

APPENDICES

APPENDIX TABLE OF CONTENTS

APPENDIX A – DATA FROM STUDY ONE

Table A1	Age and physical characteristics of each subject in elite group (42.2km).....	287
Table A2	Age and physical characteristics of each subject in elite group (21.1 km).....	287
Table A3	Age and physical characteristics of each subject in recreational group (15 km)	288
Table A4	Hydration status and running performance of elite runners during 42.2 km race.....	289
Table A5	Hydration status and running performance of elite runners during 21.1 km race.....	289
Table A6	Hydration status and running performance of recreational during 15 km race.....	290

APPENDIX B – DATA FROM STUDY TWO

Table B1	Four relative running intensities ($\% \dot{V}O_{2\max} - \text{mL.kg}^{-1}.\text{min}^{-1}$) which performed by the added weight (AW) group (n=8) during the running economy tests.....	291
Table B2	Four relative running intensities ($\% \dot{V}O_{2\max} - \text{mL.kg}^{-1}.\text{min}^{-1}$) which performed by the dehydration (D) group (n=8) during the running economy tests.....	291
Table B3	Physical and physiological characteristics of added weight (AW) group.....	292
Table B4	Physical and physiological characteristics of dehydration (D) group.....	292
Table B5	USG measurements prior to each RE test in AW trials.....	293
Table B6	USG measurements prior to each RE test in D trials.....	293
Table B7	Body weight changes prior to each test in AW trials.....	294
Table B8	Body weight changes prior to each test in D trials.....	294
Table B9	$\dot{V}O_2$ ($\text{mL.kg}^{-1}.\text{min}^{-1}$) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during AW0 trial	295
Table B10	$\dot{V}O_2$ ($\text{mL.kg}^{-1}.\text{min}^{-1}$) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during AW3 trial	295
Table B11	$\dot{V}O_2$ ($\text{mL.kg}^{-1}.\text{min}^{-1}$) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during AW4 trial	296
Table B12	$\dot{V}O_2$ ($\text{mL.kg}^{-1}.\text{min}^{-1}$) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during D0 trial	296
Table B13	$\dot{V}O_2$ ($\text{mL.kg}^{-1}.\text{min}^{-1}$) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during D3 trial	297
Table B14	$\dot{V}O_2$ ($\text{mL.kg}^{-1}.\text{min}^{-1}$) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during D4 trial	297
Table B15	$\dot{V}O_2$ ($\text{mL.kg}^{-0.75}.\text{min}^{-1}$) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during AW0 trial	298
Table B16	$\dot{V}O_2$ ($\text{mL.kg}^{-0.75}.\text{min}^{-1}$) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during AW3 trial	298
Table B17	$\dot{V}O_2$ ($\text{mL.kg}^{-0.75}.\text{min}^{-1}$) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during AW4 trial	299

Table B18	$\dot{V}O_2$ (mL.kg ^{-0.75} .min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D0 trial	299
Table B19	$\dot{V}O_2$ (mL.kg ^{-0.75} .min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D3 trial	300
Table B20	$\dot{V}O_2$ (mL.kg ^{0.75} .min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D4 trial	300
Table B21	Caloric unit cost (kcal.kg ⁻¹ .km ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW0 trial	301
Table B22	Caloric unit cost (kcal.kg ⁻¹ .km ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW3 trial	301
Table B23	Caloric unit cost (kcal.kg ⁻¹ .km ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW4 trial	302
Table B24	Caloric unit cost (kcal.kg ⁻¹ .km ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D0 trial	302
Table B25	Caloric unit cost (kcal.kg ⁻¹ .km ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D3 trial	303
Table B26	Caloric unit cost (kcal.kg ⁻¹ .km ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D4 trial	303
Table B27	Gross oxygen cost of running (mL.kg ⁻¹ .km ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW0 trial	304
Table B28	Gross oxygen cost of running (mL.kg ⁻¹ .km ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW3 trial	304
Table B29	Gross oxygen cost of running (mL.kg ⁻¹ .km ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW4 trial	305
Table B30	Gross oxygen cost of running (mL.kg ⁻¹ .km ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D0 trial	305
Table B31	Gross oxygen cost of running (mL.kg ⁻¹ .km ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D3 trial.....	306
Table B32	Gross oxygen cost of running (mL.kg ⁻¹ .km ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D4 trial	306
Table B33	Heart rate (beats.min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW0 trial	307
Table B34	Heart rate (beats.min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW3 trial	307

Table B35	Heart rate (beats.min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW4 trial	308
Table B36	Heart rate (beats.min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D0 trial	308
Table B37	Heart rate (beats.min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D3 trial	309
Table B38	Heart rate (beats.min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D4 trial	309
Table B39	Oxygen pulse (mL.beats ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW0 trial	310
Table B40	Oxygen pulse (mL.beats ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW3 trial	310
Table B41	Oxygen pulse (mL.beats ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW4 trial	311
Table B42	Oxygen pulse (mL.beats ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D0 trial	311
Table B43	Oxygen pulse (mL.beats ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D3 trial	312
Table B44	Oxygen pulse (mL.beats ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D4 trial	312
Table B45	Pulmonary ventilation (L.min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW0 trial	313
Table B46	Pulmonary ventilation (L.min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW3 trial	313
Table B47	Pulmonary ventilation (L.min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW4 trial	314
Table B48	Pulmonary ventilation (L.min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D0 trial.....	314
Table B49	Pulmonary ventilation (L.min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D3 trial	315
Table B50	Pulmonary ventilation (L.min ⁻¹) at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during D4 trial	315
Table B51	RPE at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2max}$ during AW0 trial	316

Table B52	RPE at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during AW3 trial	316
Table B53	RPE at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during AW4 trial	317
Table B54	RPE at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during D0 trial	317
Table B55	RPE at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during D3 trial	318
Table B56	RPE at running velocities that elicit 65, 70, 75 and 80% $\dot{V}O_{2\max}$ during D4 trial	318

APPENDIX C – DATA FROM STUDY THREE

Table C1	Physical and physiological characteristics of the subjects.....	319
Table C2	Body mass (kg) measurements during E20 and D10 trials.....	319
Table C3	Body mass (kg) measurements during E35 and D35 trials.....	320
Table C4	Percentage change of body mass during E20 trial.....	320
Table C5	Percentage change of body mass during D10 trial.....	320
Table C6	Percentage change of body mass during E35 trial.....	321
Table C7	Percentage change of body mass during D35 trial.....	321
Table C8	Urine specific gravity measurements during E20 and D10 trials.....	321
Table C9	Urine specific gravity measurements during E35 and D35 trials.....	322
Table C10	Sweat rate (L.min ⁻¹) measurements during E20 trial.....	322
Table C11	Sweat rate (L.min ⁻¹) measurements during D10 trial.....	322
Table C12	Sweat rate (L.min ⁻¹) measurements during E35 trial	323
Table C13	Sweat rate (L.min ⁻¹) measurements during D35 trial.....	323
Table C14	Fluid intake (L) during E20 trial.....	323
Table C15	Fluid intake (L) during D10 trial.....	324
Table C16	Fluid intake (L) during E35 trial.....	324
Table C17	Fluid intake (L) during D35 trial.....	324
Table C18	Plasma viscosity (mPa.s) during E20 trial	325
Table C19	Plasma viscosity (mPa.s) during D10 trial	325
Table C20	Plasma viscosity (mPa.s) during E35 trial	325
Table C21	Plasma viscosity (mPa.s) during D35 trial	326
Table C22	Serum osmolality (osmol/kg) during E20 trial	326
Table C23	Serum osmolality (osmol/kg) during D10 trial	326
Table C24	Serum osmolality (osmol/kg) during E35 trial	327
Table C25	Serum osmolality (osmol/kg) during D35 trial	327
Table C26	Blood glucose (mmol/L) during E20 trial	327
Table C27	Blood glucose (mmol/L) during D10 trial	328
Table C28	Blood glucose (mmol/L) during E35 trial	328
Table C29	Blood glucose (mmol/L) during D35 trial	328
Table C30	Blood lactate (mmol/L) during E20 trial	329
Table C31	Blood lactate (mmol/L) during D10 trial	329
Table C32	Blood lactate (mmol/L) during E35 trial	329
Table C33	Blood lactate (mmol/L) during D35 trial	330

Table C34	Time to exhaustion (min) during four experimental trials (E20, D10, E35 and D35).....	330
Table C35	Cardiac output responses (L.min ⁻¹) during E20 trial	330
Table C36	Cardiac output responses (L.min ⁻¹) during D10 trial	331
Table C37	Cardiac output responses (L.min ⁻¹) during E35 trial	331
Table C38	Cardiac output responses (L.min ⁻¹) during D35trial	331
Table C39	Stroke volume responses (mL.beat ⁻¹) during E20 trial	332
Table C40	Stroke volume responses (mL.beat ⁻¹) during D10 trial	332
Table C41	Stroke volume responses (mL.beat ⁻¹) during E35 trial.....	332
Table C42	Stroke volume responses (mL.beat ⁻¹) during D35trial	333
Table C43	Mean arterial pressure (mmHg) during E20 trial	333
Table C44	Mean arterial pressure (mmHg) during D10 trial	333
Table C45	Mean arterial pressure (mmHg) during E35trial	334
Table C46	Mean arterial pressure (mmHg) during D35 trial	334
Table C47	Oxygen uptake (mL.kg ⁻¹ .min ⁻¹) during E20 trial	334
Table C48	Oxygen uptake (mL.kg ⁻¹ .min ⁻¹) during D10 trial	335
Table C49	Oxygen uptake (mL.kg ⁻¹ .min ⁻¹) during E35 trial	335
Table C50	Oxygen uptake (mL.kg ⁻¹ .min ⁻¹) during D35trial	335
Table C51	Heart rate (beats.min ⁻¹) responses during E20 trial.....	336
Table C52	Heart rate (beats.min ⁻¹) responses during D10 trial.....	336
Table C53	Heart rate (beats.min ⁻¹) responses during E35 trial.....	337
Table C54	Heart rate (beats.min ⁻¹) responses during D35 trial.....	337
Table C55	Rectal temperature (°C) during E20 trial.....	338
Table C56	Rectal temperature (°C) responses during D10 trial.....	338
Table C57	Rectal temperature (°C) responses during E35 trial.....	339
Table C58	Rectal temperature (°C) responses during D35 trial.....	339
Table C59	Skin temperature (°C) during E20 trial.....	340
Table C60	Skin temperature (°C) responses during D10 trial.....	340
Table C61	Skin temperature (°C) responses during E35 trial.....	341
Table C62	Skin temperature (°C) responses during D35 trial.....	341
Table C63	Thermal comfort scale during E20 trial.....	342
Table C64	Thermal comfort scale during D10 trial.....	342
Table C65	Thermal comfort scale responses during E35 trial.....	343
Table C66	Thermal comfort scale responses during D35 trial.....	343

Table C67	Thirst sensation scale during E20 trial.....	344
Table C68	Thirst sensation scale during D10 trial.....	344
Table C69	Thirst sensation scale responses during E35 trial.....	345
Table C70	Thirst sensation scale responses during D35 trial.....	345
Table C71	Rate of Perceived Exertion (RPE) during E20 trial.....	346
Table C72	Rate of Perceived Exertion (RPE) during D10 trial.....	346
Table C73	Rate of Perceived Exertion (RPE) during E35 trial.....	347
Table C74	Rate of Perceived Exertion (RPE) during D35 trial.....	347
Table C75	Skin blood flow (% from baseline) during E20 trial	348
Table C76	Skin blood flow (% from baseline) during D10 trial	348
Table C77	Skin blood flow (% from baseline) during E35 trial	348
Table C78	Skin blood flow (% from baseline) during D35trial	349
Table C79	Relative change in plasma volume (%) during E20 trial	349
Table C80	Relative change in plasma volume (%) during D10 trial	349
Table C81	Relative change in plasma volume (%) during E35 trial	350
Table C82	Relative change in plasma volume (%) during D35 trial	350

APPENDIX D – DATA FROM STUDY FOUR

Table D1	Physical and physiological characteristics of the subjects.....	351
Table D2	Seven subjects' individual performance time during three experimental trials (CON, euhydrated in 35°C, GLUT, dehydrated in 35°C; PCB, dehydrated in 35°C).....	351
Table D3	Plasma [glutamine] ($\mu\text{mol.L}^{-1}$) during CON trial.....	351
Table D4	Plasma [glutamine] ($\mu\text{mol.L}^{-1}$) during GLUT trial.....	352
Table D5	Plasma [glutamine] ($\mu\text{mol.L}^{-1}$) during PCB trial.....	352
Table D6	Relative change in plasma volume (%) during CON trial.....	352
Table D7	Relative change in plasma volume (%) during GLUT trial.....	353
Table D8	Relative change in plasma volume (%) during PCB trial	353
Table D9	Plasma HSP 72 (ng.mL^{-1}) during CON trial.....	353
Table D10	Plasma HSP 72 (ng.mL^{-1}) during GLUT trial.....	354
Table D11	Plasma HSP 72 (ng.mL^{-1}) during PCB trial.....	354
Table D12	Body mass (kg) measurements during CON trial.....	354
Table D13	Body mass (kg) measurements during GLUT trial.....	355
Table D14	Body mass (kg) measurements during PCB trial.....	355
Table D15	Percentage change of body mass during CON trial.....	355
Table D16	Percentage change of body mass during GLUT trial.....	356
Table D17	Percentage change of body mass during PCB trial.....	356
Table D18	Urine specific gravity measurements during CON trial.....	356
Table D19	Urine specific gravity measurements during GLUT trial.....	357
Table D20	Urine specific gravity measurements during PCB trial.....	357
Table D21	Sweat rate (L.min^{-1}) measurements during CON, GLUT and PCB trials.....	357
Table D22	Fluid intake (L) measurements during CON, GLUT and PCB trials....	358
Table D23	Oxygen uptake ($\text{mL.kg}^{-1}.\text{min}^{-1}$) during CON trial	358
Table D24	Oxygen uptake ($\text{mL.kg}^{-1}.\text{min}^{-1}$) during GLUT trial	358
Table D25	Oxygen uptake ($\text{mL.kg}^{-1}.\text{min}^{-1}$) during PCB trial	359
Table D26	Plasma viscosity (mPa.s) during CON trial.....	359
Table D27	Plasma viscosity (mPa.s) during GLUT trial	359
Table D28	Plasma viscosity (mPa.s) during PCB trial	360
Table D29	Serum osmolality (osmol/kg) during CON trial	360
Table D30	Serum osmolality (osmol/kg) during GLUT trial	360
Table D31	Serum osmolality (osmol/kg) during PCB trial	361

Table D32	Plasma glucose (mmol/L) during CON trial	361
Table D33	Plasma glucose (mmol/L) during GLUT trial	361
Table D34	Plasma glucose (mmol/L) during PCB trial	362
Table D35	Plasma lactate (mmol/L) during CON trial	362
Table D36	Plasma lactate (mmol/L) during GLUT trial	362
Table D37	Plasma lactate (mmol/L) during PCB trial	363
Table D38	Serum [Na ⁺] (mmol/L) during CON trial	363
Table D39	Serum [Na ⁺] during GLUT trial	363
Table D40	Serum [Na ⁺] (mmol/L) during PCB trial	364
Table D41	Serum [K ⁺] (mmol/L) during CON trial	364
Table D42	Serum [K ⁺] (mmol/L) during GLUT trial	364
Table D43	Serum [K ⁺] (mmol/L) during PCB trial	365
Table D44	Serum [Cl ⁻] (mmol/L) during CON trial	365
Table D45	Serum [Cl ⁻] (mmol/L) during GLUT trial	365
Table D46	Serum [Cl ⁻] (mmol/L) during PCB trial	366
Table D47	Plasma protein (g/dL) during CON trial	366
Table D48	Plasma protein (g/dL) during GLUT trial	366
Table D49	Plasma protein (g/dL) during PCB trial	367
Table D50	Plasma renin (pg/mL) during CON trial.....	367
Table D51	Plasma renin (pg/mL) during GLUT trial	367
Table D52	Plasma renin (pg/mL) during PCB trial	368
Table D53	Thermal comfort scale during CON trial	368
Table D54	Thermal comfort scale during GLUT trial	368
Table D55	Thermal comfort scale during PCB trial	369
Table D56	Thirst sensation during CON trial	369
Table D57	Thirst sensation during GLUT trial	369
Table D58	Thirst sensation during PCB trial	370
Table D59	Rating of perceived exertion (RPE) during CON trial	370
Table D60	Rating of perceived exertion (RPE) during GLUT trial	370
Table D61	Rating of perceived exertion (RPE) during PCB trial	371
Table D62	Heart rate (beats.min ⁻¹) responses during CON trial.....	371
Table D63	Heart rate (beats.min ⁻¹) responses during GLUT trial.....	371
Table D64	Heart rate (beats.min ⁻¹) responses during PCB trial.....	372
Table D65	Rectal temperature (°C) responses during CON trial.....	372
Table D66	Rectal temperature (°C) responses during GLUT trial.....	373

Table D67	Rectal temperature (°C) responses during PCB trial.....	373
Table D68	Mean skin temperature (°C) responses during CON trial.....	374
Table D69	Mean skin temperature (°C) responses during GLUT trial.....	374
Table D70	Mean skin temperature (°C) responses during PCB trial.....	375