Metabolic and Physiological Responses by New Zealand Blackcurrant during Cycling: A Dose-Response Study
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ABSTRACT
New Zealand blackcurrant (NZBC) is high in anthocyanin content. Seven days of 300 mg·day-1 NZBC extract decreased the respiratory exchange ratio during 10 min cycling bouts. Dose effects of NZBC on metabolic and physiological responses during prolonged endurance exercise on cycle ergometer (378±55 W) were examined. NZBC was assigned in a double-blind, randomised, crossover design to four experimental visits (0, 300, 600, 900 mg·day-1). Supplements (CurraNZ, Health Currancy Ltd, UK; each capsule contains 35% spray-dried anthocyanin concentrate) were provided for 7 days with 14-day washout periods. Dietary intake was controlled with food diaries for the 48 hours before each visit. Indirect calorimetry techniques were used to monitor and analyse the respiratory exchange ratio (~65% VO2max). Analyses were conducted using a one-way repeated measures ANOVA with significance accepted at p<0.05 (indicated by *).

RESULTS
<table>
<thead>
<tr>
<th>Dose (mg·day-1)</th>
<th>Carbohydrate (g)</th>
<th>Fats (g)</th>
<th>Protein (g)</th>
<th>Total energy intake (kJ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>494±91</td>
<td>228±66</td>
<td>216±59</td>
<td>20654±2950</td>
</tr>
<tr>
<td>300</td>
<td>495±90</td>
<td>228±68</td>
<td>221±58</td>
<td>20804±3080</td>
</tr>
<tr>
<td>600</td>
<td>479±85</td>
<td>230±65</td>
<td>217±56</td>
<td>20724±2805</td>
</tr>
<tr>
<td>900</td>
<td>490±101</td>
<td>235±73</td>
<td>220±60</td>
<td>20709±2835</td>
</tr>
</tbody>
</table>

### INTRODUCTION
New Zealand blackcurrant is high in anthocyanin content. Seven days of 300 mg·day-1 NZBC blackcurrant extract (containing 105 mg of anthocyanin) decreased the respiratory exchange ratio (i.e. RER) during cycling bouts of 10 minutes in trained cyclists (Cook et al., 2015).

### AIM
To examine dose-response effects of 7 days of New Zealand blackcurrant extract on metabolic and physiological responses during 120 minutes cycling at a constant power of ~65% VO2max.

### METHODS
Fifteen male cyclists (>3rs experience; mean±SD; age: 38±12 years; height: 178±5 cm; body mass: 76±10 kg, VO2max: 56±8 mL/(kg·min), maximum minute power: 378±55 W) completed four 120-minute cycling bouts on an electronically braked ergometer (SRM ergometer SRM International, Germany). A Latin square design assigned the order of experimental visits. Participants were trained cyclists (>3rs experience; mean±SD; age: 38±12 years, height: 178±5 cm; body mass: 76±10 kg; VO2max: 56±8 mL/(kg·min), maximum minute power: 378±55 W). One-way repeated measures ANOVA with Bonferroni post-hoc tests were used for analysis with significance accepted at P<0.05 (indicated by *).

### RESULTS
During 2 hours cycling at a constant power of ~65%VO2max, New Zealand blackcurrant extract decreased RER in a dose-dependent manner by 2.49% and 2.48% for 600 and 900 mg·day-1.

### CONCLUSION
The decrease in respiratory exchange ratio during cycling at ~65% VO2max in trained cyclists by intake of New Zealand blackcurrant extract for 7 days was dose-dependent with the change indicating enhanced fat oxidation.

### APPLICATION
Increased fat oxidation from New Zealand blackcurrant extract intake may enhance endurance performance. Our findings may have implications for nutritional strategies by endurance athletes.

### ACKNOWLEDGEMENTS
Supplement for this study was provided by Health Currancy Ltd, UK. Support for conference attendance was provided by Blackcurrants New Zealand Inc (NZ).

### REFERENCE