
| Viswanathan *et al.*(37) | | Non-RCT  III-2 | Neutral | ✓ | ✓ | | ✓ | | ✓ | | X | | ✓ | | U | | ✓ | | ✓ | | ✓ | | Unclear whether there were any dropouts as participant numbers are not reported with outcome data.  Unclear whether participants were clothed or not for BM measurements. |
| O'Brien *et al.*(38) | | Before-after  IV | Neutral | ✓ | ✓ | | NA | | ✓ | | X | | X | | X | | ✓ | | ✓ | | ✓ | | Unclear time of day BM measurement was performed, whether subjects had fasted, BM corrected for any clothing worn, risk of reporter bias (food intake) |
| Shippee *et al.*(39) | | Before-after  IV | Positive | ✓ | ✓ | | NA | | ✓ | | X | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | Food intake was not measured (assumed all rations were eaten), number of participants who completed each phase not stated |
| Nindl *et al.*(40, 55) | | Before- after  IV | Neutral | ✓ | ✓ | | NA | | ✓ | | X | | X | | U | | ✓ | | ✓ | | ✓ | | Time of day of BM weighing and DEXA scan not reported, method of measuring EI not reported |
| Edwards *et al.* (41, 56) | | RCT  II | Neutral | ✓ | ✓ | | ✓ | | ✓ | | X | | ✓ | | X | | ✓ | | ✓ | | ✓ | | Unclear whether subjects were in fasting state when post-test BM was taken (they were pre-test), post-test BM taken over 2 days instead of 1 |
| Consolazio *et al.*(28) | | RCT  II | Neutral | ✓ | ✓ | | ✓ | | X | | X | | X | | U | | ✓ | | ✓ | | ✓ | | Time of day for BC measurement not reported, method of measuring EI not reported, management of withdrawals not reported, not reported whether participants were in fasted state prior to BM measurements |
| Hoyt *et al.*(42) | | Before-after  IV | Neutral | ✓ | ✓ | | NA | | ✓ | | X | | X | | U | | ✓ | | ✓ | | ✓ | | High loss to follow up rate for final semi-nude BM measurement. Not stated whether participants were fasted and what time of day measurement was taken. |
| Popper *et al.*(43) | | Non-RCT  III-2 | Neutral | ✓ | ✓ | | ✓ | | ✓ | | X | | ✓ | | X | | ✓ | | ✓ | | ✓ | | BM adjusted for clothing worn, baseline BM taken after breakfast but all other BM taken in fasted state |
| Morgan *et al.*(44) | | Cluster randomized trial  III-1 | Neutral | ✓ | ✓ | | ✓ | | ✓ | | X | | ✓ | | X | | ✓ | | ✓ | | ✓ | | Time of day of BM measurements and whether subjects had fasted not reported, circumference technique used for measuring % BF invalid in this population |
| Crowdy *et al.*(45) | | Non-RCT  III-2 | Neutral | ✓ | ✓ | | ✓ | | ✓ | | X | | ✓ | | U | | ✓ | | ✓ | | ✓ | | Not reported whether subjects were fasted or not when BM measured and to what extent they were clothed |
| Siegel *et al.*(46) | | Non-RCT  III-2 | Neutral | ✓ | X | | X | | X | | X | | ✓ | | X | | ✓ | | ✓ | | ✓ | | Inclusion/exclusion criteria not described, method of assigning subjects to groups not described, reasons for withdrawal not reported nor method of handling missing data, not reported whether subjects were fasted when BM measured and different equipment used for pre and post BM measurement, subjects self-reported ration intake |
| Johnson *et al.*(47) | | Before- after  IV | Positive | ✓ | ✓ | | NA | | ✓ | | X | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | |  |
| Booth *et al.*(2); Booth(57) | | Cluster randomized trial  III-1 | Neutral | ✓ | ✓ | | X | | ✓ | | X | | ✓ | | U | | ✓ | | ✓ | | ✓ | | Differences in BM at baseline, time of day of BM measurements and whether subjects had fasted not reported |
| Kyröläinen *et al.*(48) | | Before- after  IV | Neutral | ✓ | ✓ | | NA | | ✓ | | X | | ✓ | | U | | ✓ | | ✓ | | ✓ | | Subjects self-recorded food intake, time of day of BM measurements and whether subjects had fasted and/or were clothed not reported |
| von Restorff *et al.*(49) | | Non-RCT  III-2 | Negative | ✓ | X | | X | | ✓ | | X | | X | | X | | U | | X | | ✓ | | Subjects selected on ‘semi volunteer’ basis, no description of anthropometric methodology for BW and %BF post-tests, or FFM measurements, final measurements taken 2 days prior to end of exercise, participants self-recorded leftover rations, no description of statistical analyses |
| Booth *et al.*(3, 23) | | Before- after  IV | Neutral | ✓ | ✓ | | NA | | ✓ | | X | | ✓ | | U | | ✓ | | ✓ | | ✓ | | Time of day of BM measurements and whether subjects had fasted not reported |
| Gomez-Merino *et al.*(50) | | Before- after  IV | Neutral | ✓ | ✓ | | NA | | ✓ | | X | | ✓ | | U | | ✓ | | ✓ | | ✓ | | EI not measured, insufficient description of BM measurement methodology |
| Thomas *et al.*(51) | | RCT  II | Neutral | ✓ | ✓ | | X | | ✓ | | X | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | Several subjects stated that they would only volunteer for the control group, self-recorded food intake |
| Schoeller *et al.(29);* DeLany *et al.*(58) | | Non-RCT  III-2 | Neutral | ✓ | ✓ | | X | | ✓ | | X | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | Method of assigning subjects to groups not described, food intake self-recorded |
| Askew *et al.*(52); Lieberman *et al.(59)*; Shukitt-Hale *et al.*(60) | | Cluster randomized trial  III-1 | Neutral | ✓ | ✓ | | X | | ✓ | | X | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | Method of assigning subjects to groups not described, food intake self-recorded |
| Hirsch *et al.*(53); Lichton *et al.*(61) | | Non-RCT  III-2 | Neutral | ✓ | ✓ | | X | | ✓ | | X | | ✓ | | X | | ✓ | | ✓ | | ✓ | | Method of assigning combat groups to experimental or ration group not described, pre-test BM were taken during a 2-day period 9 and 10 days before the beginning of the field exercise, amount of clothing worn during BM measurement not described |

Validity items: (1) research question stated; (2) subject selection free from bias; (3) study groups comparable; (4) method for withdrawals described; (5) blinding used; (6) intervention described; (7) outcomes defined and measurements reliable and valid; (8) statistical analysis appropriate; (9) appropriate conclusions and limitations described; (10) funding and sponsorship free from bias; ✓= yes; NA= not applicable; U= unclear; x= no; BM= body mass; RCT= randomised control trial; BC= body composition; EI= energy intake; % BF= percent body fat