Impacts of Wildlife Grazing on Pastures in the Midlands, Tasmania

By Rowan William Smith
B. Agr. Sc. (Hons)
University of Tasmania

This thesis is submitted in fulfilment of the requirement for the degree of Doctor of Philosophy at the University of Tasmania

Launceston
August 2012
Statements and Declarations

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This thesis contains no material which has been accepted for a degree or diploma by the University or any other institution, except by way of the background information and duly acknowledged in the thesis, and to the best of my knowledge and belief no material previously published or written by another person except where due acknowledgement is made in the text of the thesis, nor does the thesis contain any material that infringes copyright.

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Statement of Co-Authorship
A published refereed paper, based on some of the research presented in Chapter 3 and Chapter 4 of the thesis, is included as an appendix:

The following people and their institutions are listed as authors on the publication:

- Rowan Smith, School of Agricultural Science, UTAS (60%)
- Dr Mick Statham, Tasmanian Institute of Agriculture (10%)
- Prof. Tony Norton, School of Agricultural Science, UTAS (7.5%)
- Dr Richard Rawnsley, School of Agricultural Science, UTAS (7.5%)
- Mrs Helen Statham, Tasmanian Institute of Agriculture (5%)
- Dr Alistair Gracie, School of Agricultural Science, UTAS (5%)
- Dr Danny Donaghy, School of Agricultural Science, UTAS (5%)

**Author details and their roles:**

Rowan Smith undertook the research as part of his research program and candidature for a PhD at UTAS. He was the primary author of the paper with input from his co-authors. All co-authors contributed to the idea for the research and its formalisation and development. Dr Mick Statham, Dr Richard Rawnsley and Prof Tony Norton provided advice on the refinement and presentation of the paper. Dr Alistair Gracie provided assistance with the data analysis and presentation of results. The relative contributions of the co-authors to the paper are reflected by their listing.

We the undersigned agree with the above stated proportion of work undertaken by the primary and co-authors of the refereed published paper that is included in the appendix of this thesis:

Signed:  

Professor Tony Norton  
Primary Supervisor  
(ex) School of Agricultural Science  
University of Tasmania

Prof Holger Meinke  
Head of School  
School of Agricultural Science  
University of Tasmania

Date:  August 2012
Statement of ethical conduct

The research associated with this thesis abides by the international and Australian codes on human and animal experimentation, the guidelines by the Australian Government’s Office of Gene Technology Regulator and the rulings of the Safety, Ethics and Institutional Biosafety Committees of the University. Animal ethics approval number A0009820.

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Abstract

Management of Tasmania’s native and introduced wildlife on private land is a contentious issue for landowners, animal welfare groups and the Tasmanian State Government. In 2005 the use of the poison 1080 (sodium monofluoroacetate) to kill wildlife was banned from use on public lands and the State Government has planned to cease all use by 2015. Many farmers believe that the impact of grazing by native wildlife on pastures is significant and results in a considerable financial impost. However, only limited research has been undertaken to quantify this wildlife grazing impact. Grazing and browsing wildlife include Forester kangaroo (*Macropus giganteus tasmaniensis*), Bennett’s wallaby (*Macropus rufogriseus rufogriseus*), Tasmanian pademelon (*Thylogale billardierii*), brushtail possum (*Trichosurus vulpecula*) and fallow deer (*Dama dama*).

Results of a grazing impact study in the Midlands region of Tasmania found that in the year 2009 alone, average pasture loss for the area 0-800 m from the native vegetation edge was 1,730 kg dry matter (DM)/ha. These losses of pasture decreased with increasing distance from native vegetation and varied between 0-100% depending on season and distance from native vegetation. Periodic harvests of pasture plots and collection of wildlife faecal pellets indicated shifts in grazing behaviour with reference to seasonal pasture feed availability. Pasture losses and faecal collections were lowest during spring 2009, while pasture losses were greatest during winter 2008, matching highest and lowest pasture growth rates over the experimental period.

Production of perennial and annual grasses was greater in protected plots (areas protected by grazing exclusion cages) than exposed plots (not protected by cages), while the amount of subterranean clover (*Trifolium subterraneum*) increased in 2009 in exposed plots possibly due to reduced competition from grasses. Composition of annual grasses was greater in enclosed plots in close proximity to the native vegetation and the amount of bare ground was greater in exposed plots.
Exclusion of grazing for 2 years had no significant (P>0.05) effect on soil health parameters such as: ammonium nitrogen, nitrate nitrogen and organic carbon levels, pH, electrical conductivity, and root biomass. Microbial analysis also indicated no significant (P>0.05) effect on bacterial biomass, fungal biomass, total active microbial biomass, and fungal/bacterial ratio. These results indicated that either 2 years may not have been a long enough trial period to detect changes in soil health, or that the size of exclosure treatments may have been too small to prevent buffering influence from outside the exclosure.

A study investigating the influence of grazing damage during pasture establishment found that wildlife grazing had a significant (P<0.05) effect on production of all 4 pasture types sown. Pasture types containing phalaris (*Phalaris aquatica*) produced the highest DM and had greater ground cover than pasture types based mainly on ryegrass (*Lolium perenne*) and cocksfoot (*Dactylis glomerata*).

Pasture biomass losses under some conditions were found to be as high as 100% within 25m and 68% within 800 m of native vegetation. However, feed availability was found to be a large determinant in the distance and direction wildlife will travel to graze. Continued exposure to wildlife grazing resulted in a higher proportion of bare ground and reduced production of annual and perennial grasses. Control of wildlife grazing during pasture establishment may be necessary to reach optimum production and protect pasture species susceptible to grazing at the seedling stage. Continued grazing of pastures by wildlife is likely to amplify the effects of drought. The results of this thesis provide important information to land owners and that can better equip them to manage wildlife not only at a property scale, but also a catchment scale.
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