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**The Impact of Paradise Shelducks (*Tadorna variegata*)  
on Pastoral Communities and their Role as Reservoirs  
of Agricultural Diseases**

A thesis submitted in partial fulfilment of the requirements for the degree of  
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## Abstract

Since its habitat expansion, due to human land clearance for farmland, paradise shelducks (*Tadorna variegata*) have established a firm foothold in the New Zealand agricultural environment. Paradise shelducks feed primarily on agricultural pasture and consequently compete directly with livestock for resources. As a result many farmers consider paradise shelducks to be a pest. In addition, it is a common perception that paradise shelducks contaminate agricultural land with their faeces. Although there is a wealth of information on the impacts of waterfowl on agricultural industries and diseases associated with waterfowl, no studies have specifically looked at the potential impact paradise shelducks pose on New Zealand's agricultural practices. The aims of this study were to 1) determine the presence and prevalence of pathogenic micro-organisms in paradise shelduck faeces and their associated environment, 2) evaluate the findings in terms of transmission routes and the relative risk to livestock and humans, 3) determine whether paradise shelducks have an affect on primary pasture production and composition, and 4) estimate the daily food intake rates of paradise shelducks.

This study was based on a population of paradise shelducks in Tawharanui Regional Park over each of four seasons from 2006-2007. The prevalence of pathogenic micro-organisms was determined by paradise shelduck faecal surveys for selected bacteria and parasites. Surveys were conducted for flock birds and breeding pairs. Additionally, faecal samples of sympatric species and water troughs were analysed. The impacts of paradise shelducks on pastoral communities was assessed by means of an exclusion experiment, consisting of two types of enclosure; a 'closed' enclosure to exclude all animals including paradise shelducks, and an 'open' enclosure to exclude livestock, but to allow access for paradise shelducks. Daily food intake rates for paradise shelducks were estimated from observational foraging data and necropsies of paradise shelducks.

Results show that no isolates of *Salmonella*, *Campylobacter*, *Yersinia*, *Cyrtosporidium* or *Giardia* were found. Relatively low prevalences of non haemolytic and alpha haemolytic *Streptococci*, *Enterococcus*, *Bacillus*, *Clostridium perfringens*, *Proteus mirabilis*, strongyle eggs and *Coccidia* eggs were found. Additionally, *E. coli* was consistently isolated from the faecal samples throughout the sampling period. However, the serotypes of the micro-organisms isolated were not determined, so no conclusions could be drawn in relation to their pathogenicity. Furthermore, no significant

correlations were found between the number of accumulated faeces sampled and the presence or prevalences of the micro-organisms isolated. It also appears that sampling during the driest times of the year will yield the highest presence of micro-organisms in paradise shelduck faeces. An array of micro-organisms, similar to those found in paradise shelduck faeces, were found in pukekos and house sparrow faeces as well as high contamination levels of faecal indicators in troughs. No conclusive transmission routes for the micro-organisms were found. Paradise shelducks were found to have a significant impact on pasture production and to selectively graze white clover (*Trifolium repens*). Furthermore, it was estimated that the paradise shelducks had a foraging intake rate of  $104 \pm 15$ g/day of pasture dry matter. The results confirmed that paradise shelducks can have an affect on agricultural land. A more long term study in different regions is required to evaluate the full extent to which paradise shelducks affect agricultural production in New Zealand.

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# Table of Contents

ABSTRACT.....	II
ACKNOWLEDGEMENTS.....	IV
LIST OF FIGURES.....	VII
LIST OF TABLES.....	IX
LIST OF PLATES.....	X
CHAPTER 1 : GENERAL INTRODUCTION.....	1
1.1 DIVERSITY OF WATERFOWL IN NEW ZEALAND .....	2
1.2 THE SHELDUCK .....	2
1.3 THE PARADISE SHELDUCK .....	4
1.3.1 <i>Annual Cycle</i> .....	4
1.3.2 <i>Distribution Patterns and Current Status</i> .....	6
1.3.3 <i>Farmers and Public Perception of Paradise Shelducks</i> .....	8
1.4 OUTLINE OF THE PRESENT STUDY.....	9
1.5 REFERENCES.....	12
CHAPTER 2 : MICRO-ORGANISMS OF PARADISE SHELDUCK FAECES AND THEIR EFFECTS ON AN AGRICULTURAL ENVIRONMENT .....	14
2.1 ABSTRACT.....	15
2.2 INTRODUCTION.....	16
2.2.1 <i>Pathogenic micro-organisms associated with waterfowl</i> .....	16
2.2.2 <i>Potential agriculture, livestock, economic and public health impacts</i> .....	18
2.3 BACKGROUND ON TARGETED PATHOGENIC MICRO-ORGANISMS .....	21
2.3.1 <i>Bacteria</i> .....	21
2.3.1.1 <i>Salmonella</i> .....	21
2.3.1.2 <i>Campylobacter</i> .....	22
2.3.1.3 <i>Yersinia</i> .....	23
2.3.1.4 <i>Escherichia coli</i> .....	23
2.3.1.5 <i>Bacillus</i> .....	24
2.3.1.6 <i>Streptococci</i> .....	24
2.3.1.7 <i>Enterococcus</i> .....	24
2.3.1.8 <i>Clostridium</i> .....	25
2.3.2 <i>Faecal parasites</i> .....	25
2.3.2.1 <i>Cryptosporidium</i> .....	25
2.3.2.2 <i>Giardia</i> .....	25
2.3.2.3 <i>Ascarid</i> .....	26
2.4 OBJECTIVES.....	26
2.5 METHODS.....	27
2.5.1 <i>Study Site</i> .....	27
2.5.2 <i>Faecal sampling</i> .....	29
2.5.2.1 Methods used by NZVP .....	31
2.5.2.1.1 <i>Bacteria isolation</i> .....	31
2.5.2.1.1.1 <i>Aerobic culture method</i> .....	31
2.5.2.1.1.2 <i>Anaerobic culture method</i> .....	31
2.5.2.1.1.3 <i>Enteric screen culture method</i> .....	31
2.5.2.1.1.4 <i>Antibiotic sensitivity testing</i> .....	32
2.5.2.1.1.5 <i>Ziehl-Neelsen stain</i> .....	33
2.5.2.1.2 <i>Faecal parasite counts</i> .....	33
2.5.2.1.2.1 <i>Cryptosporidium</i> .....	33
2.5.2.1.2.2 <i>Giardia</i> .....	33
2.5.2.1.2.3 <i>Faecal egg count</i> .....	34
2.5.3 <i>Trough water samples</i> .....	34
2.5.3.1 Methods used by Watercare Services Ltd. ....	34
2.5.3.1.1 <i>Escherichia coli isolation and counts</i> .....	34
2.5.3.1.2 <i>Fecal coliform isolation and counts</i> .....	35
2.5.3.1.3 <i>Salmonella isolation</i> .....	35
2.5.4 <i>Statistical analysis</i> .....	36
2.6 RESULTS .....	36

2.6.1	<i>Faecal micro-organisms</i> .....	36
2.6.1.1	<i>E. coli</i> .....	38
2.6.1.2	Non haemolytic Streptococci .....	41
2.6.1.3	Alpha haemolytic Streptococci .....	42
2.6.1.4	Enterococcus .....	44
2.6.1.5	Bacillus .....	46
2.6.1.6	Proteus mirabilis .....	48
2.6.1.7	Additional faecal micro-organisms .....	51
2.6.1.8	Pukeko and house sparrow comparison .....	51
2.6.2	<i>Water troughs</i> .....	52
2.7	DISCUSSION .....	54
2.7.1	<i>Salmonella</i> .....	54
2.7.2	<i>Campylobacter</i> .....	56
2.7.3	<i>Yersinia</i> .....	56
2.7.4	<i>E. coli</i> .....	57
2.7.5	<i>Additional bacteria</i> .....	58
2.7.6	<i>Huia database</i> .....	59
2.7.7	<i>Faecal parasites</i> .....	59
2.7.8	<i>Flock size</i> .....	60
2.7.9	<i>Seasonal effect</i> .....	61
2.7.10	<i>Host species comparison</i> .....	61
2.7.11	<i>Troughs</i> .....	63
2.7.12	<i>Paradise shelduck as reservoirs</i> .....	64
2.8	CONCLUSIONS .....	66
2.9	REFERENCES .....	69
<b>CHAPTER 3 : PARADISE SHELDUCKS AS GRAZERS IN PASTORAL COMMUNITIES .....</b>		<b>75</b>
3.1	ABSTRACT .....	76
3.2	INTRODUCTION .....	77
3.3	OBJECTIVES .....	79
3.4	METHODS .....	80
3.4.1	<i>Pasture trials</i> .....	80
3.4.2	<i>Estimation of daily pasture intake</i> .....	82
3.4.3	<i>Environmental conditions</i> .....	82
3.4.4	<i>Statistical analysis</i> .....	83
3.5	RESULTS .....	84
3.5.1	<i>Bird species counts</i> .....	84
3.5.2	<i>Environmental conditions</i> .....	85
3.5.3	<i>Pasture primary production</i> .....	86
3.5.4	<i>Pasture species composition</i> .....	88
3.5.5	<i>Pasture intake rate</i> .....	95
3.6	DISCUSSION .....	95
3.6.1	<i>Pasture primary production</i> .....	95
3.6.2	<i>Pasture species composition</i> .....	97
3.6.3	<i>Pasture intake rate</i> .....	99
3.7	CONCLUSION .....	101
3.8	REFERENCES .....	103
<b>CHAPTER 4 : GENERAL CONCLUSION .....</b>		<b>107</b>
4.1	REFERENCES .....	112
<b>APPENDIX I .....</b>		<b>112</b>
<b>APPENDIX II .....</b>		<b>113</b>
<b>APPENDIX III .....</b>		<b>115</b>
<b>APPENDIX IV .....</b>		<b>115</b>
<b>APPENDIX V .....</b>		<b>116</b>

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## List of Figures

<b>Figure 2.1.</b> Possible transmission routes of exposure and dissemination of micro-organism pathogens between waterfowl and livestock. ....	19
<b>Figure 2.2.</b> (a) Map of New Zealand outlining the Hauraki Gulf. (b) Enlarged map of Auckland showing the Hauraki Gulf and Tawharanui Regional Park. ....	28
<b>Figure 2.3.</b> (a) Map of Tawharanui Regional Park outlining the study area. (b) Enlarged map of study area showing Sites 1 (Pair Site), 2 and 3 (Flock Site) and trough locations. ....	29
<b>Figure 2.4.</b> Mean total number of micro-organisms found in paradise shelduck faecal samples to sampling dates. ....	37
<b>Figure 2.5.</b> Total number of micro-organisms found in each paradise shelduck faecal sample to number of faeces from different individuals per sample for all sampling dates. ....	37
<b>Figure 2.6.</b> <i>E. coli</i> growth values in paradise shelduck faecal samples to sampling date. ....	38
<b>Figure 2.7.</b> Mean <i>E. coli</i> growth values in paradise shelduck faecal samples to sampling date. Letters represent significantly different means at a 0.05 level (Tukey test). ....	39
<b>Figure 2.8.</b> <i>E. coli</i> growth values in paradise shelduck faecal samples to number of accumulated faeces per sample for a) all sampling dates, b) samples in the low season (May & August 2006) and c) samples in the high season (November 2006 & March 2007). ....	40
<b>Figure 2.9.</b> Non Haemolytic <i>Streptococci</i> growth values in paradise shelduck faecal samples to sampling date. ....	41
<b>Figure 2.10.</b> Mean Non Haemolytic <i>Streptococci</i> growth values in paradise shelduck faecal samples to sampling date. Letters represent significantly different means at a 0.05 level (Tukey test). ....	42
<b>Figure 2.11.</b> Non Haemolytic <i>Streptococci</i> growth values in paradise shelduck faecal samples to number of accumulated faeces per sample. ....	42
<b>Figure 2.12.</b> Alpha Haemolytic <i>Streptococci</i> growth values in paradise shelduck faecal samples to sampling date. Data points represent means $\pm$ SE. ....	43
<b>Figure 2.13.</b> Mean Alpha Haemolytic <i>Streptococci</i> growth values in paradise shelduck faecal samples to sampling date. Letters represent significantly different means at a 0.05 level (Tukey test). ....	43
<b>Figure 2.14.</b> Alpha Haemolytic <i>Streptococci</i> growth values in paradise shelduck faecal samples to number of accumulated faeces per sample. ....	44
<b>Figure 2.15.</b> <i>Enterococcus</i> growth values in paradise shelduck faecal samples to sampling date. Data points represent means $\pm$ SE. ....	45
<b>Figure 2.16.</b> Mean <i>Enterococcus</i> growth values in paradise shelduck faecal samples to sampling date. Letters represent significantly different means at a 0.05 level (Tukey test). ....	45
<b>Figure 2.17.</b> <i>Enterococcus</i> growth values in paradise shelduck faecal samples to number of accumulated faeces per sample. ....	46
<b>Figure 2.18.</b> <i>Bacillus</i> growth values in paradise shelduck faecal samples to sampling date. ....	47
<b>Figure 2.19.</b> Mean <i>Bacillus</i> growth values in paradise shelduck faecal samples to sampling date. Letters represent significantly different means at a 0.05 level (Tukey test). ....	47
<b>Figure 2.20.</b> <i>Bacillus</i> growth values in paradise shelduck faecal samples to number of accumulated faeces per sample. ....	48



**Figure 2.21.** *Proteus mirabilis* growth values in paradise shelduck faecal samples to sampling date. Data points represent means  $\pm$  SE. .... 49

**Figure 2.22.** Mean *Proteus mirabilis* growth values in paradise shelduck faecal samples to sampling date. Letters represent significantly different means at a 0.05 level (Tukey test). .... 49

**Figure 2.23.** *Proteus mirabilis* growth values in paradise shelduck faecal samples to number of accumulated faeces per sample for a) all sampling dates. b) samples in the high season (November 2006 & March 2007). .... 50

**Figure 2.24.** Growth values of micro-organisms found in faecal samples of paradise shelducks, pukekos and house sparrows. Note: The paradise shelduck figures are the mean growth values of all the sampling groups for the May 2006 sampling date. .... 52

**Figure 2.25.** Concentration of *E. coli* (cfu/100ml) found in water samples taken from water troughs at Tawharanui Regional Park. .... 53

**Figure 2.26.** Concentration of faecal coliforms (cfu/100ml) found in water samples taken from water troughs at Tawharanui Regional Park. .... 53

**Figure 3.1.** Number ( $\bar{x}$  : SE) of paradise shelducks observed at each of the three study sites (Figure 2.3) at Tawharanui Regional Park over the entire sampling period. .... 85

**Figure 3.2.** Accumulated pasture dry matter ( $\bar{x}$  : SE kg/ha) for both closed and open exclosures over a four week growth period in each sampling month for flock and pair treatments. .... 87

**Figure 3.3.** Total mean pasture species composition (%) for both closed and open exclosures over a four week growth period in each sampling month for flock and pair treatment types. .... 90

**Figure 3.4.** Total mean pasture clover composition (%) for both closed and open exclosures over a four week growth period in each sampling month for flock and pair treatment types. .... 94

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## List of Tables

<b>Table 1.1.</b> Anatidae species found in New Zealand.....	3
<b>Table 2.1.</b> Samples sent to NZVP for analysis. ....	30
<b>Table 2.2.</b> Quantitative growth values of bacteria isolates. ....	31
<b>Table 2.3.</b> Growth values for micro-organisms found in paradise shelduck faeces. ....	51
<b>Table 2.4.</b> <i>Salmonella</i> presence in water troughs at Tawharanui Regional Park.....	54
<b>Table 3.1.</b> Testing methods for soil nutrient levels by NZLABS.....	83
<b>Table 3.2.</b> Mean $\pm$ SE (n=4) number of birds observed in all three study sites combined at Tawharanui Regional Park over the entire sampling period. ....	84
<b>Table 3.3.</b> Mean $\pm$ SE (range) and ANOVAs (df) for environmental measures inside open and closed enclosures at Tawharanui Regional Park.....	85
<b>Table 3.4.</b> Repeated measures analysis of variance (Pillai's Trace) for the effects of time, flock size (flock or pair sites), season and enclosure type (open or closed) on the net accumulated dry matter production. ....	86
<b>Table 3.5.</b> Three-way analysis of variance (ANOVA) for the effects of flock size (flock or pair sites), season and enclosure type (open or closed) on the net accumulated dry matter production for each week of the trial.....	88
<b>Table 3.6.</b> Repeated measures analysis of variance (Pillai's Trace) for the effects of time, flock size (flock or pair sites), season and enclosure type (open or closed) on the pasture composition (%) of ryegrass.....	89
<b>Table 3.7.</b> Three-way analysis of variance (ANOVA) for the effects of flock size (flock or pair sites), season and enclosure type (open or closed) on the pasture composition (%) of ryegrass. for each week of the trial.....	90
<b>Table 3.8.</b> Repeated measures analysis of variance (Pillai's Trace) for the effects of time, flock size (flock or pair sites), season and enclosure type (open or closed) on the pasture composition (%) of kikuyu.....	91
<b>Table 3.9.</b> Three-way analysis of variance (ANOVA) for the effects of flock size (flock or pair sites), season and enclosure type (open or closed) on the pasture composition (%) of kikuyu. for each week of the trial.....	92
<b>Table 3.10.</b> Repeated measures analysis of variance (Pillai's Trace) for the effects of time, flock size (flock or pair sites), season and enclosure type (open or closed) on the pasture composition (%) of clover. ....	93
<b>Table 3.11.</b> Three-way analysis of variance (ANOVA) for the effects of flock size (flock or pair sites), season and enclosure type (open or closed) on the pasture composition (%) of clover. for each week of the trial. ....	93
<b>Table 3.12.</b> Mean $\pm$ SE amount of food ingested by paradise shelducks shot in the Auckland Region, mean $\pm$ SE foraging data for paradise shelducks at Tawharanui Regional Park and the estimated daily food intake for paradise shelducks.. ....	95

# List of Plates

<b>Plate 1.1.</b> Photo by M. Delaney 2006.....	1
<b>Plate 2.1.</b> Photo by M. Delaney 2006.....	14
<b>Plate 2.2.</b> Paradise shelduck pair on water trough. Photo by M. Delaney 2006.....	35
<b>Plate 3.1.</b> Photo by M. Delaney 2006.....	75
<b>Plate 3.2.</b> Showing a sampling site containing a set of exclosures: two closed exclosures and two open exclosures. Photo by M. Delaney 2006.....	80
<b>Plate 4.1.</b> Photo by M. Delaney 2006.....	107