Working with the GB Rowing Team- practical insights

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Outline

- Background - GB Rowing Team
- What does an elite rower eat?
- Why is dairy important in a rowers diet?
- Concurrent training - building lean mass
- How to feed elite rowers during competition – practical experiences

Rowing background

- Sweep rowing and sculling
- Openweight & lightweight divisions
- Race distance – 2000m
- 5:30 – 7:00minutes
- Training 2-3 x per day
- Many overseas training camps

Weight categories

59kg

Crew average 57kg
Coxswain minimum 50kg

72.5kg

Crew average 70kg
Coxswain minimum 55kg

Anthropometric data from rowers at 2000 Olympic Games (Kerr et al. 2007)

Anthropometric data	Males Lightweight	Males Open weight	Females Lightweight	Females Open weight
Age (yrs.)	27.1 ± 4.1	26.4± 3.6	26 ± 2.9	27.8 ± 4.4
Body mass (Kg)	72.5 ± 1.8	94.3 ± 5.9	58.5 ± 1.5	76.6 ± 5.2
Sum of 8 skinfolds (mm)	44.7± 8.1	65.3 ± 17.3	59.7 ± 12.4	89 ± 23.6
Height (m)	1.82 ± 0.04	1.94 ± 0.05	1.69 ± 0.05	1.81 ± 0.05
Arm span	187.6 ± 4.9	200.3 ± 6.2	170.5 ± 4.3	183.8 ± 5.2

Energy intake/expenditure

- Open weight women – EI – 2633 - 3169kcal EE- 3177kcal (4000-5000kcal per day)
- Open weight men – EI -4688kcal EE – 4710kcal (Steen et al. 1995, Hagerman et al. n.d.)
  (5000-6000kcal/day)
- Lightweight women – EI – 2214kcal EE – 3957kcal (Hill et al 2001)
  (3000-4000kcal per day)
- Lightweight men – (4000-5000kcal per day)
- 2K race – 200-250kcal (Hill et al 2001, Hagerman et al. 1978)

Nutritional requirements of elite rowers

- High energy requirement ~ 3000-6000kcal per day
- ⇧carbohydrate. But varies according to training program and individual body composition requirement ~ 6-10gCHO/kg (Stellingwerff et al. 2011)
- Protein ~ 1.5 -2.5g/kg – timing, type and amount important. Upper end if reducing energy intake (Mettler et al. 2010) Good review by Helms et al. (2014), Murphy et al. 2014)
- Fat - ~1 -1.5g/kg – encourage essential fats especially omega 3's
- High intake antioxidants/polyphenols from fruit and veg
- High fluid requirements

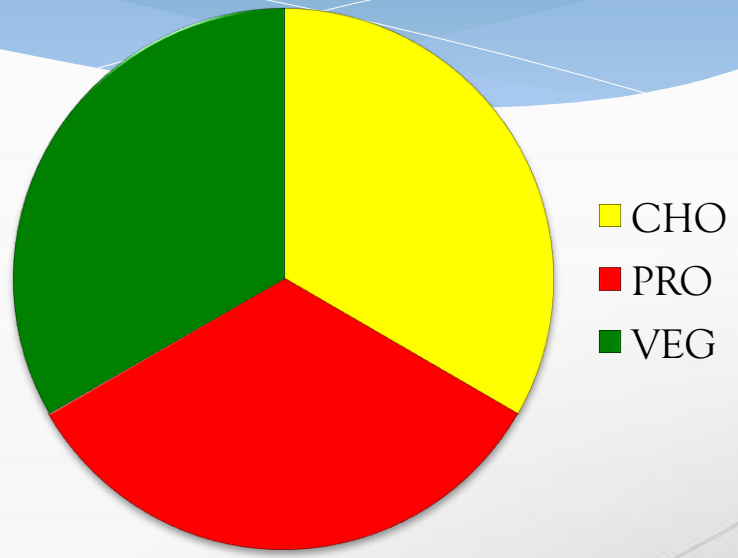
Intake does not always meet theoretical requirements

Dietary analysis data -CHO – 5-8g/kg, Prot 2-3g/kg, Fat – 1-2.5g/kg

Nutritional prep for yearly training phases – power sports (from Stellingwerf et al 2011)

	General Prep	Specific Prep	Taper/Competition	Transition
Training /Comp focus	High training volume (~5-12+hrs per week)/lower training intensity Emphasis on aerobic development Mixed training modalities including resistance, core & cross training.	Maintained to lower volume (~4-10+ hrs per week)/higher intensity Emphasis on anaerobic development, race specific pace & increasing competitions. Increased specialised training altitude camps	Lower volume (~3-8hrs per week)/high training quality/intensity. Emphasis on race-specific intensities & neuromuscular power. Increased targeted competitions	Volume & intensity very low to complete rest (~2 - 4hrs per week) Physiological & psychological recovery to prevent over reaching/training
Nutrition focus	High caloric intake to support training (~3500-5000kcal per day for 70kg) Support desired changes in body comp Recovery after training Daily macro. target: **6-12gCHO/Kg/d** **1.5-1.7gPRO/Kg/d** **1.5-2g FAT/Kg/d**	Nutrition to support high intensity training (~3000-4500kcal per day for 70kg) Specific support/recovery for key specialised training sessions. Daily macro. target: **6-10gCHO/Kg/d** **1.5-1.7gPRO/Kg/d** **1-1.5g FAT/Kg/d**	Nutrition to support high intensity racing (~ 2800-4300kcal per day for 70kg) Avoiding weight-gain with decreasing training volume during taper. Daily macro. target: **6-10gCHO/Kg/d** **1.5-1.7gPRO/Kg/d** **0.8-1.2g FAT/Kg/d**	Nutrition for active to sedentary individuals (~2000-3000kcal per day for 70kg) Some minor weight gain expected. Daily macro. target: **4-6gCHO/Kg/d** **0.8-1.2gPRO/Kg/d** **1-1.5g FAT/Kg/d**

Vary proportions according to type of training



Longer aerobic/endurance type training

Resistance training

Typical day

Food/fluid intake	Food/fluid intake
6.45 Breakfast Large bowl Muesli with semi skimmed milk. Banana. Glass orange juice. Tea	**14.30 training 60 min weight training** Whey protein drink during session
7.30 training 100min in boat steady state 750 - 1000ml sports drink	**16.00 Post session** – bagel with cottage cheese and ham Squash/water
10.00 2nd breakfast 2 x wholegrain toast with scrambled eggs and baked beans Water/squash. Tea	**19.00 Dinner** Chicken stir fry with lots of vegetables and noodles Fresh fruit salad with low fat Greek yoghurt, honey, nuts/seeds and dried fruit. Water/squash
11.30 training 30 min ergo threshold intensity Water	**Before bed** Milk drink or night time recovery drink
12.30 Lunch Salad with 2 x mackerel, hummus and 3 x wholegrain pitta bread Banana 250ml mixed berry and yoghurt smoothie Water/squash	4500kcal 580g CHO (7g/kg) 230gPRO (2.9g/kg) 156g FAT (2g/kg)

Why?

- **Protein** (80% casein,20% whey) for muscle adaptation / bone health
- **Calcium** for bone health/muscle contraction/body composition
- **Phosphorus** for bone health/component of ATP, Pcr etc.
- **Potassium** for muscle contraction/nerve impulse generation
- **Sodium** to replace sweat losses and promote hydration/muscle contraction
- **Carbohydrate** for glycogen replenishment
- Also **B Vits** for energy metabolism
- Plus it **tastes** good!

Milk and nutrients for sport

Milk type Per 500ml	Energy (Kcal)	Protein (g)	Carbohydrate (g)	Fat (g)	Calcium (mg)	Sodium (mg/ mmol)
Whole	340	17	23.5	20	610	220/9.6
Semi Skimmed	235	18	24	9	620	220/9.6
1% fat	210	18	25	5	635	225/9.8
Skimmed	175	18	24.5	1.5	645	225/9.8
Flavoured milk	330	18.5	49.5	7.5	620	270/ 11.7
Drinking yoghurt	310	15.5	65.5	Trace	500	235/ 10.2
Dried Skimmed Milk Powder 1 tspn (3g)	10	1.1	1.6	Trace	38	16/0.7

Building lean mass

- Difficult on concurrent training program
- Protein type and timing important
- 20g every 3 hours better than 10g every 1.5 hours or 40g every 2 hours (Areta et al. 2013)
- Amino acids found in protein provide building blocks and signal
- Leucine identified as being the main trigger for MPS

Timing

- ~20-25g dose (0.3g/kg) at each meal and in close proximity to session – before, during & after
- Previous meal would act as vehicle for dose prior to session
- Consume fluid protein containing whey during weights then food based snack afterwards with protein & carbs.

Type of protein?

- Milk proteins – whey and casein
- Whey greater leucine content
- Egg, meat, fish, chicken, dairy

Food	Leucine content by weight
Whey protein isolate	14%
Milk Protein	10%
Egg protein	8.5%
Muscle protein	8%
Soy protein	8%
Wheat protein	7%

Greek style 12-17g protein /160/170g pot

≈30g protein per 40g serve

18-40gprot/500ml

Cottage cheese 12.6g/100ml

14.6g protein/100g

High protein ice cream 22.5g protein/150ml

Pre weights breakfast/second breakfast providing approx. 20 - 25g HBV protein and 70 - 80g carbohydrate

- Large bowl cereal plus 574ml (1 pint) milk plus 1 banana
- 180g scrambled eggs or 3 boiled eggs on 3 thick slices toast
- Large bowl cereal with 287ml (½ pint) milk plus 1 x higher protein yoghurt (Greek style)
- 574ml low fat milk plus 1 x cinnamon bagel
- One round sandwiches (thick sliced bread) or bagel with low fat spread and tuna (100g)/ chicken (75g)/ ham (75g)/ cheese(75g) plus one banana

Recovery nutrition within first 2 hours

(Stellingwerff et al 2011)

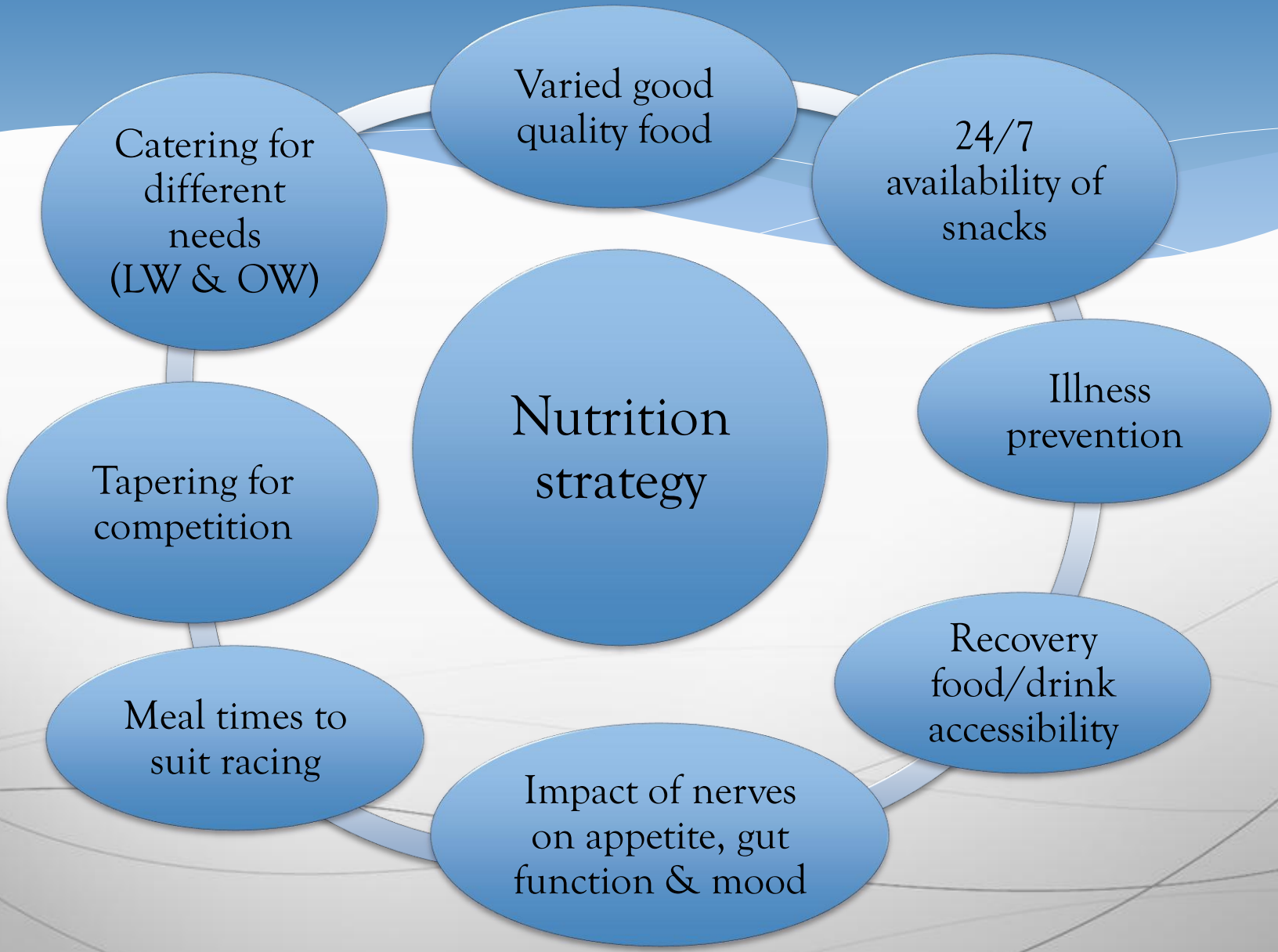
Long aerobic/endurance training **>1 hr. low intensity**	**Intense short duration or prolonged resistance circuit training (20-40min)**	**Technical drills/short duration resistance training**	**Situations of short recovery (<4 hours) (multiple races)**
CHO – 1.2- 1.5g/kg PRO – 0.3g/kg FAT – 0.2-0.3g/kg Fluid Antioxidants	CHO – 1.2- 1.5g/kg PRO – 0.3g/kg FAT – minimal Fluid Antioxidants	CHO – 0.5- 1.0g/kg PRO – 0.3g/kg FAT – minimal Fluid Antioxidants	CHO – 1.2- 1.5g/kg PRO – minimal FAT – minimal Fluid Antioxidants
Poached eggs, spinach & grilled tomatoes on wholegrain bagels plus Yoghurt/ fruit smoothie with oats	Large bowl porridge with honey, banana & dried blueberries/cranberries plus 1 higher protein yoghurt Water/fruit juice	Cottage cheese with wholegrain crackers/bread & kiwi, mango & banana Water	Seeded bread with honey plus fruit juice smoothie

Race day nutrition

Making weight

- Gradual decrease in weight before competition starts.
- 0.5kg per week max.
- **Pre race**
- Contents of GI system – fibre content of diet can be reduced 2 days prior to weigh in – 0.5-1kg
- Physical weight of food – consuming 'lighter foods' can be useful
- Fluids and hydration status
- Weight of muscle and liver glycogen - 1 g glycogen stored with 3-4 g water

Planning for an Olympic Games



References

Areta, J., L., Burke, L., M., Ross, M., L., Camera, D., M., West, D., W., D., Broad, E., Jeacocke, N., A., Moore, D., R., Stellingwerff, T., Phillips, S., ,M., Hawley, J., A., Coffey, V., G. (2013)Timing and distribution of protein ingestion during prolonged recovery from resistance exercise alters myofibrillar synthesis. Journal of physiology, 591.9, 2319-2331.

Hagerman, F., C., Connors, M., C., Gault, J., A., Hagerman, G., R., Polinski, W., J. (1978) Energy expenditure during simulated rowing. Journal of Applied Physiology, 45 (1), 87-93.

Hagerman, F., & Hagerman, M. (n.d.). A comparison of energy output and input among elite rowers. FISA level 3 coaching manual, Chapter 10, 267-272. Retrieved from www.worldrowing.com

Helms, E., R., Zinn, C., Rowlands, D., S., & Brown, S., R. (2014) A systematic review of dietary protein during caloric restriction in resistance trained lean athletes: A case for higher intake. International Journal of Sport Nutrition and Exercise Metabolism, 24, 127-138.

Hill, J., R., Davies, P., S., W. (2002) Energy intake and expenditure in elite lightweight female rowers. Medicine and Science in Sports and Exercise, 34 (11), 1823-1829.

Kerr, D., A., Ross, W., D., Norton, K., Hume, P., Kagawa, M., & Ackland, T., R. (2007) Olympic lightweight and open-class rowers possess distinctive physical and proportionality characteristics. Journal of Sports Sciences, 25(1), 43-53.

References

Mettler, S., Mitchell, N., Tipton, K. (2010) Increased protein intake reduces lean body mass loss during weight loss in athletes. Medicine and Science in Sports and Exercise, 42(2), 326-337.

Morris, F., L., Payne, W., R. (1996) Seasonal variation in the body composition of lightweight rowers. British Journal of Sports Medicine, 30, 301-304.

Murphy, C., H., Hector, A., J., & Phillips, S., M. (2014) Considerations for protein intake in managing weight loss in athletes. (E-pub ahead of print) European Journal of Sports Science. DOI: 10.1080/17461391.2014.936325

Steen, S., N., Mayer, K., Brownell, K., D., & Wadden, T., A. (1995) Dietary intake of female collegiate heavyweight rowers. International journal of Sport Nutrition, 5, 225-231.

Stellingwerff, T., Maughan, R., J., & Burke, L., M. (2011) Nutrition for power sports: Middle-distance running, track cycling, rowing, canoeing/kayaking, and swimming. Journal of Sports Sciences, 29 (Suppl 1), S79-89.