



# 2020 NSCA COACHES CONFERENCE & LIVESTREAM



#Coaches20

# *NAVIGATING THE POTENTIAL PITFALLS OF POPULAR DIETS FOR THE PERFORMANCE ATHLETE*



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Registrant  
*The Sport and Exercise Nutrition Register*

# *CONFLICTS OF INTEREST*

I have no actual or potential conflict of interest in relation to this presentation. My presentation today will be centered around my own interpretations of the scientific literature.





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<https://doi.org/10.1007/s40279-018-1005-2>

REVIEW ARTICLE



## From Paper to Podium: Quantifying the Translational Potential of Performance Nutrition Research

Graeme L. Close<sup>1</sup> · Andreas M. Kasper<sup>1</sup> · James P. Morton<sup>1</sup>

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*“Sport nutrition is one of the fastest growing and evolving disciplines of sport and exercise science, demonstrated by a 4-fold increase in the number of research papers between 2012 and 2018.”<sup>1</sup>*



# *WHAT'S THE PROBLEM?*

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# LOW CARBOHYDRATE DIET RATIONALE



Glycogen stores are finite

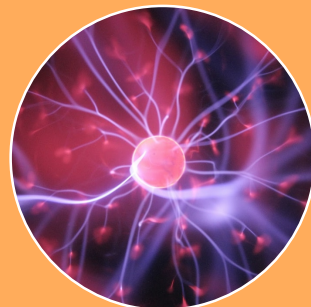
- Even lean athletes may have in excess of 30,000 calories stored as adipose tissue<sup>2</sup>



Increased oxidation of fat as fuel may improve body composition



High-carbohydrate intakes before and during exercise inhibit fat utilization



Improved cell-signaling and gene expression<sup>3</sup>



Weight/fat loss



Health benefits?

## Low-carb diet propelled Chris Froome to three Tour de France titles



Chris Froome   
@chrisfroome

 Follow

Rest day breakfast   #TDF #TDF2016

7:59 PM - 19 Jul 2016

  729  3,018





### Giro - Stage 19 (Summit finish)

Date: Fri 25th May  
AM Weight: 68.9 kg  
Post Weight: kg  
PL:  
Duration: 6 h 02 min  
Expenditure: 6180 kj

### TARGET FUELLING PLANS

Breakfast	On Bike	Lunch	Dinner
<b>HIGH</b>	<b>HIGH</b>	<b>HIGH</b>	<b>HIGH</b>

### BREAKFAST

200ml Juice

400g Rice

Egg (3 Whites/1 Yolk)

4 Pancakes with Jam

Green Tea with Honey

	Carbs	Protein	Fat	Kcal	Fluid (ml)
Grams	189	31	32	996	
Grams/kg	2.7	0.4	0.5		

#### Feedback:

- Perfect breakfast for today's stage.

### RACE (5 h 12 min):



14 x GO Gel



2 x Rocket

	Carbs	Protein	Fat	Kcal	Fluid (ml)
Grams	502	4	4	2348	
g/hr <sup>1</sup>	96	1	1		

### DAILY TOTAL SUMMARY

	Carbs	Protein	Fat	Kcal	Fluid (ml)
Grams	1305	143	88	6663	
Grams/kg	18.9	2.1	1.3		

### DAILY SUMMARY AND RECOMMENDATIONS:

- Extreme carb intake but 9 g/kg of this occurred after the stage.

### TARGET FUELLING PLANS

Breakfast	On Bike	Recovery	Dinner
<b>HIGH</b>	<b>HIGH</b>	<b>HIGH</b>	<b>HIGH</b>

### WHAT YOU DID

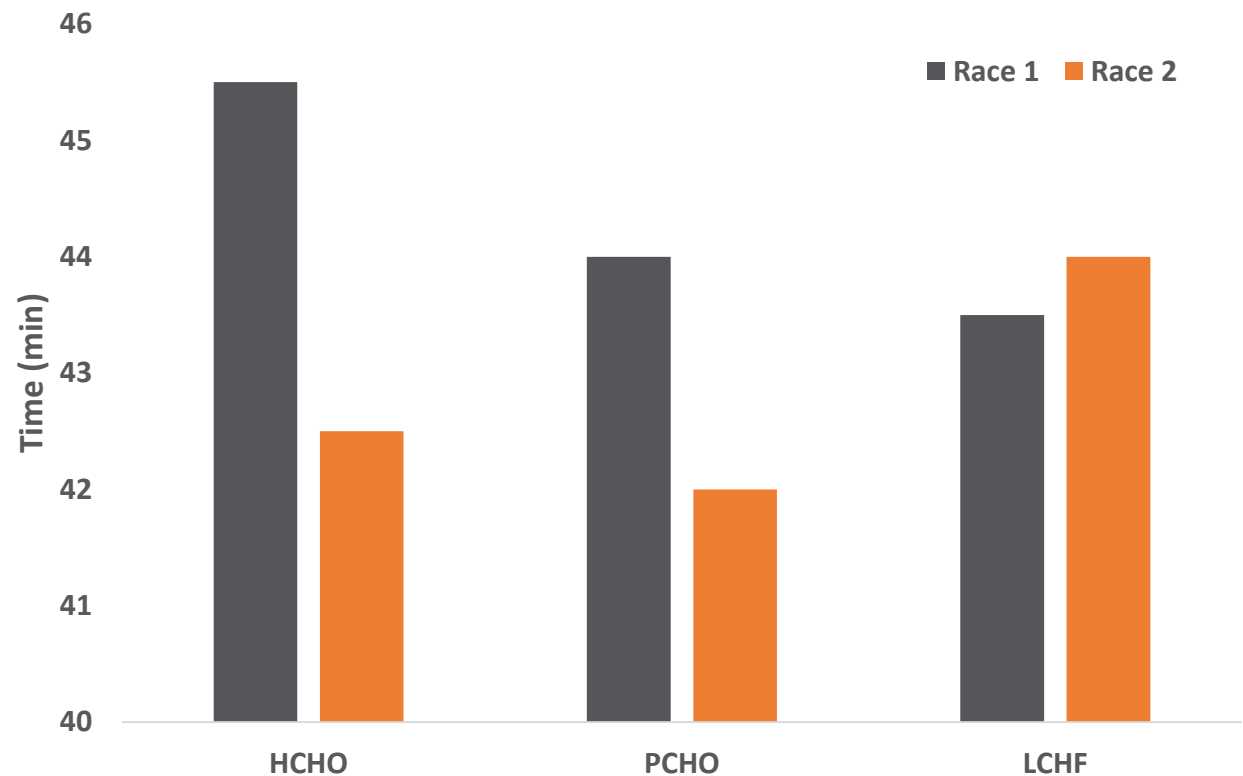
<b>2.7 g/kg</b>	<b>96g/h</b>	<b>6.3 g/kg</b>	<b>2.7 g/kg</b>
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## Low carbohydrate, high fat diet impairs exercise economy and negates the performance benefit from intensified training in elite race walkers

Louise M. Burke<sup>1,2</sup>, Megan L. Ross<sup>1,2</sup>, Laura A. Garvican-Lewis<sup>1,2</sup>, Marijke Welvaert<sup>3,4</sup>, Ida A. Heikura<sup>1,2</sup>, Sara G. Forbes<sup>1</sup>, Joanne G. Mirtschin<sup>1</sup>, Louise E. Cato<sup>1</sup>, Nicki Strobel<sup>5</sup>, Avish P. Sharma<sup>6</sup> and John A. Hawley<sup>2,7</sup>

- High CHO: 190 seconds faster
- Periodized CHO: 124 seconds faster
- Low CHO, high fat: 23 seconds slower

Race times for IAAF 10 km race walk events, pre and post diet intervention

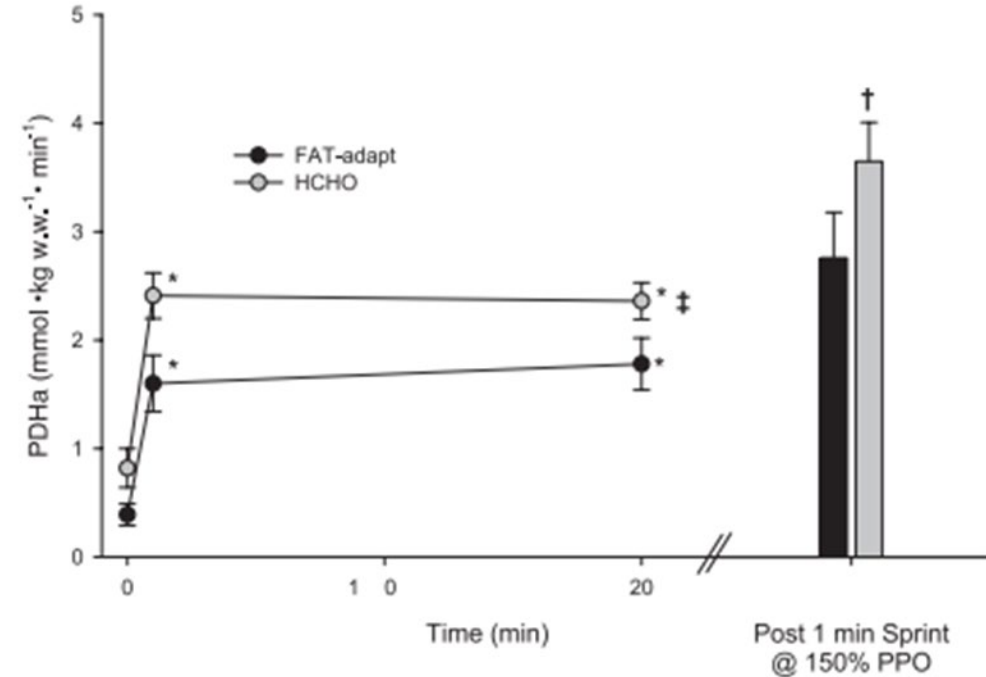


## Decreased PDH activation and glycogenolysis during exercise following fat adaptation with carbohydrate restoration

Trent Stellingwerff, Lawrence L. Spriet, Matthew J. Watt, Nicholas E. Kimber, Mark Hargreaves, John A. Hawley and Louise M. Burke

*AJP - Endo* 290:380-388, 2006. First published Sep 27, 2005; doi:10.1152/ajpendo.00268.2005

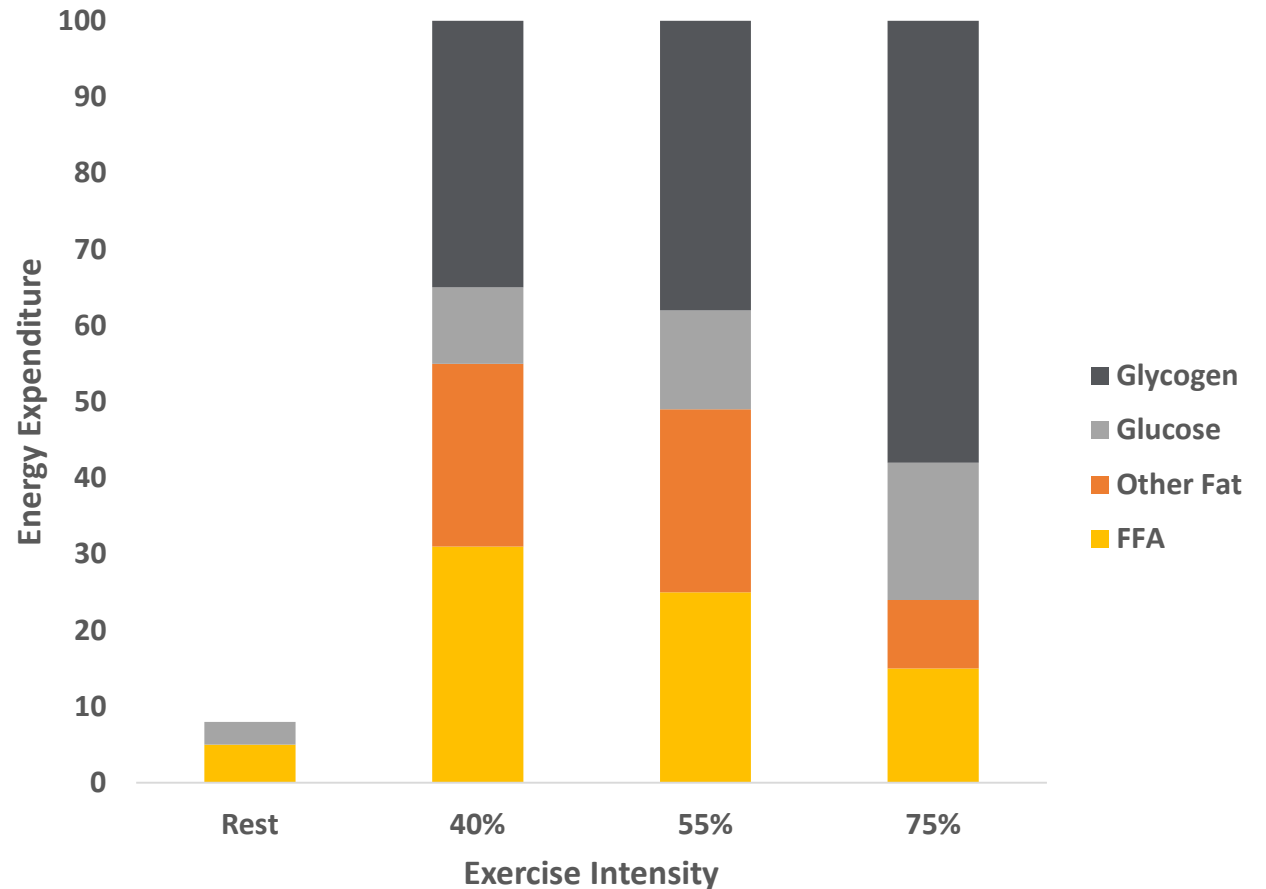
- Trained athletes
- Five days
  - HCHO (10.3 g/kg)
  - FAT-adapt (4.6 g/kg)
- One day CHO restoration
  - Similar glycogen levels
  - Glycogenolysis decreased in FAT-adapt group
  - Decreased ability to utilize glycogen at high intensities



# CONSIDER EXERCISE INTENSITY

- CHO and fat oxidation rates increase proportionally as intensity increases
- As intensity reaches 70-75%, increase in glycogen and glucose oxidation, decrease in fat oxidation
- Important to consider the demands of the session, sport or event
  - Position?

Energy Expenditure and Fuel Selection<sup>6</sup>



# PERFORMANCE CONSIDERATIONS



- Three sets to failure at 12 RM caused a 26% reduction in glycogen stores; six sets leads to a 39% decrease<sup>7</sup>
- Higher-repetition, moderate-load training results in the greatest reductions in muscle glycogen stores
- Peri workout nutrition can amplify or dampen training response

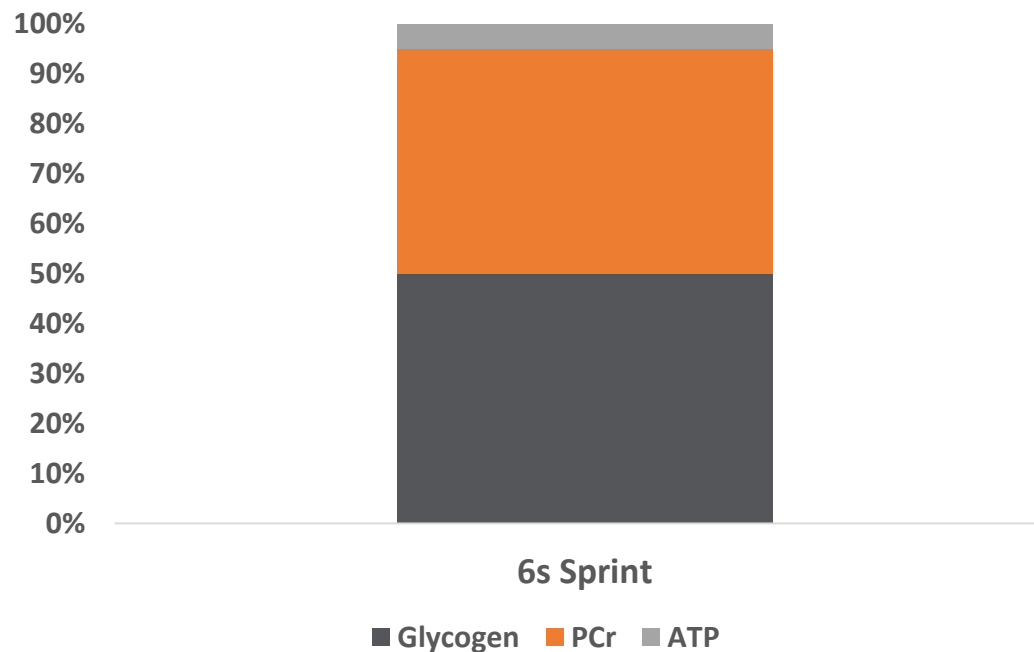
# PERFORMANCE CONSIDERATIONS

Low glycogen reduces the capacity to repeatedly perform high intensity efforts<sup>8</sup>

Glycogenolysis contributes 50% of the ATP production in a six second sprint<sup>9</sup>



Contributions to ATP Production



# ADDITIONAL CONSIDERATIONS



Repeated high intensity training under conditions of low-carbohydrate increases susceptibility to illness<sup>10</sup>

Long-term; de-training? Muscle mass loss?



Can we periodize the carbohydrate intake?

- Careful day-to-day periodization as opposed to chronic periods of CHO restriction is likely to maintain metabolic flexibility and still allow for the completion of high-intensity and prolonged duration workloads<sup>11</sup>
- Consider the daily demands and goals of individual...

# *LOW CARBOHYDRATE CONCLUSIONS*

- Chronic low carbohydrate diets can down regulate the ability to utilize carbohydrate as a fuel source
- Seems logical for most athletes to consume carbohydrates pre- and post-training
- Consider the demands of the sessions/day
  - Key for recovery and immunity
  - Glycogen can be adequately replenished with diet (24-hours)
  - Periodization of carbohydrate intake may be beneficial



# VEGANISM RATIONALE



- Decreased disease risk?<sup>12</sup>
- Lower in saturated fat, more fiber
- Increased fruit and vegetable consumption<sup>13</sup>
- Ethical, environmental and religious reasons...

# Hector Bellerin: 'A Vegan Diet Made Me Reach My Full Potential'

The footballer initially ditched animal products for health reasons - but now he maintains it for the environment and animals

MARIA CHIORANDO · DEC 14, 2018



**Vegan in the NFL: How 15 Tennessee Titans Made the Switch**



*“Achieving micronutrient sufficiency is an important concern for all athletes. The **AND** have indicated that attention should be paid to achieving adequacy in vitamin B12, iron, zinc, calcium, iodine and vitamin D intakes when designing a vegan diet in particular”.<sup>14</sup>*



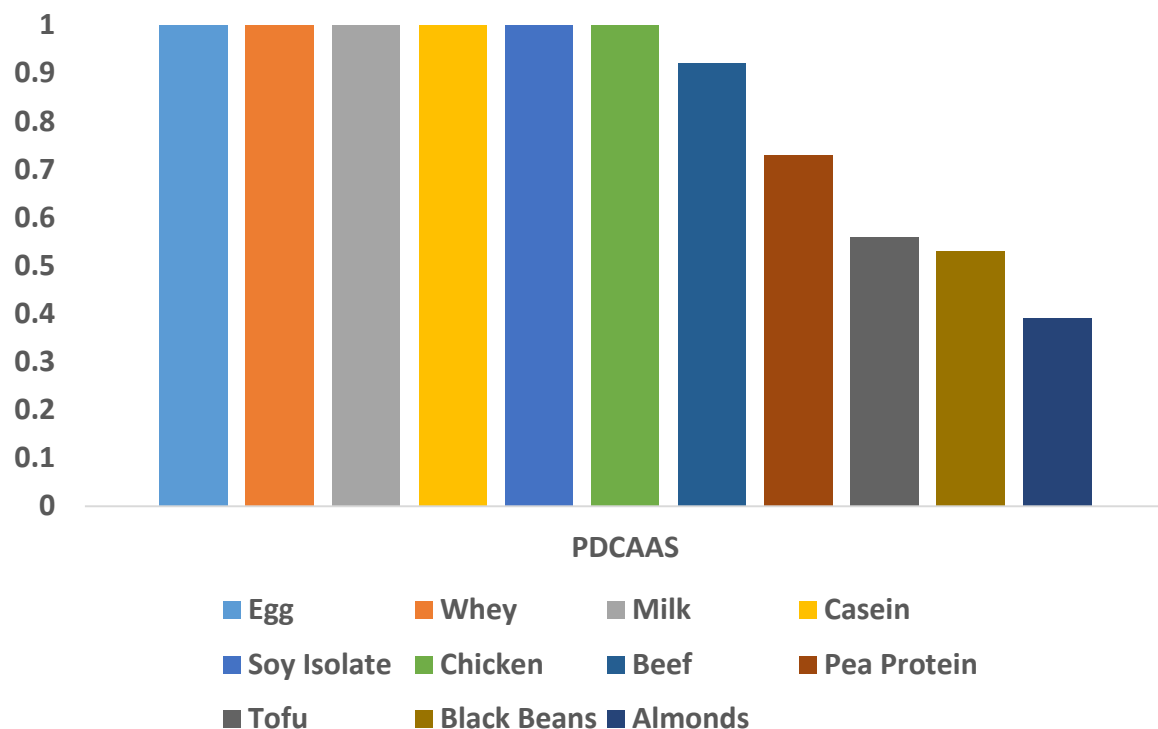
# ARE WE ON TO SOMETHING?

CAROLINA PANTHERS

**How Cam Newton's vegan diet may be hurting Panthers QB's play and injury recovery**



# NOT ALL PROTEIN IS CREATED EQUAL



- Vegan athletes however appear to consume less protein than their omnivorous and vegetarian counterparts<sup>15</sup>
- Digestibility of plant-based protein are markedly less than that of animal products<sup>16</sup>
- Additional baggage...
  - Calories
  - Fiber

*“On the basis of 4 systematic reviews assessing the harms and benefits associated with red meat and processed meat consumption and 1 systematic review assessing people's health-related values and preferences on meat consumption, we suggest that individuals continue their current consumption of both unprocessed red meat and processed meat.”<sup>17</sup>*



**Annals of Internal Medicine**

**CLINICAL GUIDELINE**

## **Unprocessed Red Meat and Processed Meat Consumption: Dietary Guideline Recommendations From the NutriRECS Consortium**

Bradley C. Johnston, PhD; Dena Zeraatkar, MSc; Mi Ah Han, PhD; Robin W.M. Vernooij, PhD; Claudia Valli, MSc; Regina El Dib, PhD; Catherine Marshall; Patrick J. Stover, PhD; Susan Fairweather-Taitt, PhD; Grzegorz Wójcik, PhD; Faiz Bhatia, PEng; Russell de Souza, ScD; Carlos Brotons, MD, PhD; Joerg J. Meerpohl, MD; Chirag J. Patel, PhD; Benjamin Djulbegovic, MD, PhD; Pablo Alonso-Coello, MD, PhD; Malgorzata M. Bala, MD, PhD; and Gordon H. Guyatt, MD

# *VEGANISM CONCLUSIONS*

- Not impossible...
  - Hard to disagree with increased fruit and vegetable intake
- Protein quality and daily total matter
- Nutrient deficiencies impact more than just performance
- “Requires diligence to sustain”
- Additional supplementation may be warranted
  - Don’t forget creatine, beta-alanine, taurine...
- Accessibility, financial resources, cooking skills?
- No non-animal source of collagen or gelatin
  - Joint and tendon injuries?



# *FASTING RATIONALE*



# INTERMITTENT SPRINT PERFORMANCE<sup>18</sup>



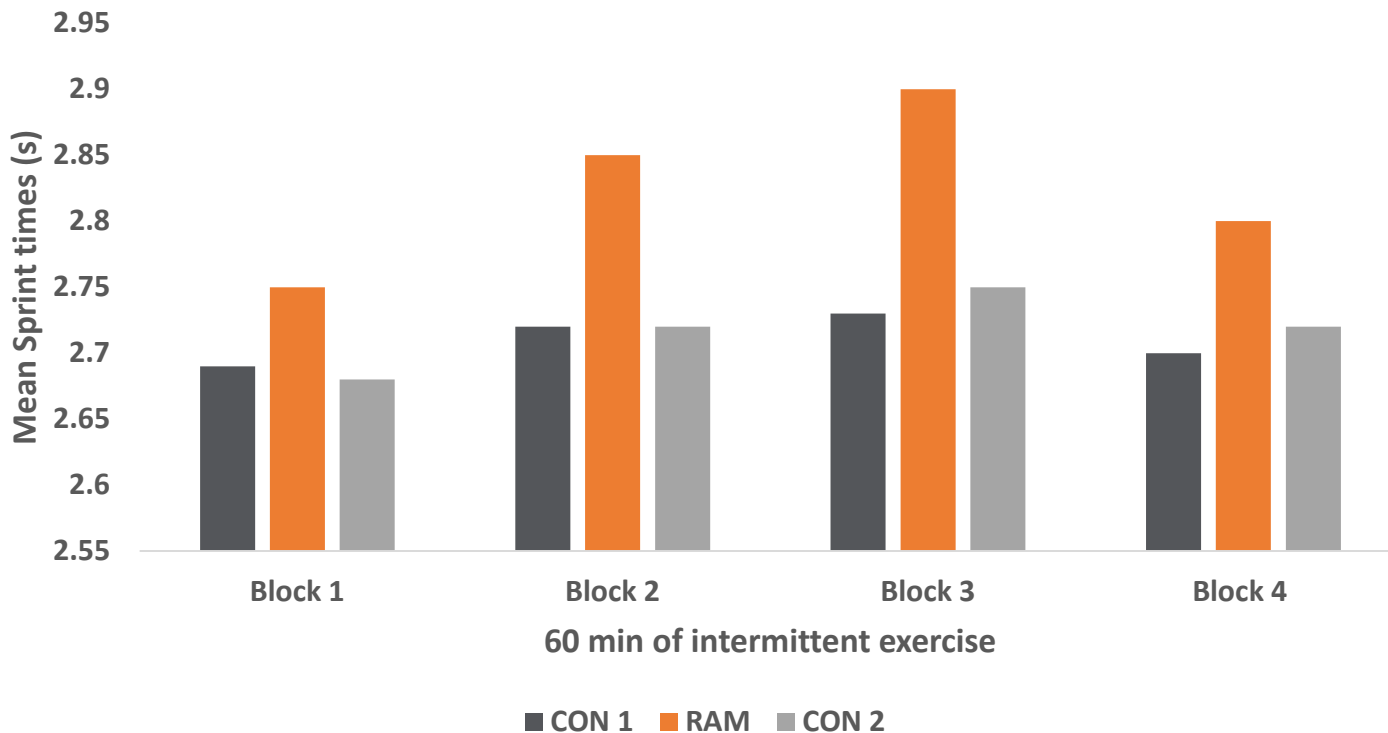
Article

## Poorer Intermittent Sprints Performance in Ramadan-Fasted Muslim Footballers despite Controlling for Pre-Exercise Dietary Intake, Sleep and Training Load

Abdul Rashid Aziz<sup>1,2,\*</sup>, Ahmad Munir Che Muhamad<sup>3</sup>, Siti Raifana Roslan<sup>3</sup>, Nazirah Ghulam Mohamed<sup>3</sup>, Rabindarjeet Singh<sup>3,4</sup> and Michael Yong Hwa Chia<sup>2</sup>

*“Despite similarities in dietary intake, sleeping hours and training loads between conditions, results still indicate that Ramadan fasting had an adverse effect on prolonged intermittent performance”.*<sup>18</sup>

15-m sprint times

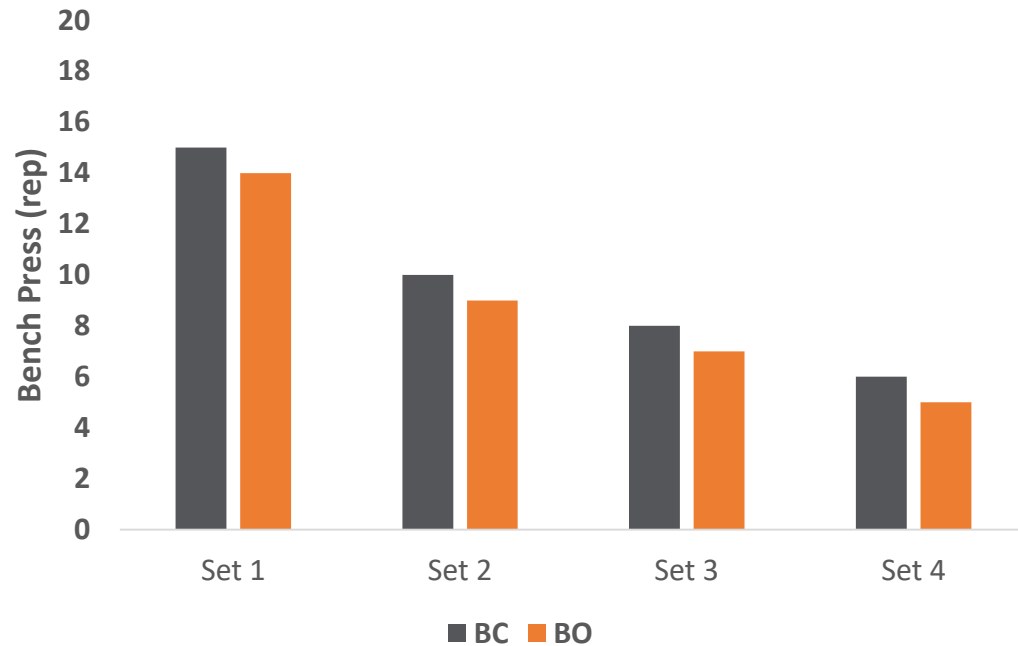


# BREAKFAST OMISSION REDUCES SUBSEQUENT RESISTANCE EXERCISE PERFORMANCE

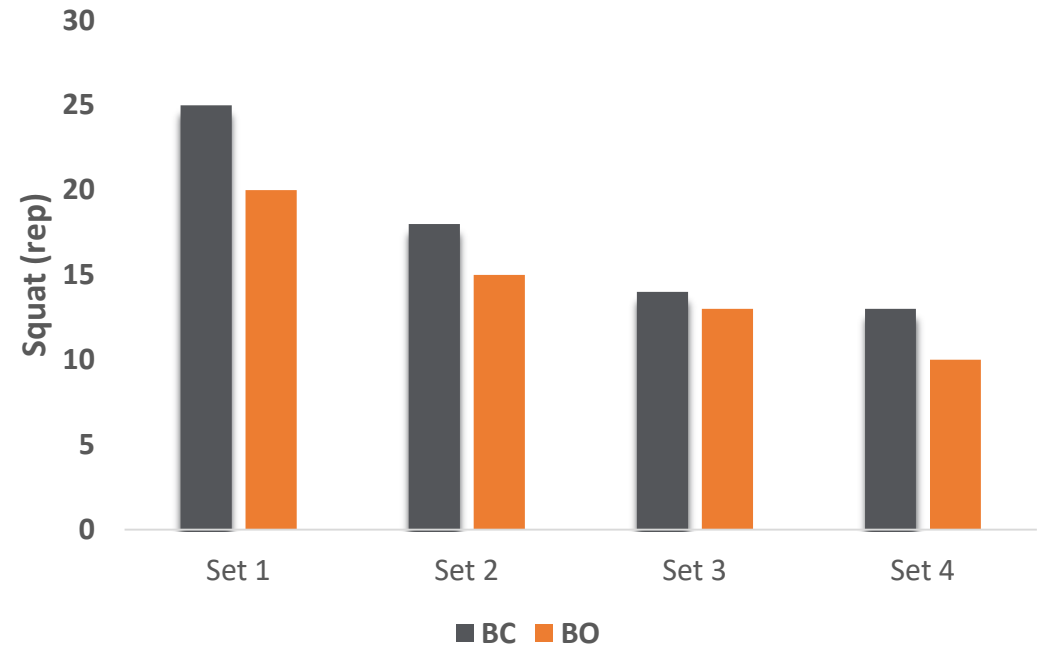
MOHAMED NASHRUDIN BIN NAHARUDIN,<sup>1,2</sup> ASHRIL YUSOF,<sup>2</sup> HARRY SHAW,<sup>1</sup> MATTHEW STOCKTON,<sup>1</sup> DAVID J. CLAYTON,<sup>3</sup> AND LEWIS J. JAMES<sup>1</sup>

<sup>1</sup>National Center of Sport and Exercise Medicine, School of Sport Exercise and Health Science, Loughborough University, Leicester, United Kingdom; <sup>2</sup>Sport Center, University Malaya, Kuala Lumpur, Malaysia; and <sup>3</sup>School of Science and Technology, Nottingham Trent University, Nottingham, United Kingdom

## Bench Press



## Squat



# FASTING & TRAINING CONSIDERATIONS



Low-volume training unlikely to be influenced by pre-exercise glycogen status<sup>20</sup>

<8 sets, duration of <45 mins, and intensity is high (>85% 1 RM)



Carbohydrate intake around training when volume is higher likely to augment performance improvements and facilitate greater hypertrophy<sup>20</sup>

>10 sets, duration of >50 mins, and intensity is moderate-high (50-75% 1 RM)



Common that athletes skip breakfast in the morning

Liver glycogen is depleted following overnight fast

Do athletes have the time, availability or skills to consume food prior to session?

# *DON'T FORGET RECOVERY*

Prolonged periods without food likely compromise training adaptations  
Post-exercise feed?



Skewed protein intake with prolonged fasts  
4-5 protein boluses unlikely if fasting



Despite recent suggestions that one does not “need” to consume protein immediately post-training, consuming nothing offers no advantage and perhaps even a disadvantage<sup>21</sup>



Potential to negatively impact the subsequent session?

# ADDITIONAL CONSIDERATIONS



Skipping breakfast can negatively impact performance later in the day<sup>22</sup>

- Multiple training sessions, competition, game day...



Greater hunger and preoccupations with food<sup>23</sup>



Long-term advantages over continuous energy restriction remain unclear



Perhaps benefits with early time-restricted feeding

- Health benefits?
- Circadian rhythm/biology?
- Protein...

# *FASTING CONCLUSIONS*

- Ultimately, daily totals > timing
- Likely sub-optimal given the demands of performance athletes
- Consider carbohydrates prior to high-volume resistance exercise, especially if training in the morning
- Consider the demands & intensity...
  - Session demands, training demands, competitions demands
  - Potential role when performance is secondary?
- Another opportunity to periodize nutrition intake?
- Body composition management tool?

# TAKE HOME MESSAGE



*“Dietary extremism typically yields results due to an improved diet; an emphasis on whole foods, achieving a caloric deficit or greater attention to dietary intake, not by the purported elimination of whole food groups and/or macronutrients. Ultimately, personal preference is a key consideration when it comes to dietary adherence, but practitioners have a duty to both support and provide the necessary information to their athletes. Restrictive approaches may be detrimental in the long-term for an athlete when considering their performance, health, recovery and immunity”.*

*THANK YOU FOR LISTENING!*



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