animals

MDPI

Supplementary Materials

Supplementary Tables

Supplementary Table S1. Mean ± standard error of mean (min, max) values of measured indoor and outdoor temperatures and blood parameters at departure and arrival in experiment 1.

Variable	Enclosed vehicle		Open vehicle	
	Departure	Arrival	Departure	Arrival
Indoor temperature, °C				
Head	+2.3±0.6 (1.1, 7.6)	+16.9±0.6 (12.8, 19.7)	−1.3±0.9 (−4.6, 3.9)	+12.4±0.6 (9.2, 15.3)
Ear	+0.3±0.7 (−2.9, 4.5)	+9.4±1.1 (5.0, 15.3)	−1.0±0.7 (−4.2, 3.3)	+1.8±0.3 (0.7, 3.3)
Abdomen	+35.1±0.2 (33.8, 35.9)	+36.0±0.3 (34.1, 37.2)	+34.6±0.6 (30.0, 36.9)	+36.2±0.5 (32.5, 38.0)
Foot/pastern	+31.9±0.9 (26.5, 34.4)	+31.6±1.3 (21.4, 36.3)	+30.1±1.3 (21.1, 34.6)	+31.2±1.4 (22.4, 35.1)
Outdoor minimum temperature, °C				
Ear	−13.8±1.06 (−18.9; −7.5)	−5.6±0.7 (−8.2; −1.7)	−17.5±30.9 (−21.1; −12.5)	−6.8±0.9 (−11.2; −1.3)
Foot/pastern	−16.5±1.03 (−21.7; −12.8)	−10.5±0.6 (−16.2;7,6)	−16.5±0.8 (−19.5; −12.2)	−10.3±0.4 (−12.4; −7.9)
Blood parameters				
ACTH, ng/L	+98.2±4.6 (75.6, 117.0)	+90.7±3.9 (71.6, 110.9)	+78.0±5.9 (53.3, 107.7)	+88.5±5.0 (55.2, 113.9)
ALT, U/L	+24.4±1.2 (19.3, 31.2)	+23.0±1.2 (19.1, 31.3)	+24.4±0.5 (21.4, 26.5)	+24.2±0.9 (18.8, 28.1)
HSP, ng/L	+1667.5±47.7 (1407.2, 1846.3)	+1386.2±109 (490.4, 1642.3)	+1711.5±59.7 (1519.6, 2141.5)	+1664.1±59.1 (1421.9, 2070.0)
Cortisol, µg/L	32.2±1.9 (27.6, 38.7)	+35.6±1.5 (28.0, 42.4)	+34.2±1.5 (25.0, 40.8)	+36.1±1.5 (31.0, 47.8)
NEFA, mmol/L	+204.7±8.3 (164.7, 240.2)	+197.2±5.17 (173.7, 226.6)	+177.2±5.9 (149.8, 201.2)	+206.9±8.8 (154.5, 255.5)
LDH, IU/L	+255.4±4.8 (235.7, 275.4)	+251.5±7.2 (225.1, 298.3)	+247.9±6.8 (221.4, 291.0)	+258.2±6.9 (232.2, 304.2)
CA, ng/L	+115.7±4.6 (95.6, 132.3)	+109.0±3.8 (86.5, 131.2)	+110.4±2.5 (100.8, 124.7)	+111.3±4.05 (92.2, 132.9)
CK, IU/L	+32.6±0.7 (27.1, 35.3)	+32.9±1.05 (28.7, 37.9)	+28.7±1.2 (24.3, 37.2)	+29.5±0.6 (25.1, 31.3)

Glucose, mmol/L	+4.18±0.14 (3.51, 5.29)	+4.17±0.24 (3.53, 6.24)	+4.17±0.15 (3.43, 5.21)	+5.04±0.5 (3.59, 7.94)

ACTH = adrenocorticotropic hormone; ALT = alanine aminotransferase; HSP = heat shock protein; NEFA= free fatty acid levels; LDH = lactic acid dehydrogenase; CA = catecholamine; CK = Creatine kinase.

Supplementary Table S2. Mean ± standard error mean (min, max) values of measured indoor and outdoor temperatures and blood parameters at departure and arrival in experiment 2.

Variable	Duration of transport 1 hour		Duration of transport 2 hours	
	Departure	Arrival	Departure	Arrival
Indoor temperature, °C				
Head	+13.7±0.4 (11.8, 15.8)	+24.0±1.2 (19.0, 28.8)	+14.4±0.6 (11.5, 18.0)	+23.4±1.1 (18.6, 28.9)
Ear	+4.0±0.8 (1.4, 9.6)	+10.2±1.3 (4.3, 17.9)	+9.6±1.1 (4.5, 15.6)	+8.0±1.2 (3.4, 15.9)
Abdomen	+36.2±0.3 (35.1, 37.7)	+37.3±0.26 (35.9, 38.5)	+35.7±0.2 (35.0, 36.9)	+36.5±0.4 (34.5, 37.9)
Foot/pastern	+32.4±0.7 (29.0, 35.4)	+32.7±0.6 (29.7, 35.1)	+33.5±0.43 (31.8, 36.3)	+34.6±0.6 (31.0, 36.4)
Outdoor minimum temperature, °C				
Ear	−5.7±0.7 (−9.3; −1.3)	−7.03±1.07 (−10.7; −1.8)	−3.5±0.6 (−6.7; 0.3)	−3.78±0.7 (−7.2; −0.8)
Foot/pastern	−6.09±1.2 (−11.9 ;1.9)	−11.1±0.9 (−17.3; −7.8)	−6.8±1.2 (−11.3; 1.9)	−7.56±0.7 (−9.7; −1.6)
Blood parameters				
ACTH, ng/L	+97.4±4.4 (82.6, 118.8)	+88.0±4.7 (67.0, 114.6)	+89.4±4.4 (69.9, 119.0)	+103.7±6.8 (60.8, 137.8)
ALT, U/L	+24.2±1.2 (19.4, 31.3)	+25.5±0.8 (22.1, 29.3)	+25.0±1.01 (21.0, 32.5)	+31.0±1.05 (26.5, 36.5)
HSP, ng/L	+1740.1±67.37 (1514.6, 2218.8)	+1584.5±54.6 (1360.1, 1930.6)	+1673.5±69.4 (1413.3, 2168.7)	1574.7±49.2 (1330.2, 1752.8)
Cortisol, µg/L	+37.8±2.4 (18.7, 45.0)	+39.3±1.05 (35.0, 45.0)	+40.6±1.1 (36.7, 45.4)	+44.4±1.09 (36.5, 48.2)
NEFA, mmol/L	+234.4±9.6 (188.2, 291.4)	+214.7±9.7 (177.7, 267.4)	+234.4±7.5 (194.8, 265.8)	+255.8±9.07 (210.44, 295.17)
LDH, IU/L	+255.9±8.7 (212.3, 306.5)	+248.0±8.9 (203.9, 288.4)	+301.6±14.7 (249.6, 378.4)	+329.4±14.8 (272.6, 409.0)
CA, ng/L	+119.1±3.8	+126.8±3.65	+141.5±5.14	+113.0±9.4

	(99.4, 136.6)	(110.6, 145.8)	(110.6, 164.4)	(79.2, 162.2)
CK, IU/L	+34.5±0.8	+35.4±1.03	+35.4±1.2	+40.4±1.3
	(29.8, 38.5)	(31.8, 40.2)	(29.8, 41.7)	(31.8, 46.8)
Glucose, mmol/L	+3.68±0.13	+3.65±0.3	+3.46±0.1	+4.26±0.6
	(3.08, 4.42)	(2.99, 5.99)	(2.94, 4.08)	(3.06, 9.27)

ACTH = adrenocorticotropic hormone; ALT = alanine aminotransferase; HSP = heat shock protein; NEFA= free fatty acid levels; LDH = lactic acid dehydrogenase; CA = catecholamine; CK = Creatine kinase

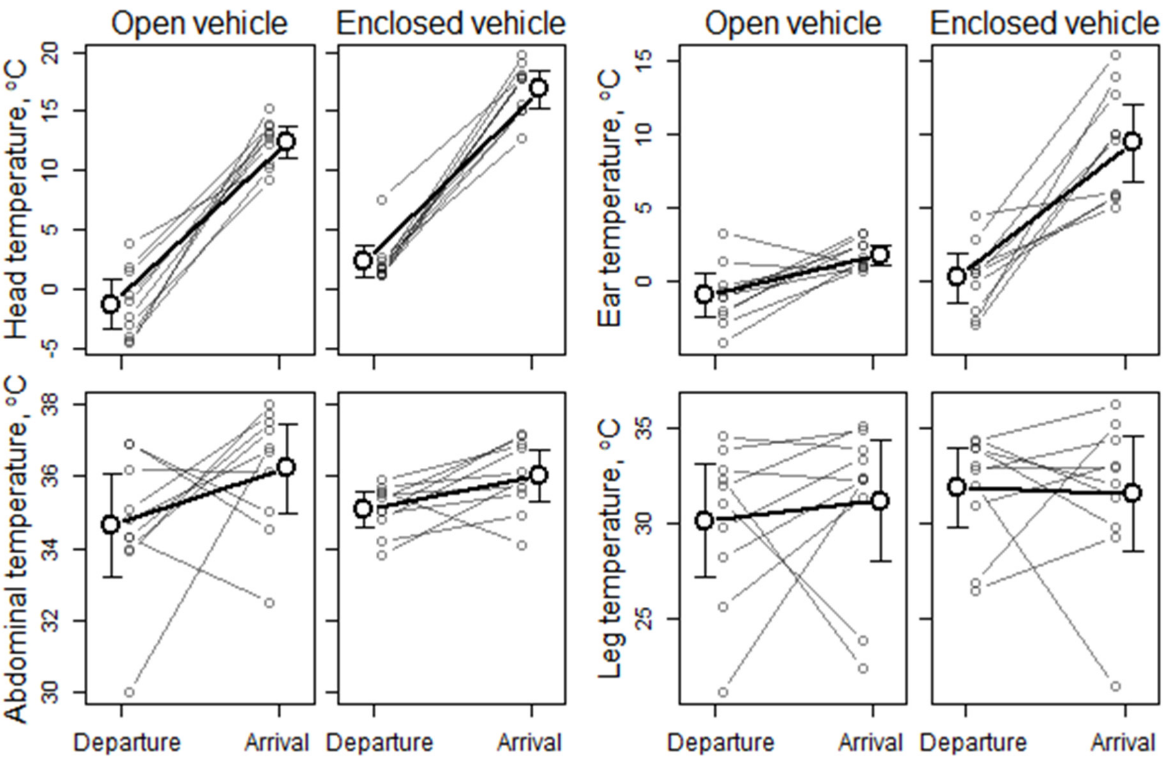
Supplementary Table S3. Mean ± standard error mean (min, max) values of measured indoor and outdoor temperatures and blood parameters at departure and arrival in experiment 3.

Variable	Yes		No	
Pre-transport feeding	Departure	Arrival	Departure	Arrival
Indoor temperature, °C				
Head	+11.6±0.5	+22.4±1.5	+13.7±0.7	+24.8±1.2
	(9.6, 13.4)	(15.8, 29.0)	(9.9, 17.6)	(18.7, 29.7)
Ear	+3.5±1.0	+7.6±0.9	+5.3±0.7	+10.8±2.2
	(0.2, 9.3)	(2.9, 11.8)	(1.7, 8.8)	(3.8, 26.6)
Abdomen	+35.1±0.2	+36.6±0.3	+36.1±0.4	+36.7±0.4
	(34.1, 36.2)	(34.7, 37.4)	(34.5, 37.9)	(34.3, 37.7)
Foot/pastern	+31.9±0.7	+31.7±1.1	+31.9±1.2	+33.9±0.6
	(27.2, 34.1)	(27.1, 35.8)	(26.4, 36.1)	(31.1, 37.6)
Outdoor minimum temperature, °C				
Ear	−13.4±0.7	−7.2±1.5	−12.1±1.5	−7.4±1.6
	(−18.6; −10.7)	(−14.7;0.4)	(−17.4; −3.8)	(−14.3;1.1)
Foot/pastern	−14.1±0.8	−10.1±0.7	−15.9±0.5	−9.04±0.7
	(−18.1; -−10.9)	(−13.5; −6.8)	(−12.4; −13.2)	(−12; −4.4)
Blood parameters				
ACTH, ng/L	+69.5±4.3	+65.4±3.2	+71.2±4.04	+61.9±3.4
	(55.2, 95.1)	(52.4, 80.0)	(53.5, 90.0)	(48.1, 80.4)
ALT, U/L	+21.5±2.0	+19.2±0.6	+22.6±1.6	+26.6±1.2
	(15.6, 33.9)	(16.8, 22.5)	(18.0, 34.4)	(21.9, 35.2)
HSP, ng/L	+2034.6±105	+2127.3±69	+2039.9±90.2	+2347.4±69.4
	(1687.3, 2738.5)	(1771.7, 2498.5)	(1478.9, 2454.4)	(1930.6, 2662.5)
Cortisol, μg/L	+23.1±3.7	+18.7±0.7	+22.3±1.4	+22.5±1.2
	(15.8, 45.1)	(15.6, 23.3)	(16.7, 30.0)	(17.6, 26.6)
NEFA, mmol/L	+174.5±9.0	+159.6±1.9	+184.5±9.8	+197.4±4.3
	(149.4, 243.7)	(150.1, 167.0)	(153.0, 257.0)	(181.2, 217.7)

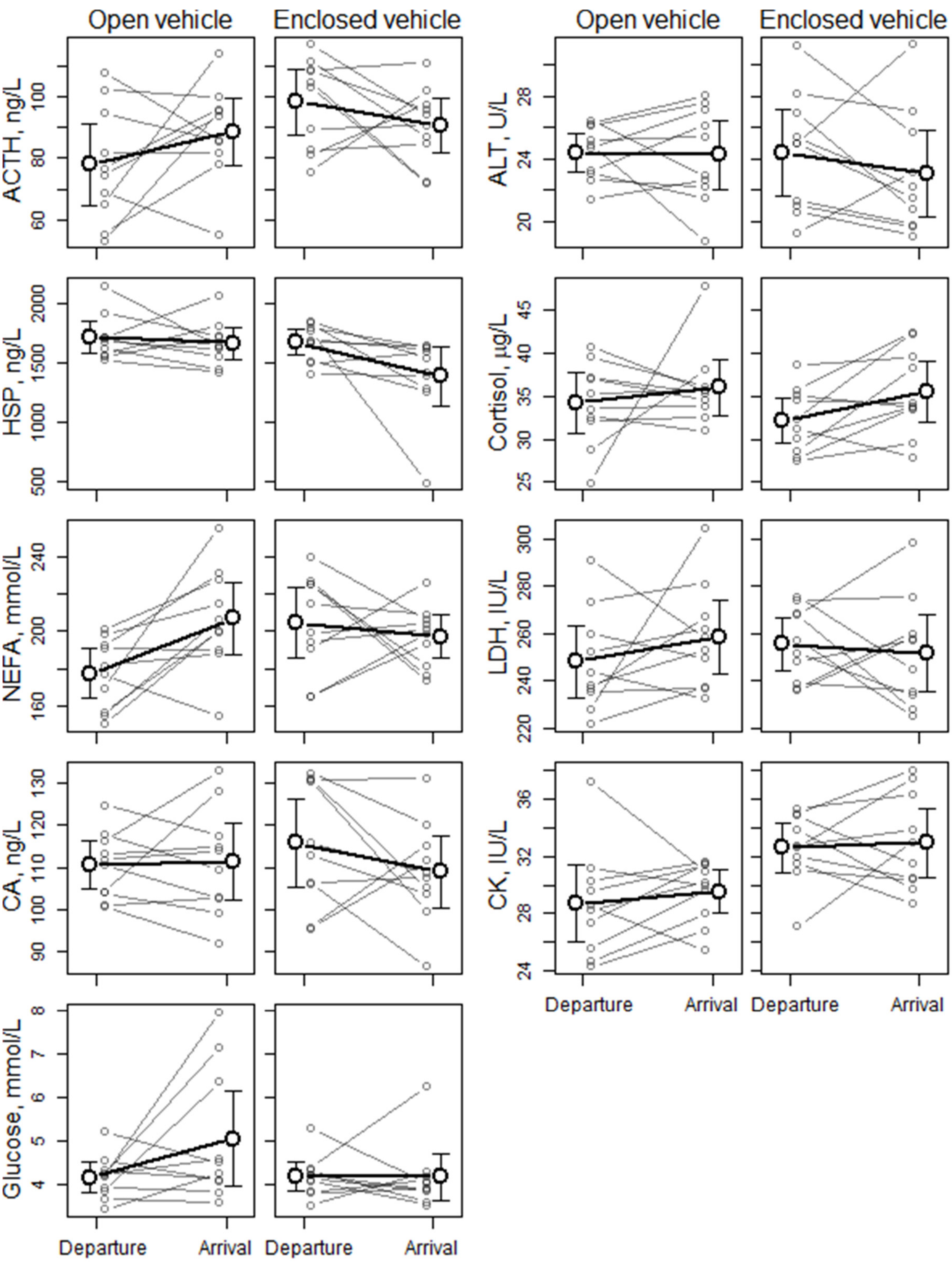
LDH, IU/L	+274.4±10.9	+252.9±14.5	+268.5±16.1	+298±12.5
	(213.0, 315.8)	(206.3, 342.4)	(210.9, 347.0)	(243.9, 364.6)
CA, ng/L	+123.8±8.9	+116.5±4.6	+126.0±5.8	+133.7±4.3
	(95.1, 173.4)	(97.9, 139.7)	(105.2, 162.5)	(119.1, 167.3)
CK, IU/L	+41.5±3.2	+39.8±1.9	+41.5±1.7	+45.2±1.9
	(27.0, 63.7)	(31.1, 53.1)	(36.0, 50.6)	(36.3, 58.3)
Glucose, mmol/L	+3.96±0.09	+4.00±0.2	+3.78±0.1	+3.99±0.4
	(3.62, 4.53)	(3.40, 5.34)	(3.23, 4.28)	(3.26, 7.23)

ACTH = adrenocorticotropic hormone; ALT = alanine aminotransferase; HSP = heat shock protein; NEFA= free fatty acid levels; LDH = lactic acid dehydrogenase; CA = catecholamine; CK = Creatine kinase

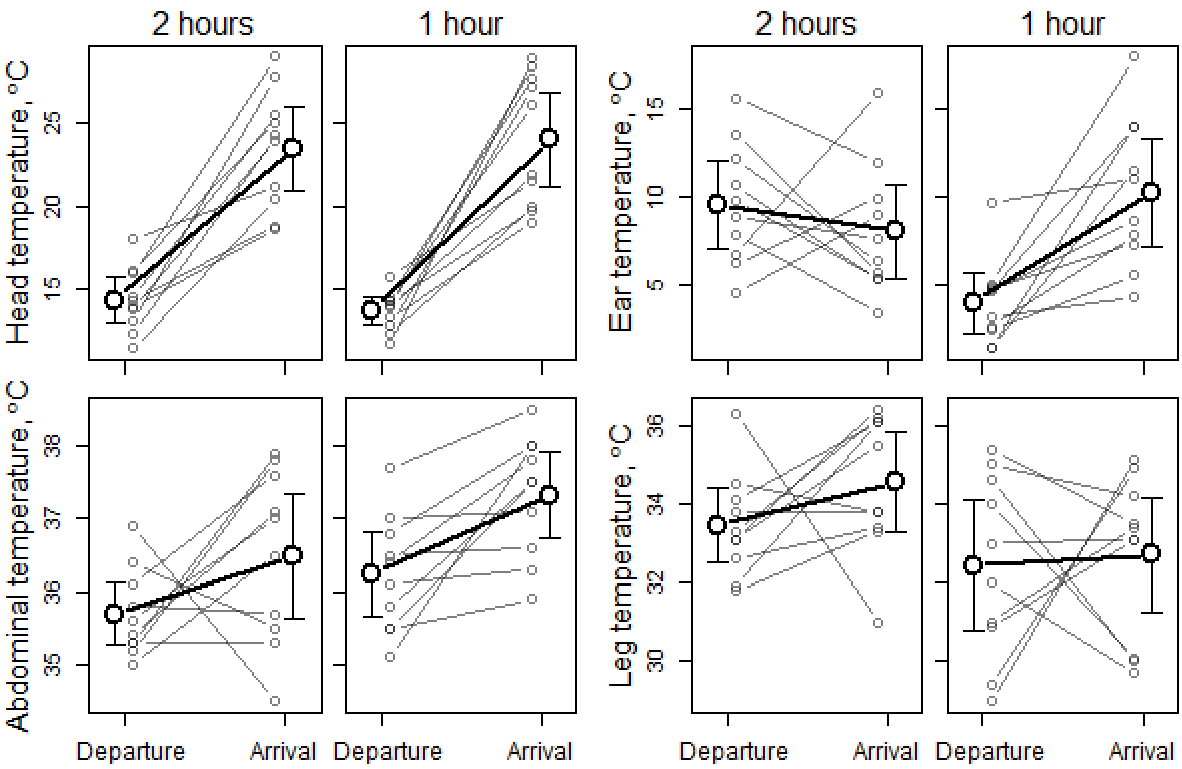
Supplementary Figures



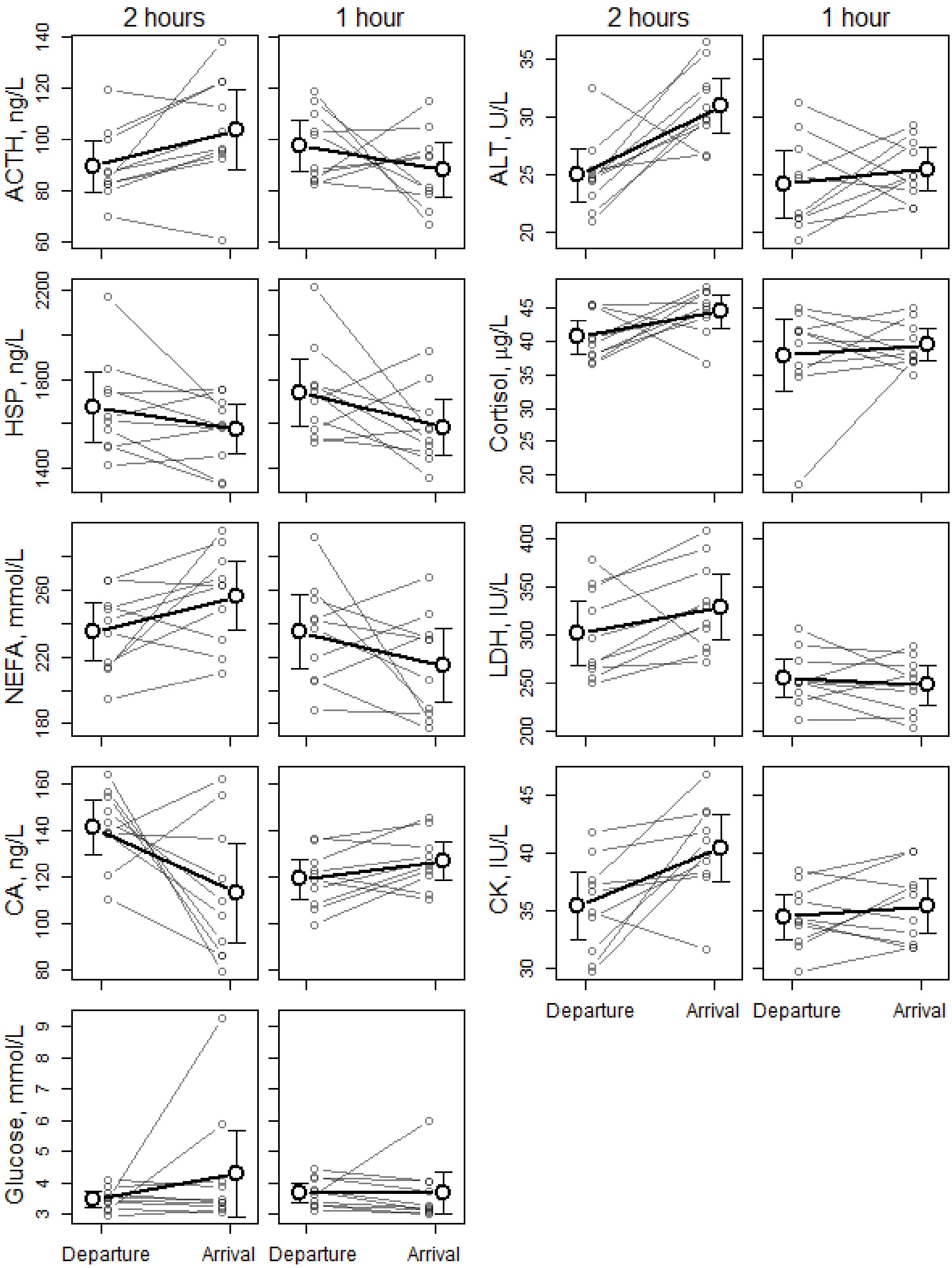
Supplementary Figure S1. Measured temperatures at departure and arrival in experiment 1 (animals exposed *vs* not exposed to the wind during transport). Larger circles with error bars denote mean values with 95% confidence interval, smaller circles joined with lines mark measurements made on single animals.



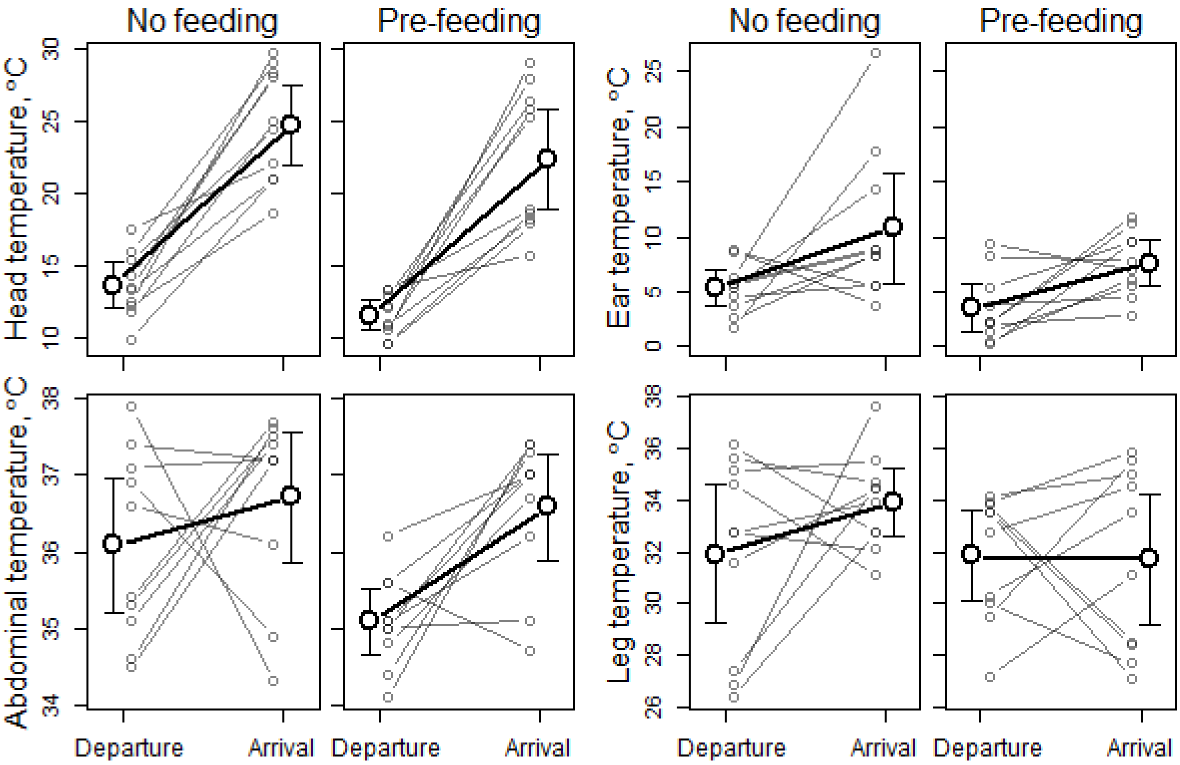
Supplementary Figure S2. Measured blood parameters at departure and arrival in experiment 1 (animals exposed *vs* not exposed to the wind during transport). Larger circles with error bars denote mean values with 95% confidence interval, smaller circles joined with lines mark measurements made on single animals.



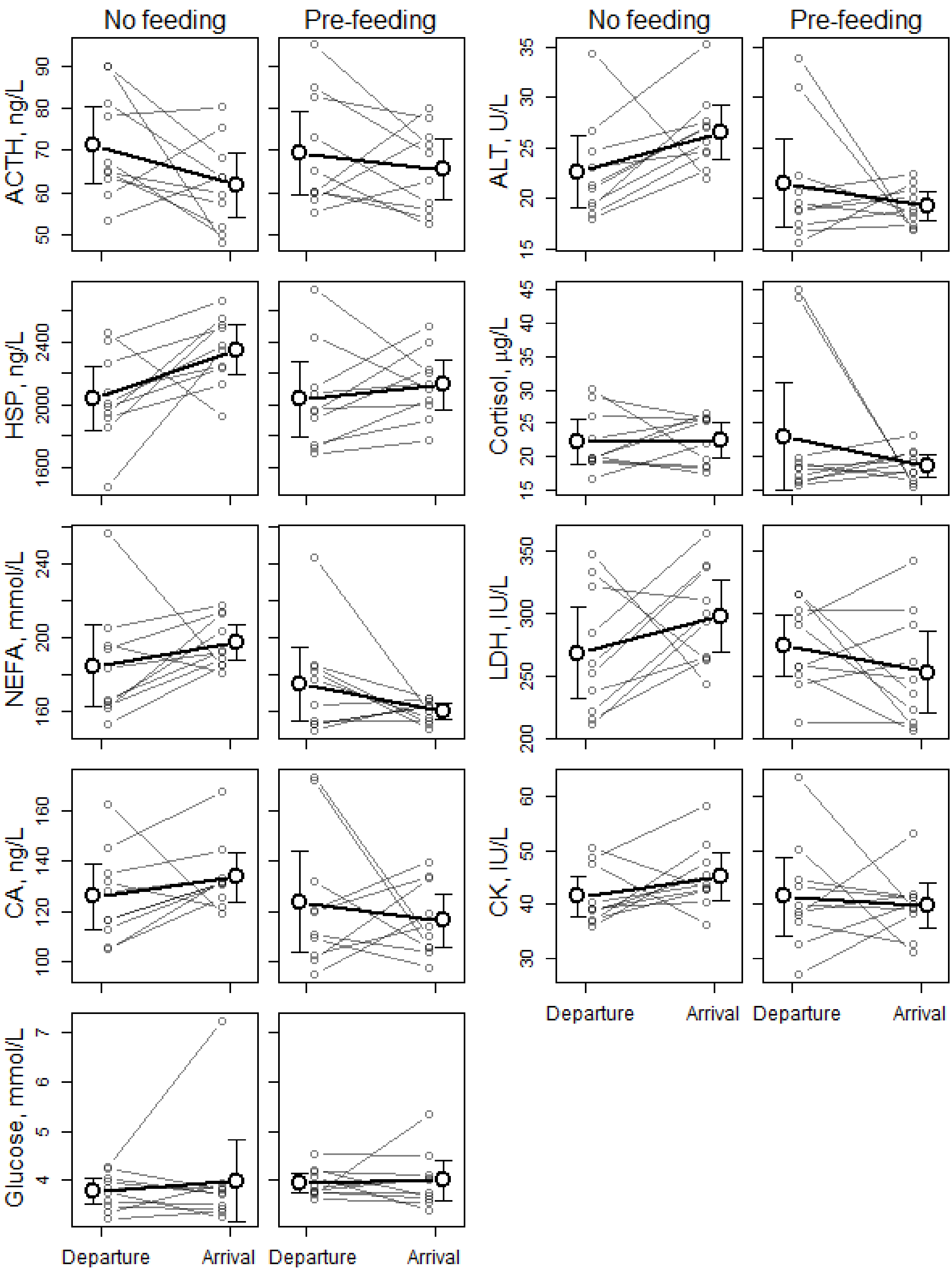
Supplementary Figure S3. Measured temperatures at departure and arrival in experiment 2 (duration of transport 2 hours *vs* 1 hour). Larger circles with error bars denote mean values with 95% confidence interval, smaller circles joined with lines mark measurements made on single animals.



Supplementary Figure S4. Measured blood parameters at departure and arrival in experiment 2 (duration of transport 2 hours *vs* 1 hour). Larger circles with error bars denote mean values with 95% confidence interval, smaller circles joined with lines mark measurements made on single animals.



Supplementary Figure S5. Measured temperatures at departure and arrival in experiment 3 (without *vs* with pre-feeding). Larger circles with error bars denote mean values with 95% confidence interval, smaller circles joined with lines mark measurements made on single animals.



Supplementary Figure S6. Measured blood parameters at departure and arrival in experiment 3 (without *vs* with pre-feeding). Larger circles with error bars denote mean values with 95% confidence interval, smaller circles joined with lines mark measurements made on single animals.

Author Contributions: conceptualization, methodology, resources, BS, XJ and CJCP, supervision DA, collection of data FC, investigation and data curation, FC and TK, writing—original draft preparation, FC, DA and CJCP; writing—review and editing FC, CJCP and DA.

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Institutional Review Board Statement: Sheep were cared for in accordance with the guidelines for animal experiments of Inner Mongolia Agricultural University. The experimental protocol (No: NND20212037) was approved by the Institutional Ethics Committee of Inner Mongolia Agricultural University.

Data Availability Statement: The raw data has not been published or stored elsewhere but is available on request from F.C.

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Conflicts of Interest The authors declare no conflict of interest**.**

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