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Examiner comment on the literature review in Ph.D. theses

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The review of literature, so central to scholarly work and disciplined inquiry, is expected of the Ph.D. student, but how far along the road are they expected to travel? This article investigates the expectations of 'the literature' in research and scholarship at Ph.D. level from the examiner and assessment perspective. The analysis draws on the examiner report data for 501 candidates (1310 reports) across five Australian universities. On average about one-tenth of an examiner report is devoted to the literature and examiners provide detail about coverage, types of errors and the nature of use of the literature. It was the latter type of comment about coherent and substantive use of the literature that provided the most information about 'expectation'. Examiners identified 'working understanding', 'critical appraisal' of the body of literature, 'connection of the literature to findings', and 'disciplinary perspective' as key indicators of performance in the candidate's use of the literature. While examiners appeared to anticipate that all these elements should be present in scholarly work (and identified them in the best theses), they were prepared to accept less for a barely passable thesis, but pressed for at least some demonstration of critical appraisal.

Introduction

In academe scholarly activity is inextricably interlinked with 'research'. Peer review is the main process by which the quality and contribution of research is judged, and is an activity undertaken by academics as part of their work. The way in which academics work is captured in the concept of 'scholarship' (Brew, 2001), and this includes their 'professional approach', and the qualities of 'meticulousness and rigour associated with academic inquiry and reporting' (p. 45). The skills and understandings required for disciplined scholarly inquiry are acquired through undertaking research in a defined field or fields, usually through a research degree such as a Ph.D. Even so, these capacities, especially the ability to evaluate research and write in a coherent way

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about it, are not easily attained or accessed, and they require time and immersion in research activity to form and develop. Supervisors of research students need to assist them to read the professional literature, and to demonstrate, 'as explicitly as possible, how the scholarly community exercises its judgements, and the more implicit aspects of scholarly activity' (Delamont *et al.*, 1997, p. 105). Candidates need to know how peer review works and to demonstrate this in the production of a thesis that is 'judged on its ability to acknowledge the existing field adequately as well as on its ability to add something new'. The examiner is also assessing the potential of the candidate as a 'peer', i.e. their readiness to enter the academy (Yates, 2004, p. 81). A credible doctoral performance in evaluating the literature, identifying the strengths and weaknesses of previous studies, and their contribution as well as one's own, is to demonstrate a capacity for peer review. To 'merit publication' is to satisfy one's peers. The Quality Assurance Agency (QAA) in the UK notes the identifying criterion for doctoral work is that it leads to the creation and interpretation of new knowledge through original research, sufficient to 'satisfy peer review' and 'merit' publication (QAA, 2001). Doctoral examination has been seen to be less a form of educational assessment than a form of peer review (Phillips, 1994, p. 137).

The review of literature, so central to scholarly work and disciplined inquiry, is expected of the doctoral student, but how far along the road are they expected to travel in this scholarly endeavour? What exactly are they expected to achieve? This article addresses this question through the analysis of the examination reports on Ph.D. doctoral theses across disciplines in five Australian universities.

The main question addressed is: What are the expectations of the literature in research and scholarship at doctoral level, and how are these evidenced in thesis examination? Questions specific to this are: Relative to other elements in examiner reports on the Ph.D., how much emphasis is given to the literature and what forms does it take; and What are the qualities that examiners identify as indicators of strong and poor use of the literature in a thesis, and is this reflected in their recommendation?

After an analysis of the literature and a section on method, this article moves on to an analysis that identifies how much examiners say about the literature, how closely this relates to the final recommendation for the thesis, and what can be identified about their expectations of the treatment of the literature.

The role of the literature review in doctoral candidature

While 'the literature' may feature in several places, and in various forms of presentation throughout a thesis or dissertation (Bruce, 1994, p. 218), there are some common conventions and expectations, and the most traditional of these is summarised by Ely *et al.* (1997):

> there comes a time, usually in the drafting of the working text, when a researcher discusses how 'the literature in the field' and other sources of information led to understanding ... The language of theory, in fact, often stands like parentheses at either end of academic research reports: a theoretical framework is proposed at the beginning and a theoretical discussion synthesizes findings and their significance at the end. (p. 225)

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A comparative analysis of on-farm greenhouse gas emissions from agricultural enterprises in south eastern Australia

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ABSTRACT

Agriculture in Australia contributes 16% of national greenhouse gas (GHG) emissions, with enteric CH_4 and N_2O contributing 10.4% and 2.8% of national emissions, respectively. If agriculture is to face an emissions constrained future then it is important to understand the emission profiles of different agricultural land uses and emissions associated with different production systems. Using the Australian National Inventory methodology, whole farm GHG emissions were calculated for different farm types in south eastern Australia. Fourteen representative farms were examined that included production of Merino fine wool, prime lamb, beef cattle, milk, wheat and canola. These farm systems were defined by the production parameters of an average farm and a top producing farm, ranked on gross margin/ha/100 mm rainfall in benchmarking studies. Emissions from the systems were allocated to the primary product from each farm such as wool, meat, milk fat plus protein (MFP) or grains. The biophysical models GrassGro and DairyMod were used to simulate the livestock systems and model outputs were then used in an emissions calculator. This calculator used a yearly time frame and employed the International Panel on Climate Change methodology, as currently used in the Australian National Inventory. The calculator included CH_4 and N_2O on-farm emissions but excluded emissions from pre- and post-farm processes, such as meat processing and fertiliser production. Energy and transport emissions were also excluded because they are not defined as agricultural emissions in the Australian National Inventory. Dairy farms produced the highest emissions/ha (8.4–10.5 t CO_2-eqv/ha), followed by beef (3.9–5.1 t CO_2-eqv/ha), sheep (2.8–4.3 t CO_2-eqv/ha) and grains (0.1–0.2 t CO_2-eqv/ha). When compared on an emissions intensity basis (*i.e.*, t CO_2-eqv/t product), cow/calf farms emitted the most (22.4–22.8 t CO_2-eqv/t carcass weight) followed by wool (18.1–18.7 t CO_2-eqv/t clean fleece), prime lamb (11.4–12.0 t CO_2-eqv/t carcass weight), dairy (8.5–9.4 t CO_2-eqv/t milk fat + protein), steers (6.3–6.7 t CO_2-eqv/t carcass weight) and finally grains (0.04–0.15 t CO_2-eqv/t grain). Emissions intensities of top farms were not always less than average farms. If a C price were imposed on agriculture, emissions intensity provides insight about relative cost impacts of the C price on production of different agricultural products under different production systems. The

Abbreviations: CO_2e, carbon dioxide equivalents; CP, crude protein; DM, dry matter; DMD, DM digestibility; GHG, greenhouse gas; GWP, global warming potential; IPCC, Intergovernmental Panel on Climate Change; LCA, life cycle assessment; LW, liveweight; ME, metabolisable energy; MFP, milk fat plus protein.

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incidence of the C price on different products and production systems could trigger land use change.

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1. Introduction

Greenhouse gas (GHG) emissions from agriculture account for 10–12% of all man made GHG emissions and are the main source of anthropogenic N_2O (60%) and CH_4 (50%; Smith et al., 2007). In Australia in 2007, agriculture produced an estimated 88.1 t of CO_2 equivalents (CO_2-eqv) emissions or 16.3% of net national emissions. This figure excludes on-farm fuel and energy which are not defined as agricultural emissions in the Australian National Inventory, but do contribute to the transport and stationary energy sectors (DCCEE, 2009). In Australia, 85.9% (20.2 t) of national N_2O emissions and 58.9% (67.9 t) of national CH_4 emissions are produced by agriculture (DCCEE, 2009). The beef, sheep and dairy industries are the highest emitters due to enteric CH_4 emissions and additional N_2O from feces and urine deposition (DCCEE, 2009). Cropping systems contribute to agricultural emissions through N_2O from fertiliser use and a small proportion of CH_4 and N_2O from burning crop residues (DCCEE, 2009).

The Australian government has been exploring options to reduce agricultural emissions through avenues such as a C price as established by an Emissions Trading Scheme, a C tax or a C offset market (DCCEE, 2008, 2010). To understand how Australia's agricultural sector could be affected by these policy options requires detailed knowledge of current emissions from various agricultural production systems and how these emissions can be reduced or offset. In particular, information is required on emissions that are generated on-farm, as these are the only emissions which farmers will be accountable for under current policy constructs. However, determining those emissions is complicated by factors such as the range of production environments and management practices that characterise agriculture, plus definitional issues over what constitutes an agricultural emission. Hence, it is not surprising that there are a range of measures of emissions from Australian farms (Keogh, 2007; Keogh and Thompson, 2008; Kopke et al., 2008; Young, 2009). Most of these studies report on emissions from one or a few farm types and none consider emission differences among farms in different animal industries in the same region.

We, in contrast, estimate GHG emissions produced by average and leading farms, as defined by financial performance, in various livestock and crop dominant farming systems in south eastern Australia. The research examines emissions from within an emerging policy environment focused primarily on farm emissions. We compare GHG emissions from beef, sheep, dairy and grain farming systems using a range of metrics including tonnes of CO_2-eqv/ha, tonnes of CO_2-eqv/tonne primary product and tonnes of CO_2-eqv/100 MJ of metabolisable energy (ME) intake.

2. Materials and methods

2.1. Simulated farms

Agricultural GHG emissions were modelled for 14 representative farms in south eastern Australia. The relatively reliable rainfall and fertile soils of this Mediterranean environment suit various types of farming. Sheep, beef, dairy and grain production were each broadly represented by two different types of farms, which were simulated using whole farm mechanistic biophysical models (WFM). Livestock farms were further divided into average and top producing farms, based on their gross margin/ha/100 mm rainfall in the Farm Monitor Project benchmarking studies, with leading farms representing the top 20% of farms (English et al., 2008; Tocker and Quinn, 2008; Berrisford and Tocker, 2009; Gilmour et al., 2009; Tocker et al., 2009, 2010). The Farm Monitor Project Reports consists of physical and financial farm data collected from Victorian farmers each year from a mailed questionnaire. The information is compiled into reports that collectively include data from 159 sheep, dairy, beef and cropping farms in southwest Victoria. As farms in these reports are distributed over the region and receive different rainfall, the statistic of gross margin/ha/100 mm rainfall was used to assess performance among farms with various amounts of rainfall. The ranking of top farms *versus* average farms for this statistic allows comparison of farm productivity benchmarks, farm practices and, in our study, GHG emissions for each type of farming system.

Each farm was modelled as a single enterprise system and their physical characteristics are in Table 1. Stocking rates on each farm were converted to ME intake requirements of animals as: a 50 kg Merino non-lactating sheep requires 8.8 MJ/d of ME to maintain liveweight (LW) and higher ME amounts are needed for heavier animals, animals gaining LW or pregnant and lactating animals (SCA, 1990; Abbott and Maxwell, 2002). The ME consumed by the herd or flock was calculated on sheep and beef farms using the GrassGro model (Moore et al., 1997) and on dairy farms using the conversion rates of McLaren (1997) after adjusting to a 50 kg sheep.

The two sheep farms focused on production of Merino fine wool or prime lamb. The majority of feed on sheep farms came from perennial ryegrass (*Lolium perenne*) and Subterranean clover (*Trifolium subterraneum*) pasture. Supplementary feed in