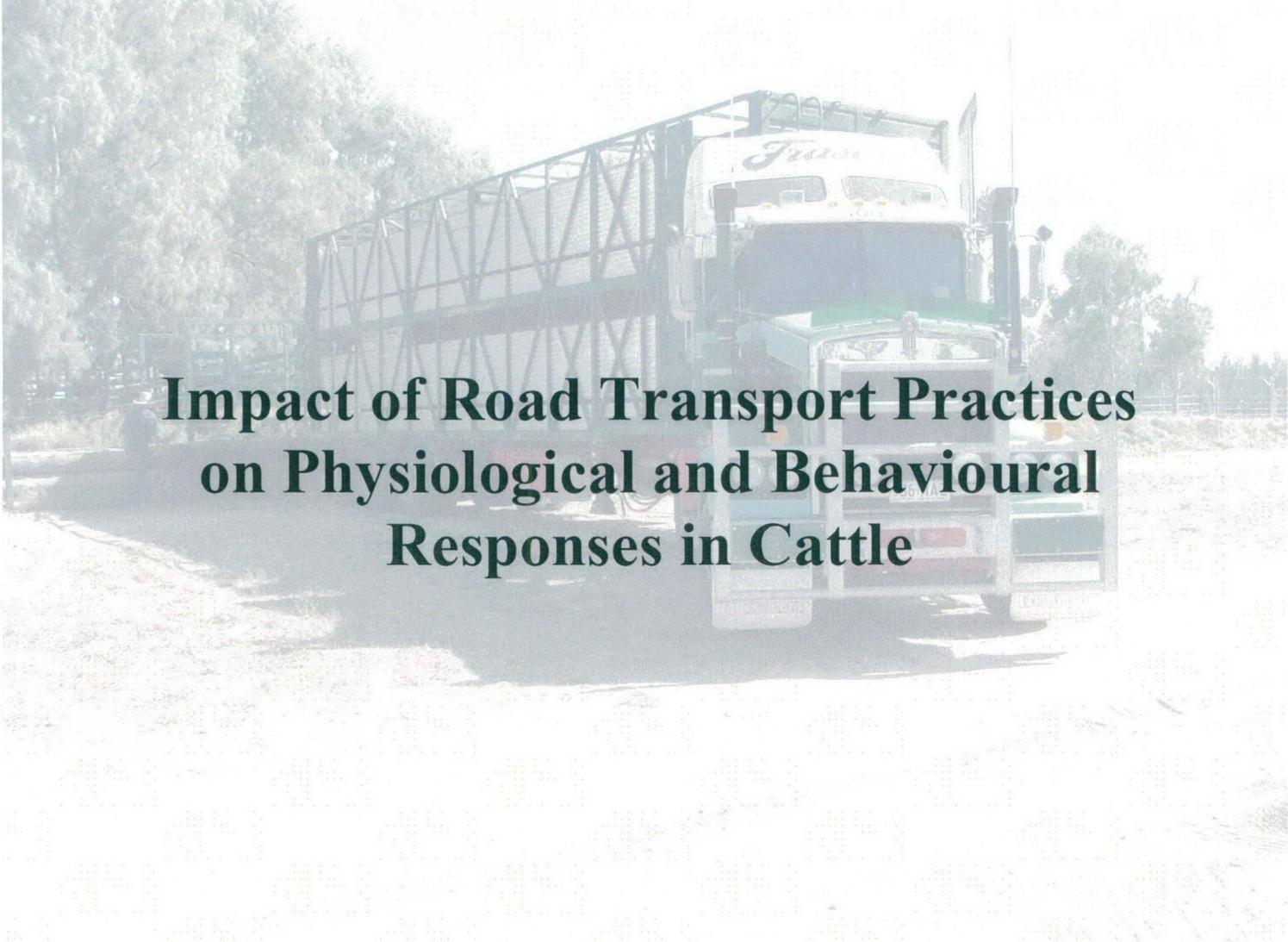


UNIVERSITY OF NEW ENGLAND
SCHOOL OF RURAL SCIENCE AND AGRICULTURE

A photograph of a white Freightliner truck with a metal cage trailer, parked on a dirt road. The truck is facing the camera, and the trailer is empty. The background shows trees and a clear sky.

**Impact of Road Transport Practices
on Physiological and Behavioural
Responses in Cattle**

A THESIS SUBMITTED FOR THE DEGREE OF MASTER OF RURAL SCIENCE

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DECLARATION

I certify that the substance of this thesis has not already been submitted and is not currently being submitted for any other degree. All assistance received in the preparation of this thesis, and all sources used, have been acknowledged.



Sharon G Pettiford

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ABBREVIATIONS

ACTH	Adrenocorticotrophic Hormone
ALB	Albumin
ANOVA	Analysis of Variance
ANS	Autonomic Nervous System
ATP	Adenosine Triphosphate
BAS	Basophils
BHB	Beta Hydroxybutyrate
BRD	Bovine Respiratory Disease
BUN	Blood Urea Nitrogen
CK	Creatine Kinase
CNS	Central Nervous System
CRH	Corticotrophin Releasing Hormone
CV	Coefficient of Variation
EDTA	Ethylenediaminetetraacetic
EOS	Eosinophils
EU	European Union
FFA	Free Fatty Acids
GPS	Global Positioning System
HAPT	Haptoglobin
HCT	Haematocrit
HGB	Haemoglobin
HPA	Hypothalamic Pituitary Adrenal
LYM	Lymphocytes
MCH	Mean Corpuscular Haemoglobin
MCHC	Mean Corpuscular Haemoglobin Concentration
MCV	Mean Corpuscular Volume
MJ	Megajoules
MON	Monocytes
NEU	Neutrophils
N:L	Neutrophil to Lymphocyte Ratio
NSW	New South Wales
OSMOL	Osmolality
PCV	Packed Cell Volume
pH	Hydrogen-ion Concentration
PT	Pre-transport
QLD	Queensland
RBC	Red Blood Cell; Red Blood Count
RH	Relative Humidity
RIA	Radioimmunoassay
RPM	Revolutions Per Minute
SA	Sympatho-adrenal
SCARM	Standing Committee on Agriculture and Resource Management
SED	Standard Error of the Difference
THI	Temperature Humidity Index
TP	Total Protein
US	United States
WBC	White Blood Cell; White Blood Count
WBT	Wet Bulb Temperature
WSPA	World Society for the Protection of Animals

ABSTRACT

The movement of cattle by road transport in Australia is necessary and is common practice for many rural operations. Whilst acknowledging the importance of livestock transport by road, the impact that transport has on the animal's well-being is not well understood, particularly under Australian transport conditions. The purpose of this thesis was to investigate the impact of two different loading practices combined with 6 h of road transport and secondly to examine the impact of transport duration on the physiological and behavioural responses in cattle.

The first experiment investigated the impact of an electric prodder at loading versus normal quiet loading without a prodder (control), followed by a 6 h road transport journey and a 17 h recovery period. Use of an electric prodder during loading compared with those animals that were loaded without the prodder did not modify the physiological responses to loading, transport or the rate of recovery. The physiological responses in yearling cattle indicated that most stress occurred during loading and the initial stages of transport, but after this the cattle habituated and coped well with the 6 hours of transport. Following 17 h of recovery, nearly all the variables measured had returned to their pre-transport levels. However, this does not mean that such practices are advocated during loading. The post-transport values and rates of recovery of the physiological measurements suggest that 6 h of road transport did not create a substantial imposition on the welfare of healthy yearling cattle.

The second study examined the transport of cattle for journey durations of 6, 12, 30 and 48 h. The aim of the experiment was to quantify the impact of transport duration from farm to

feedlot on behavioural and physiological indicators of cattle welfare. Significant interactions between transport duration and time were observed for the majority of the blood measurements and liveweight. The physiological measurements recorded in this study indicated that duration did impact on the level of biological cost to the animals, with the largest treatment effect observed immediately on arrival for all treatment groups. These effects were generally not large and the majority were often still within normal physiological values. The group that underwent the 48 h treatment lost the greatest amount of liveweight. Hence there was a positive relationship between transport duration and the loss in liveweight, however, the differences between treatments were not always significant. The cattle recovered the majority (95 – 98%) of the weight lost through trucking after 72 h of recovery with *ad libitum* food and water.

This final study also indicated that cattle that were transported 48 h spent significantly more time lying down in the recovery yards, than cattle transported for 12 h, during the initial 3 h post-transport recovery period. However, during the second 3 h period, the results differed between replicates and less time was spent lying by the cattle transported for 48 h and more drinking and eating activity was observed. Transport duration had no effect on feedlot average daily gain over the 42 day feedlot finishing period that occurred post recovery. The results of this study generally indicate that healthy cattle that have not had restricted access to food or water prior to transport can tolerate best practice transport of these durations without major compromise to their welfare or productive capacity.

Abstract

The results obtained from these studies address research that is pertinent to loading and long distance transport of cattle by road in Australia. Notably, this research gives a better understanding of the impact of livestock transport on cattle welfare. The two investigations of loading practices and transport duration show that loading and the initial stages of transport can be somewhat stressful, however as the journey progresses cattle habituate to the transport process, whether it be of short or long duration. Moreover, the results indicate that if the cattle to be transported are healthy, and have not been deprived of feed or water prior to commencement of transport a substantial recovery can be achieved within 3 days of *ad libitum* good quality feed and clean water. Most importantly these two studies have scientifically validated and more clearly defined how healthy cattle respond to different loading treatments and journey durations during both transit and recovery under Australian conditions.

Keywords: Cattle, Loading, Duration, Stress, Transport, Recovery

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