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Determining thermal stress during the transport of mammals

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DECLARATION

I declare that this dissertation is my own work, with all assistance acknowledged. This dissertation is being submitted for the degree of Master of Science at the University of Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

…….

(KIRSTEN WIMBERGER)

……. day of …… 2005

I certify that the procedures used in this dissertation were approved by the Animals Ethics Screening Committee of the University of Witwatersrand (AESC numbers: 2000/27/4, 2002/24/5, 2002/41/4, 2003/51/3).

PRESENTATIONS

The presentations listed below are offered in support of this dissertation.

Wimberger, K., Faurie, A. S. and Mitchell, D. (2003) Determining thermal stress during transport of animals (oral presentation). At the 31st Annual Congress of the Physiological Society of Southern Africa (PSSA), Potchestroom, 18-20 September.

Wimberger, K., Faurie, A. S. and Mitchell, D. (2005) Rectal temperatures measured after capture do not reflect core body temperature of large mammals (oral presentation). At the 32nd Conference of the Zoological Society of Southern Africa (ZSSA), Grahamstown, 13-15 July.

ABSTRACT

The high morbidity and mortality of wild mammals and livestock during capture and transport is generally ascribed to thermal stress. Consequently, capture operators can benefit from improved methods that may reduce thermal stress. The aim of my study was to develop a practical method of measuring the body temperature of mammals during capture and transport operations. Firstly, I determined whether intermittent temperature recordings, which allow for minute-by-minute monitoring of an animal's temperature, could accurately reflect continuous measures of an animal's rectal temperature. Intermittent temperatures were measured via telemetry while continuous and off-line recordings were measured with data loggers. Secondly, I compared rectal and abdominal temperatures to determine if rectal temperature can provide a practical, non-invasive method of estimating core body temperature. Additionally, I measured body temperature and environmental conditions throughout transportation and compared pre- and post-transport levels of faecal cortisol, and blood cortisol, haematocrit and catecholamines. Measuring rectal temperatures seems to be the only feasible, non-invasive technique to obtain temperature during transport operations. However, rectal temperature records required about 30 minutes to stabilise after inserting a thermometric device. After rectal temperature stabilised, generally the difference between abdominal and rectal temperatures varied greatly for individual animals, while the average differences in temperatures between the body sites were not significant for all, except one, species. I have also shown that

telemeters and data loggers can be used interchangeably to measure the body temperature of animals. The differences between temperatures measured by the devices were not significant, except for substantial differences shown in two animals. The addition of earphones and a large aerial inside the vehicle improved the telemetry results, by limiting the extraneous noise of the capture and transport environment. These conditions probably caused the anomalous readings in the two animals. General thermal responses to stress are that animals showed a peak in temperature due to capture and a decrease in temperature during transport. Therefore, capture-related stress and the likelihood of animals dying during capture could be minimised by ensuring that the animals are not chased longer than a set cut-off time. Further, globe temperature should be monitored to ensure that animals are not captured in high thermal conditions. In contradiction with the current guidelines regarding the appropriate time of day for capture, I recommend that animals should not be caught at the end of the day, as my results show that this is when their body temperatures are the highest. Body temperatures during transport and differences in faeces cortisol before and after transport seem to indicate that animals adapt to repeated stress events.

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TABLE OF CONTENTS **Page**

DECLARATION i

PRESENTATIONS ii

ABSTRACT iii

ACKNOWLEDGEMENTS v

LIST OF FIGURES xi

LIST OF TABLES xiv

CHAPTER 1: Introduction 1

1.1 Stress of capture and transport 2

1.1.1. Causes of stress 2

1.1.2. Responses to stress 3

1.1.2.1 Changes in blood and faecal constituents 3

1.1.2.2. Thermal responses 5

1.2 Measurement of body temperature 9

1.2.1. Rectal thermometry used during the capture and transport of mammals 9

1.2.2. Sites of temperature measurement during capture and transport of mammals 11

1.2.3 Consequences of capture and/or transport on body temperature 18

1.3 Consequences of environmental conditions on body Temperature 21

Page

1.4 Aims 22

CHAPTER 2: Comparison of temperatures measured by telemeters to temperatures measured by data loggers in the rectum of mammals

2.1 Methods 27

2.1.1 Equipment used to measure body temperature 27

2.1.1.1 Calibration 32

2.1.1.2. Time constant 32

2.1.2 Rectal insertion of the combined module 36

2.1.3 Capture and transport 38

2.1.4 Data analysis 40

2.2 Results 41

2.2.1 Time to stabilization 41

2.2.2 Temperature differences between the thermometric devices 44

2.3 Discussion 47

CHAPTER 3: Comparison of temperatures measured in the rectum to temperatures measured in the abdomen of mammals

3.1 Methods 53

3.1.1 Surgical implantation of data loggers into the abdomen 53

3.1.1.1 Surgical procedures common to all species 53

3.1.1.2 Species-specific surgical procedures 57

Page

3.1.2 Rectal insertion of thermometric devices 57

3.1.3 Measurement of rectal and abdominal temperature 58

3.1.3.1 Measurement of temperatures in livestock 58

3.1.3.2 Measurement of temperatures in wild animals 58

3.1.4 Data analysis 60

3.2 Results 61

3.2.1 Rectal temperatures measured by telemeters 61

3.2.1.1 Time to stabilisation 61

3.2.1.2 Temperature differences between the two body sites 62

3.2.2 Rectal temperatures measured by data loggers 65

3.2.2.1 Time to stabilisation 65

3.2.2.2 Temperature differences between the two body sites 68

3.3 Discussion 72

CHAPTER 4: Body temperatures under thermal stress

4.1 Methods 79

4.1.1 Mimicked capture and transport operations 80

4.1.1.1 Surgical implantation of data loggers into abdomen 80

4.1.1.2 Capture and transport procedures 81

4.1.2 Actual capture and transport operations 83

Page

4.1.3 Environmental measurements during capture and transport operations 84

4.1.4 Data analysis 85

4.1.4.1 Mimicked capture and transport operations 85

4.1.4.2 Actual capture and transport operations 91

4.2 Results 91

4.2.1 Mimicked capture and transport operations 91

4.2.2 Actual capture and transport operations 118

4.3 Discussion 124

CHAPTER 5: Comparing pre- and post-transport values of blood and faecal constituents of mammals

5.1 Methods 136

5.1.1 Sample collection 136

5.1.1.1 Blood 136

5.1.1.2 Faeces 137

5.1.2 Faecal cortisol extraction 137

5.1.3 Analysis of cortisol in blood and faeces 138

5.1.4 Analysis of catecholamines in blood of Angora goats 138

5.1.5 Data analysis 141

5.1.5.1 Analyses of catecholamines, cortisol and haematocrit in blood of Angora goats and blesbok 141

Page

5.1.5.2 Analysis of cortisol in faeces of impala and blesbok 141

5.2 Results 141

5.2.1 Analyses of catecholamines, cortisol and haematocrit in blood of Angora goats and blesbok 142

5.2.2 Analysis of cortisol in faeces of impala and blesbok 146

5.3 Discussion 149

CHAPTER 6: Conclusion 154

7 APPENDICES:

1: Ethical clearances and permissions of authorisations to conduct my experiments 159

2: General capture and transport procedures used in my study 160

3.a: Different types of containers on vehicles used to transport animals in my study 162

3.b: Two different ways of loading animals, used in my study 163

3.c: Examples of a trailer and a crate used to transport animals in my study 164

4: Generic name, brand name and supplier of the drugs used in my study 165

8 REFERENCES 169

LIST OF FIGURES **Page**

Figure 2.1: Two thermometric devices used in my study: a data logger (StowAway TidbiT) and a telemeter (Datamet) 29

Figure 2.2: An example of temperatures measured by a telemeter (Mini-Mitter) detected during calibration by simultaneously using hand counts and automated counting, via a radio receiver and a computer 31

Figure 2.3.a: An example of a calibration curve for a telemeter (Mini-Mitter) 33

Figure 2.3.b: An example of a calibration curve for a StowAway TidbiT data logger 34

Figure 2.4: An example of a calibration curve for a data logger (StowAway TidbiT) separately, and joined, in a module, to a telemeter (Mini-Mitter) 35

Figure 2.5: A tsessebe's rectal temperature after capture and during transport, obtained from a module containing both a telemeter (signals were hand-counted) and a data logger 43

Figure 2.6: An elephant's rectal temperature during transport, obtained from a module containing both a telemeter (signals were hand-counted) and a data logger 48

Figure 3.1: Temperatures measured by data loggers in the abdomen and the rectum of a male and female blesbok, during a capture and transport operation 66

Page

Figure 4.1: Diagrammatic representation of how to calculate thermal response indices, using typical temperatures of a mammal undergoing capture and transport, as well as a mammal showing differences in its transport temperature to its nychthemeral rhythm 87

Figure 4.2: Abdominal temperatures of impala during a capture and transport procedure, showing the unusual temperature responses of three impala (outliers) 92

Figure 4.3: Thermal response indices for mean impala and three impala outliers, for loading and transport phases of four transport trips 100

Figure 4.4: Mean time constants for abdominal temperatures of impala, excluding the impala outliers, and mean globe temperature for four transport trips 103

Figure 4.5: Abdominal temperature and environmental conditions during loading and transport of three tsessebe 104

Figure 4.6: Abdominal temperatures of three blesbok during capture and transport on two different transport days 109

Figure 4.7: Average differences between nychthemeral rhythms and abdominal temperatures during transport for Angora goats, as well as average globe temperature during two transports 117

Page

Figure 4.8: Air temperature inside the transport vehicle and rectal temperatures of three blesbok (with only a rectal device) during transport 120

Figure 4.9: Globe temperature of the capture areas and rectal temperature of three white rhinoceroses during three transport trips 121

Figure 4.10: Globe temperature inside the transport vehicles and rectal temperatures of three elephants during three transport trips 123

Figure 5.1: Standard curve for adrenaline standard and noradrenaline standard used to determine the concentration of unknown catecholamines 140

Figure 5.2.a: Changes in haematocrit after transport, from pre-transport values, for individual Angora goats and blesbok 143

Figure 5.2.b: Increases in cortisol concentrations after transport, from pre-transport concentrations, for individual Angora goats and blesbok 144

Figure 5.3: Changes in catecholamine concentrations after transport, from pre-transport concentrations, for individual Angora goats 147

Figure 5.4: Faecal cortisol concentrations from pooled samples before and after various transports for blesbok and impala. 148

LIST OF TABLES **Page**

Table 2.1: Capture and transport conditions of animals that had thermometric devices inserted into their rectums 37

Table 2.2: Pharmacological procedures used during the transport of animals in Chapter 2 39

Table 2.3: Times for data loggers (joined with a telemeter in a module) to stabilise after being inserted into the rectums of animals used in Chapter 2 and the times for the modules to be voided naturally by the animal, manually extracted from the animal or when the animal died 42

Table 2.4.a: The average differences of body temperatures obtained by subtracting temperatures measured by a telemeter from temperatures measured by a data logger in the rectum of each animal and species during the capture and transport procedures 45

Table 2.4.b: Further analysis of data from Table 2.4.a, showing maximum positive and negative deviations of the differences in rectal temperature measurements by data loggers and telemeters and whether the temperatures from the two devices are in agreement with each other 46

Table 3.1: Experimentation sites and animal care for animals that had intra-abdominal data loggers for Chapter 3 55

Page

Table 3.2: Pharmacological procedures used during surgical implantation of data loggers in the abdomen of animals 56

Table 3.3: Pharmacological procedures used during transport of the animals used in Chapter 3 59

Table 3.4.a: The average differences of body temperatures obtained by subtracting temperatures measured by a telemeter in the rectum from temperatures measured by a data logger in the abdomen of each animal 63

Table 3.4.b: Further analysis of data from Table 3.4.a showing maximum positive and negative deviations of the differences in temperature measurements of data loggers in the abdomen and telemeters inserted into the rectum of animals, and whether these differences were significantly different to zero 64

Table 3.5: Times for temperatures recorded by data loggers to stabilise after being inserted into the rectums of animals used in Chapter 3 and the times for a thermometric device to be naturally voided by the animal or when the animal died 67

Table 3.6.a: The average differences of body temperatures obtained by subtracting temperatures measured by a data logger in the rectum from temperatures measured by data loggers in the abdomen for each animal. 69

Page

Table 3.6.b: Further analysis of data from Table 3.6.a, showing maximum positive and negative deviations of the differences in temperature measurements of data loggers in the rectum and abdomen of animals used in Chapter 3, and whether the temperature differences were significantly different to zero 70

Table 4.1: Pharmacological procedures used during mimicked and actual transport of animals in Chapter 4 82

Table 4.2.a: Average pre-loading abdominal temperatures of mean impala and of three impala outliers, for four transport trips 93

Table 4.2.b: Average loading abdominal temperatures of mean impala and of three impala outliers, for four transport trips 94

Table 4.2.c: Average transport abdominal temperatures of mean impala and of three impala outliers, for four transport trips 95

Table 4.3: Peak abdominal temperature of three outlier impala and mean peak temperature for rest of impala, for four transport trips 99

Table 4.4: Peak abdominal temperatures, mean temperature during transport and time of death for three tsessebe in a capture and transport operation 105

Table 4.5: Two thermal response indices for each of the three tsessebe. 107

Table 4.6.a: Differences between three blesbok in their nychthermeral rhythms and in their loading temperatures. 111

Page

Table 4.6.b: Differences between three blesbok in their abdominal temperatures during transport and an hour after transport 113

Table 4.7: Thermal response indices of abdominal temperature during the transport and post-transport phases of three blesbok, for each transport trip 114

Table 4.8: Thermal response indices for five Angora goats 118

Table 5.1: Mean pre-transport values and mean difference of haematocrit, cortisol and catecholamine values during transport, from pre-transport values, for Angora goats and blesbok. 145