Provenance, Purity & Price Premiums: Consumer Valuations of Organic & Place-of-Origin Food Labelling

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Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any tertiary institution, and to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

John Paull
November 2006

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John Paull
November 2006
Abstract

China is now the world’s largest food producer for many food categories, and has recently embarked on a major conversion to organic agriculture. Australian farmers have described their industry as in crisis due to increasing competition from imports; they have called for strengthening of country of origin labelling on food. Priestley (2005) noted the absence of data on the premium Australian consumers will pay, if any, for Australian food produce. Halpin (2004) has reported that the current premiums on organic food are well beyond what Australian consumers are likely to be willing to pay, and that this will probably inhibit the growth of the industry in Australia. Vogl, Kilcher & Schmidt (2005) declare that consumers expect organic produce to be labelled with a regional identity. The present study set out to establish the values consumers place on organic, on provenance, and on faux-organic claims (Type II eco-labels), and to determine the interactions between these factors.

Australian consumers (N=221) were surveyed online. Organic was valued at an 8.12% premium, and Certified Organic was valued at a 15.63% premium. The provenance Australia was valued at a 25.98% premium over China, and Tasmania was valued at a 31.59% premium over China. Both Natural and Eco added value, 2.48% and 2.84% respectively.

Certified Organic attracted a lower premium when coupled with China (11.62%). This Organic x Provenance interaction was consistent with respondents declaring they lacked trust in Chinese labelling. Interaction effects for eight demographic variables, including age, education, and place of residence, are reported. Gender and income do not have a significant influence on consumer values.

This study found that adjunctive labelling offers both Australian and Chinese producers the opportunity to add value to their produce. It found that Australian producers would be beneficiaries from implementation of the Fair Dinkum Food Campaign's call for Country of Origin Labelling (CoOL), which is currently lacking on processed food. It establishes that organic is a path for both Australian and Chinese producers to add value. It suggests that China’s push into organic production has the potential to lead the world to an organic future, and continuing on this path may give China the opportunity to redefine the standard for internationally traded food as Certified Organic.
A Note on Terminology

Organic:
Organic is used as the name of a treatment variable in this study. The Organic treatment variable is tested at three levels: \textit{null, Organic and Certified Organic}. Where these terms are used in the text to describe a variable level, or within a treatment combination, they are presented in italics, as per the usage in this paragraph.

Eco:
Eco is used as the name of a treatment variable in this study. The Eco treatment variable is tested at three levels: \textit{null, Natural, Eco}. Where these terms are used in the text to describe a variable level, or within a treatment combination, they are presented in italics, as per the usage in this paragraph.

Eco-labelling:
Eco-labelling is a term used in the literature, and particularly by ISO (International Standards Organisation), to refer to an environmental claim on a product. Where Eco-labelling is used in this document, it is used in conformity with the ISO usage. In ISO usage, four of the treatment levels used in this study, namely \textit{Certified Organic, Organic, Natural and Eco} are eco-labels. ISO distinguishes Type I and Type II eco-labels, the former are claims certified by a third party, and hence \textit{Certified Organic} is an ISO Type I eco-label. ISO Type II eco-labels refer to claims that are self proclaimed. Hence, three of the treatment levels in this study conform to this ISO description: \textit{Organic, Natural and Eco}.

Provenance:
Provenance is the name of a treatment variable in this study. The Provenance variable is tested at three levels: \textit{China, Australia, Tasmania}. Where these terms are used in the text to describe a variable level, or within a treatment combination, they are presented in italics, as per the usage in this paragraph. “Australia” and “Tasmania” are also used as levels of the demographic variable: “Place of Residence”; in this usage they are not italicized. Where there is scope for confusion, levels of the Residence demographic variable, are preceded by “\textit{Res:}” or “\textit{Residence:}”, as in, for example, “\textit{Res: Tas}, “\textit{Res: Tasmania}” and “\textit{Residence: Tasmania}”; where there is scope for confusion, levels of the Provenance variable may likewise be preceded by “\textit{Provenance:}” as in “\textit{Provenance: Tasmania}”. The intent is to keep the use of these qualifiers to a bare minimum.
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Executive Summary of Results and Conclusions

The following is a summary of results and conclusions from the Provenance, Purity and Price Premiums: Consumer Valuations of Organic and Place-of-Origin Food Labelling study. The introduction to this study is presented in Chapter 1, background briefing papers are presented in Chapter 2, the methodology is described in Chapter 3, the results in Chapter 4, and the discussion and conclusions in Chapter 5.

1. Halpin (2004) reported that certified organic premiums averaged 80% in Australia, and proposed that most consumers are likely to consider this figure too high. This study confirmed Halpin’s hypothesis, finding that Australian consumers valued Certified Organic at a premium of 15.63% (Figure 4.3).

2. Priestley (2005), in response to the Fair Dinkum Food Campaign and its call for Country of Origin Labelling, reported the absence of a study reporting the existence of a consumer willingness to pay a premium for Australian produce. The present study found that Australian consumers value Australia at a premium of 25.98%, compared to China, and Tasmania at a premium of 31.59%, compared to China (Figure 4.4). This confirms the underlying premise of the Fair Dinkum Food Campaign that Australian produced food has a premium value for Australian consumers, and confirms that the FSANZ lack of Country of Origin Labelling for processed food disadvantages Australian producers.

3. The suggestions of Daboh (2004), Leu (2006a) and Wong (2006) that Eco-labels, Natural and Eco, are threats to the organic industry are not borne out by this study. Natural attracted a premium of 2.48% and Eco attracted a premium of 2.84% (Figure 4.5). (This compares to Organic attracted a premium of 8.12% and Certified Organic a premium of 15.63% (Figure 4.3)).

4. For Australian consumers, Organic yielded half of the premium of Certified Organic (8.12% versus 15.63%), (Figure 4.7). This confirms the ongoing opportunity for Australian producers in organics. There is a larger opportunity in Certified Organic since the premium is higher and it offers export potential. For producers who opt not to certify, there is an opportunity to benefit from a self-claimed organic appellation, and thus avoid the certification costs, the paperwork burden and the third party auditing, while still benefiting from a premium price, albeit a lesser
premium. (This option is not available for Australian or Chinese producers marketing in China, where “organic” is now a controlled term and can only be applied there to *Certified Organic*).

5. All three treatment variables (Organic, Provenance and Eco), added significant value for Australian consumers (Figure 4.1, Figure 4.2). This confirms the representations by both Pollan (2006), and Singer & Mason (2006), that food narratives are now important elements in food choice for consumers.

6. Notwithstanding that this study reports many interaction effects, the major treatment variable results are very robust, across almost all treatment and demographic conditions. With only rare or no exceptions, (a) *Certified Organic* attracts a premium over Organic, and Organic over null, (b) Australia and Tasmania both attract a premium over China, and (c) Natural and Eco attract a premium over null. The interactions reported here, with few exceptions, are ordinal (rather than disordinal); that is, where there are interactions, they mostly take the role of moderating, weakening, or strengthening an effect, rather than reversing it.

7. China suffers a 30% “trust deficit”, with respondents indicating they did not trust Chinese labelling and/or certification. This manifested in China/Certified Organic attracting a premium of 11.62% compared to Australia/Certified Organic yielding a premium of 16.48%. Tasmania/Certified Organic yielded a premium of 17.95% (Figure 4.7).

8. The premiums that Natural and Eco attract, are reduced by half, when they are coupled with Certified Organic. While Eco by itself adds 4.12%, when coupled with Certified Organic, it adds only 1.9% (Figure 4.9).

9. Adding Eco to a China label is likely to be about twice as effective as adding Natural (yielding a 2.89% premium compared to 1.69%) (Figure 4.11). For the Provenances Australia and Tasmania, both Eco and Natural are equally valued.

10. Income and gender have no impact on food valuations based on Organic status, Provenance or Eco (Table 4.9).

11. The Age ≤20 group (i.e. 20 years and under) does not value Organic or Certified Organic (Figure 4.14). The question is, is this “just” an age effect (and they will grow out of it), or is it a...
generational effect and that organic appellations are nugatory for them (and they will carry this valuation strategy with them as they age)?

12. The Primary Education group attributes no value to Organic or Certified Organic (Figure 4.16), even exhibiting a negative trend.

13. The more frequently people purchase organics, the higher the premium they attribute to Organic and Certified Organic (Figure 4.18).

14. Half of the premium for Certified Organic can be attributed to “certified” and half to “organic” (Figure 4.3). However, for people related to the organics industry, this changes to approximately 20% contributed by “organic” and 80% of the premium attributable to “certified’ (Figure 4.20).

15. The Age ≤20 group discriminates on Provenance less than other age groups (Figure 4.22).

16. The Provenance Tasmania (compared to Australia), is valued up 9.8% by Tasmanians, up just 1.3% for mainland Australians, and is valued down 5.6% for Overseas residents (Figure 4.24).

17. The Primary Education group values Australia over China, less than half as much as Secondary and Tertiary Education groups (12.5% compared to 27.3% and 27.7%), and it values down Tasmania (Figure 4.26).

18. Main Shoppers are more discriminating on Provenance than Not Main Shoppers, i.e. they attach larger premiums to Australia and Tasmania (over China), (27.8% and 34.5%, compared to 19.7% and 21.6%), (Figure 4.28).

19. The Age 61+ group (i.e. 61 years and older) valued up Certified Organic/China, but at half the rate of other groups, (Age 61+ valued up Certified Organic/China 6.65%, compared to 14.75% for Age 21-40) (Figure 4.29).

20. The Tertiary Education group values down unadjuncted Provenance labels (indicating their preference for more sophisticated labelling) (Figure 4.32).
21. Female/Not Main Shoppers discriminate less on Provenance than other gender x shopper groups; relative to other groups, they value up China, and value down Tasmania (Figure 4.35).

22. The Male/Never Purchase Organic group values up Australia (over China) more than other Male x organic shopper groups, and values Tasmania equally to Australia (Figure 4.37).

23. The Age ≤20/Below Average Income group does not discriminate on Provenance (Figure 4.39).

24. Not Main Shoppers who are mainland Australians, or who report Below Average Income, discriminate on Provenance less than other groups (Figure 4.41).

25. All groups across all demographics value Australia over China, and Tasmania over China, and there is a main effect of Tasmania > Australia (Figure 4.4), nevertheless a variety of demographic groups value Australia over Tasmania (e.g. Figure 4.45)

26. The Primary Education Main shopper group prefers simple labelling and the addition of Natural and Eco detracts value (Figure 4.47).

27. For almost all groups Natural and Eco add value, some groups equally, some Natural > Eco and some Eco > Natural (Figure 4.49, Figure 4.50).

28. Interactions in this study establish that the value of food based on labelling variables is a complex and multi-factorial process and is a field ripe for further research (Table 4.11, Table 4.12 & Table 4.13)

29. China is already the world’s largest producer of many food crops, continues to rapidly expand this sector, has embarked on both a major food export effort, and on a bold programme of converting large areas of production to organic (Figure 2.1). China is now number one in the world for horticultural organically managed land (Figures 2.2), and has the potential to soon be in the position to redefine the standard of internationally traded food as Certified Organic, which would severely disadvantage Australian chemically-dependent food producers.

30. China is using organics as a means to (a) address pollution issues of farming practices (b) improve health for farm workers and consumers (c) bring wealth to farmers and (d) ensure access
of Chinese produce to export markets. This study confirms that Certified Organic adds value for Australian consumers for food from China. (Figure 4.7).

31. Australian and Tasmanian farmers are lagging the world in conversion to organic (Figure 2.14). As markets are increasingly able and willing to test for pesticide residues, local farmers who persist with the status quo are at risk of producing the food equivalent of excellent quality vinyl records in an iPod world. This study identifies Certified Organic as the best available opportunity for Australian farmers and producers to add value to their produce.

32. There are already organic cities, towns, villages and precincts in many countries, though not in Australia. To date there is no declared organic island, although several islands are examining this option. In the meantime, there is the opportunity for Tasmania or Australia to achieve “first organic island” status.

33. Adjunctive labelling of food adds significant value for Australian consumers (Figure 4.2), and is an opportunity for Tasmanian and Australian mainland food producers. The value of Tasmanian produced food “once packed and processed” is AU$2,090 million (Griffiths, 2005, p. 4). With the Certified Organic premium of 15.63%, there is the potential for Tasmania to add AU$327 million to the value of its production, from conversion to organic systems.

34. The last decade has witnessed the increasing exporting of Australian jobs, firstly manufacturing and secondly service industries, to lower cost countries, particularly China and India. Farming will be the third wave of this offshoring, unless a convincing case for exceptionalism can be mounted, or Australian producers capitalise on the value they can add, rather than the cost they can subtract. Australia may have a world class chemically-dependent food production system, that may be in terminal decline, if chemical-farming and its chemical-food products, are rapidly becoming anachronisms. Organic is an option that Australian farmers might examine, while options remain, and for the same reasons as Chinese farmers are embracing organics. Alternatively, the offshoring of Australian farms and jobs has the potential for environmental dividends, if Australian farms revert to native vegetation, due to being economically non-viable as farms.

35. This study found that the World Wide Web was an excellent, effective and efficient medium for conducting this type of research, offering design, researcher and respondent benefits. This me-
dium enabled the questions to be re-randomised for each respondent, enabled the respondent to truly self-select to opt into or out of the survey, ensured their anonymity (known to improve the reliability and validity of responses), allowed subjects to respond at a time and place of their choosing, and at their own pace, while it offered time and cost savings for the researcher, and enabled continuous monitoring of results and online collation of results (Table 3.2, Figure 3.1).
Chapter 1: Introduction

1.1 Synopsis

This chapter introduces the topic of *Provenance, Purity and Price Premiums: Consumer Valuations of Organic and Place-of-Origin Food Labelling*. It identifies that this is a multi-factorial area, that the three factors under study are intertwined, that they are usefully considered together rather than in isolation, and that the factors are jointly and severally matters of contention in contemporary Australia. Four specific research questions are identified. These four questions reside in a multi-facted contextual space of organic agriculture, provenance and price competition, two countries’ divergent responses to agricultural crises, and the consumer interface of these processes, namely adjunctive food labels; these issues are each addressed in Chapter 1.

Chapter 2 is a series of background briefing papers that pertain to the topic of *Provenance, Purity and Price Premiums*. While these papers can be read as a sequence, they are designed as stand-alone briefing papers for the purpose of contextualising the research questions and the results; as such they can be referred to, or not, according to the predilections of the reader.

Chapter 3 describes the methodology for the present study. A Rubiks cube 3x3x3 full factorial design was used (3 factors each at three levels). The research instrument was developed for online presentation. Online offers many benefits to a researcher as well as to respondents. These benefits include that data is collected digitally, so there is no double handing of data or data transcription errors, and known biasing effects such as order of question biases are avoided by the expedient of re-randomizing questions for each respondent. Online presentation is also efficient for respondents because they can respond at a time and place of their own choosing, and at their own pace. Computer-mediated responding and anonymity for respondents are known to enhance the veracity of respondent answers. Online data collection is congruent with the *no waste* ideas dating from the earliest of the organic literature (Paull, 2006a).

Chapter 4 presents results pertaining to the four research questions. The three main effects were all significant, multiple interactions were significant, including interactions between the three treatment factors and the eight demographic variables. (Results are summarized in the *Executive Summary of Results*).
Chapter 5 is a discussion on the “so what?” of the present study, and draws some implications for the future. Price premiums are one factor inducing farmers to convert to organic agriculture (Thiers, 2005), and Giovannucci (2005) identified them as the primary factor; if however the decision to convert is postponed past the point where organic agriculture becomes the new international standard for tradable food, and chemically-produced food becomes anachronistic, then price premiums become moot. Racing to the bottom is the kind of race where, if you win, you lose; the present study is predicated on the thought that a race to the top would be a more worthy race in which Australian farmers might usefully engage, as stewards of a share of our food supply, and our planet.

1.2 Four Research Questions

The provenance of food, its purity and international tradability are issues of long standing in Western and Middle Eastern cultures. The manna in the desert was described as “bread from heaven” (John, circa 89AD, 6:31); while the Koran similarly refers to “food from heaven” (Muhammad, c. 632 AD, 5:114). In a chapter titled “Clean and Unclean Food”, Moses (c. 1440a BC, 11:47) admonishes readers: “You must distinguish between the unclean and the clean”. He advises his followers: “Do not eat anything you find already dead. You may give it to an alien living in any of your towns … or you may sell it to a foreigner” (Moses, c. 1440b BC, 14:21). The issues of provenance, purity and tradability of food, remain issues of concern, and increasing contention in contemporary Australia.

The inaugural Australian Vegetable Conference held in Brisbane in May 2006 reflected the stress that Australian farmers are under from cheap imports, especially from China. The industry has called for mandatory CoOL on food sold in Australia (Angevin-Castro, 2005a). The Australian Fair Dinkum Food campaign rests on the assumption that consumers will preference local over imported food, and are willing to pay a price premium for Australian grown food, although this oft hypothesized premium has not been quantified (Priestley, 2005). According to the ACCC (2003a, p. 2) “consumers often decide to purchase a product based on its country of origin, especially in the case of Australian produced products. They may even be prepared to pay more for Australian products”. Priestley (2005) found no data to support this hypothesis of an Australian provenance premium, nor studies that tested it. The first of four research questions that the present study sets out to address is: what value do Australian consumers place on food provenance?
A farm worker is paid AU$1.27 per hour in China, compared to AU$33.00 per hour in Australia (Hart & Horak, 2005). Such disparities are not new, almost a century ago King (1911) made similar comparisons. What is new is that tariffs are now down, sea freight is fast, reliable and inexpensive, and China is growing enough food for two Chinas (refer background briefing: §2.3 China’s Organic Revolution). These factors acting in concert are responsible for much of the “crisis” for Australian producers. This study examines the value Australian consumers place on three food provenances: Australian, Tasmanian and Chinese.

China has its own “crisis”, of a quite different nature, due to pollution of its food, its population and its environment. One response has been to very recently, and rapidly, embrace organic agriculture. China’s Green Food production is now worth in excess of AU$15 billion, and with 3.5 million organic horticultural hectares, it organically cultivates more area than any other country (refer background briefing: §2.3 China’s Organic Revolution). The likely consequence of this transition to organic agriculture is that in the very near future Chinese produce will be competing on both price and quality with Australian produce.

The second research question examined in this study is: what value do Australian consumers place on organic status? Halpin (2004) reported the absence of consumer studies, and that market-place premiums for organic food in Australia averaged 80%; he commented that “the major finding of this study is that existing premiums are well above what the average consumer is likely to be willing to pay”, and, that being the case, “the growth of organic consumption is likely to be inhibited by the existing levels of price premiums” (p. 71). In a study restricted to Australian consumers of organic food, Meldrum (2005) reported 83% believed price premiums for organic food should be in the range 0% to 15% (p. 13). In Australia “organic” is not a term controlled under legislation. As a consequence produce can be self-declared as Organic or third-party certified as Certified Organic, and this study examined the value consumers place on both of these organic label options.

The industry has expressed concern that organic-look-alike labelling may be a threat to the integrity and the value of organic labelling, for example, by leading to consumer confusion, and taking advantage of consumer ignorance (of label-term meanings) on the one hand, and the consumer desire on the other hand, to “do the right thing” by their health, their children’s health, the environment and/or animal welfare. Leu (2006a) and Wong (2006) identified Natural and Eco as the terms of greatest concern, and it is these two terms that head the list of five “green food claims” of concern identified by Daboh (2004). It has been proposed that consumers “might pay a premium” for food
bearing such labelling (Daboh, 2004, p. 9). The International Standards Organisation refers to such terms as Type II eco-labels (refer background briefing: §2.6 ISO Eco-labels). The proliferation of Type II eco-labels reportedly leads to consumer confusion, although it has been suggested that such claims are not regarded highly by consumers (Pahl, 2004). The third research question the present study sets out to address is: what value do consumers place on these self-declared eco-labels?

Vogl, Kilcher & Schmidt (2005) proposed that consumers expect organic produce to be labelled with a provenance. Current FSANZ food labelling rules in Australia allow provenance to be suppressed by manufacturers by them declaring, for example: “made from imported and local ingredients” FSANZ (2006a). The fourth research question this study sets out to examine is the hypothesis that for consumers there is an interaction effect between organic and provenance.

Before arriving at these four research questions, and developing a design to address them, the author met with representatives of the Department of Economic Development (DED), the then Department of Primary Industry Water & Environment (DPIWE, now DPIW), and the Organic Coalition of Tasmania, to scope what might usefully be tackled. It was quickly apparent that there was a dearth of data, with Dawkins (2005, p. 29) identifying that: “There is currently a lack of information regarding the Tasmanian organic industry”. One reason is that neither state nor federal governments collect organics data. The industry has multiple certifiers, there are multiple data collection protocols, and the data that are collected, are collected by them on a commercial-in-confidence basis (Halpin, 2004). The limited data collected by AQIS on organic exports from Australia, are collected on the basis of the weight of the exports, and not of the value. Halpin (2004, p. 82) reported that there has been “no dedicated consumer study” and “the direct impact of labelling on consumer purchasing behaviour is hard to determine”.

As background to this research, I attended the 15th Organic World Congress (20-23 September, 2005, Convention Centre) held in Adelaide. The International Federation of Organic Agriculture Movements (IFOAM), is the international umbrella body of organic movements and organisations. Their premier event is held once every three years, and this was the first occasion it had occurred in the southern hemisphere. The Congress incorporated the 15th IFOAM Organic World Conference, the International Scientific Conference on Organic Agriculture, and the 8th International Organic Viticulture and Wine Conference. With over 1000 delegates, mostly from overseas, from more than 50 countries, this was an exciting and informative event in which to participate. Associated with this
event there was also an organic trade show, and a public GoOrganic open air festival held in the Adelaide parkland.

I subsequently attended the following additional conferences in pursuit of this research:

- *Tasmanian Economic Forum* (Tasmanian Function & Conference Centre, Hobart, December 9, 2005);
- *Beyond our Shores: Australia’s Changing Role in the Global Economy* (AusTrade, Hobart, June 20, 2006);
- *Inaugural Australian Vegetable Industry Conference* (Brisbane Convention Centre, Brisbane, May 10 - 12, 2006); and the
- *Tasmanian Organic Forum* (OCT, Campbell Town, Tasmania, August 22, 2006).

Organic outlets were visited in four states (Tasmania, Victoria, South Australia and Queensland), including *Macro Wholefoods*, which is Australia’s first organic supermarket chain, currently expanding, and with outlets in Sydney and Melbourne (Jaremkiewicz, 2006).

### 1.3 Organic Food

German supermarket chain ALDI is rapidly growing in Australia, and has just introduced its own home brand organics range in Australia “Just Organic”, with each product carrying this statement prominently under the brand name:

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organ.ic/organik/ def: 1 grown as nature intended with no chemicals or additives,
altogether a better way to eat.
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The ALDI *Just Organic* “Pure Organic Honey” on sale in Queensland during September 2006, was certified by the Australian organic certifier NASAA, and also carried additional regional information:

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This Pure Organic Honey, rich in natural goodness, is produced on Kangaroo Island by the world’s only remaining pure strain of the Ligurian honeybee.
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Certain of the Festival Supermarkets in Adelaide have, as of August 2006, defined “Organic” as a separate grocery category, and as a consequence, have both de-integrated their organic produce, and begun expanding their organic range.

Organic agriculture is defined by the International Federation of Organic Agriculture Movements (IFOAM) to include:
all agricultural systems that promote environmentally, socially and economically sound production of food and fibers (IFOAM, 2004, p. 1).

It is defined more expansively by WHO/FAO in the Codex Alimentarius as:

Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system (FAO, 2001a, p. 1).

IFOAM was founded in 1972 (CIPA, 2006), is based in Bonn, and as the umbrella institution for organic organisations, is the largest international environmental management organisation in the world. The stated aim is the worldwide universal adoption of organic agriculture (IFOAM, 2005a). In the most recent survey, 121 countries provided data on organic farming (of a total of 191 UN recognised countries). They reported 31.5 million hectares under organic management plus an additional 19.7 million hectares certified for organic wild collection, and 623,174 organic farms (Willer & Yussefi, 2006). IFOAM systems are based on four principles: the Principle of Health, the Principle of Ecology, the Principle of Fairness, and the Principle of Care (IFOAM, 2005b).

The term “organic farming” was coined by British agriculturalist Lord Northbourne, and first appeared in his canonical work “Look to the Land” (1940). In this seminal and prescient book, it is clear from the outset that Northbourne’s organic farming is born of a conflict, a clash of incompatible ideas, leading to different world outcomes. Hence, from the outset, organic farming is introduced in an adversarial context, “organic versus chemical farming” (Northbourne, 1940, p. 81) (refer background briefing: §2.2 The Farm as Organism). Although he does not use the term, Northbourne presents an advaita vedantic (non-dualist) (Grimes, 1996) viewpoint, surely unusual for an Englishman in those fraught early days of WWII. Northbourne introduced the concept of “the farm as organism” (Paull, 2006b) as the foundational idea of organic farming.

Worldwide, organic food sales amount to AU$39.6 billion (Sahota, 2006), and are estimated to reach US$100 billion (AU$134.5 billion) by 2008 (DTI, 2006). Organic food is described as the
It was surprising to learn in the course of this research that China is an international leader in organic farming (refer background briefing: §2.3 China’s Organic Revolution) and that Tasmania is a laggard (refer background briefing: §2.3 Organic Tasmania, Leader or Lagger?; Paull, 2006c). Both the Australian mainland and Tasmania exhibit some potential for morphing into “organic islands”. The thought of such islands, and the potential for reification of “clean and green”, underpinned the development of this research project.

One of the benefits and motivations for farmers to convert to organic agriculture is the price premium attached to organic produce (Giovannucci, 2005; Best, 2006). There is the suggestion that price premiums are essential for the conversion of farmers to organic (Teagasc, 2001; OCW, 2006). There are legal constraints on the use of “organic” in many jurisdictions (Kristiansen & Merfield, 2006), including China, but not including Australia (other than the Trade Practices Act which applies to all business activity in Australia). There has been only one legal challenge by the ACCC (Australian Competition and Consumer Commission) to the use of organic on a product in Australia; that case is currently unresolved (refer background briefing: §2.7 ACCC: Australia’s Food Label Watchdog, for an exhaustive account of ACCC legal challenges to provenance and organic claims in Australia).

Labelling is a crucial element for the organic industry, because organic produce is otherwise indistinguishable from non-organic produce. In Australia, produce can be labelled “organic” (ISO Type II, i.e. self claimed), or “certified organic” (ISO Type I, i.e. third party certified), (refer background briefing: §2.6 ISO Eco-labels). Whether consumers value these attributions differently has not been reported, although Dawkins (2005) calls for an investigation into controls over the use of the non-certified “organic”. In some countries, for example China, this issue does not arise because “organic” is a controlled term (BioFach, 2005), and so there is no organic/certified organic market bifurcation. Dawkins (2005, p. 31) reported some Tasmanian certified organic farmers considering decertifying “because it can be called organic even if it is not certified”.

One of the key innovations of organic agriculture has been to enable information to pass down the food chain to the consumer (Pollan, 2006). Organic has, from the outset, been process oriented, rather than outcome focussed; organic certification authenticates the process of production. Con-
sumers purchase organic for food safety, nature conservation and taste, in that order (Hamm, Gronefield & Halpin, 2002); they nominate as reasons for purchasing: the avoidance of pesticides, GMOs, and animal-feed antibiotics, and the positive benefits of being “natural”, animal welfare, health and taste; while 51% mentioned price as a criterion for purchase (Meier-Ploeger & Roeger, 2004). Reasons for purchasing organic have been classified as: healthier for me, healthier for my children, better for the environment, and kinder to animals (Nielsen, 2005). The main two reasons farmers convert to organic production are “environment-friendly farming” and “producing high quality food”, and with “profitability” an increasingly important motivation (Flaten & Lein, 2006, p. 2). Globalisation of food systems places ongoing pressure to dilute the organic vision (Halberg, Alroe & Kristensen, 2006). The US Department of Agriculture, as of 2002, administers and controls the organic standard for USA (USDA, 2006a), in addition to its incongruent roles of supporting and regulating genetically engineered crops (USDA, 2005), and licensing agricultural pesticides (EPA, 2003). Morford (2006) describes the take-over-and-dilute process as “The sad death of ‘Organic’”. Pollan’s (2006) narratives provide further reasons for avoiding US-produced food.

The odd concept that food and poisons can cohabit the world’s foodspace is a uniquely twentieth century idea. Recent rejections of consignments of pesticide contaminated food produce exported from Australia (Taylor, 2006; ABC, 2006) indicate the new dual realities, that detection is becoming more sophisticated, and markets are becoming less tolerant of pesticide contamination. In Europe retailers increasingly demand EUREPGAP-compliant produce (McBride, 2004).

The NSW Food Authority (2005, p. 2) notes that “as organic products cannot be readily distinguished from conventionally produced products, a heightened potential for fraud exists”. The facilitating condition precedent for such a fraud being the price differential between organic and non-organic food. Some fraudulent passing-off has been reported (Meikle, 2006), with one case in Australia (ACCC, 2006a; see Table 2.1).

There is the opinion that “in order to function, organic certification must generate a market premium (i.e. a price differential) high enough to convince the producer to adopt the desired practices” (Thiers, 2005, p. 6). Giovannucci (2005, p.16) reported that farmers convert to organic for various reasons, “income considerations are predominant” and these include earning more for their produce, and reducing the costs of inputs. Thiers (2005) reported many farmers receiving 5% to 10% premium for organic, and some no premium at all. Kinnear (2005, p. 21) has claimed that Australian
supermarkets “are aiming at a 30% premium” because overseas experience is that, at that level, “organic food sales take off”.

1.4 Provenance: A Tale of Two Garlics

A shopping excursion to a Hobart greengrocer in August 2006 reveals that the price of garlic is $30.00 per kg for Tasmanian produce, and $3.00 per kg for Chinese produce. When dissociated from their place of origin labels, these products have a Coke/Pepsi indistinguishability, discriminable only by alliaceaen aficionados. The 1000% price difference illustrates the two sides of a single coin; what for Australian farmers is a “crisis” (Badcock, 2005, p. 3), is for China a boom (Huang & Gale, 2006).

This phenomenon of a high-volume-low-cost newcomer stressing a traditional producer, is an echo of how nineteenth century new-world producers, including Australia, impacted the wool and wheat farmers of Europe. At that time, Australian produce was available in large quantities, and despite being transported half way round the world, was substantially cheaper; this precipitated a crisis in European agriculture (Ingemann, 2006).

China has embarked on a rapid expansion of its agricultural sector with the aim to help farmers “become rich after they have shaken off poverty” (China State Council, 2001, ch.5, p.2). China now produces approximately half the world’s vegetables (Huang & Gale, 2006). In Australia there has been a “Crisis Summit”, “the squeeze on growers continues at an alarming rate”, and the industry is “under extreme pressure” with decreasing exports and increasing imports (Laird, 2005).

One Australian response to this “crisis” has been the Fair Dinkum Food Campaign (AusVeg, 2005a). In 2005 a tractor convoy of Tasmanian and mainland Australian farmers to Canberra sought government sanctioning of compulsory country-of-origin labelling (CoOL) on food sold in Australia. For fresh produce, this aspect of the campaign was promptly agreed and instated (FSANZ, 2006b). Compliance is uneven; the author found good compliance in Hobart, and poor compliance in Melbourne, during August 2006.
Farmers have seen CoOL as an aid to selling their produce, on the implicit assumption that consumers will pay a premium for Australian produce. The General Manager, Fresh Food, of the major Australian food retailer Woolworths, agreed that Australian branded produce could attract a price premium although he was unable to quantify such a premium (Bate, 2006). Priestley (2005) was unable to identify any studies that measured, or even confirmed the existence of, CoOL premiums in Australia.

“If the Chinese can make it, we can’t really afford to be in the business” (Iwaski, 2006) is a pragmatic response to Chinese price competition. With the possible exceptions of wheat and wool and some other broad acre crops, there is no reason to expect that Australian farmers can compete with Chinese farmers on price, now or in the foreseeable future. Hart & Horak (2005) point out that Australian labor costs are more than twenty-five times Chinese labour costs. There is the Iwasaki capitulation option, or the alternative option of competing on some other dimension, some point of difference other than price, and this is the issue at the root of this thesis.

The Fair Dinkum Food campaign has focussed, to date, largely on lobbying for provenance labelling; banking on Australian consumers to support the local product, for reasons that have not been clearly articulated. These reasons may include local loyalty, parochiality, keeping money in the community, and, perhaps, quality. This wishful-thinking approach has proven to be remarkably unsuccessful in saving either Australian manufacturing, or Australian services, from being off-shored (Grant, 2005). There is the possibility that food, food production, and farming, is somehow a “special case”, although a case for exceptionalism has not been made any more thoroughly, or convincingly, for food, than for manufacturing or service industries.

China produced 65% of the world’s garlic (NFAPP, 2003), more recently reported as 72% (Harden, 2006). In the USA, the competition from cheap Chinese garlic was resolved by the impost of a 376.6% tariff (NFAPP, 2003), reportedly the highest rate of duty ever imposed by the US Department of Commerce (Kane, 2004). The Australian tariff on imported garlic is 0% (DFAT, 2004). Other than the US protectionist approach, which has been demonstrably and surgically successful, with Chinese garlic imports to USA dropping 4777% (NFAPP, 2003), are there other paths that Australian farmers might follow to extricate themselves from their self-declared crisis?
1.5 Crisis: A Tale of Two Responses

The Chinese character for crisis is reported to literally translate as “opportunity riding the dangerous wind” (Waitley 1984, p. 192).

The huge economic strides that China has taken in the past several decades have not been attained without environmental costs. Smil (1997) dubbed it “China’s environmental crisis”, and the topic has been continuously reported since then (Schwartz, Leyden & Hyatt, 1999; Wang, 2000; Kattoulas, 2001; Whittington, 2004; McCarthy, 2006). It is reported that “pesticide residues keep China’s fresh tomato out of markets like Japan, Korea and the EU” (Latner & Lei, 2006, p. 5). China has made a brave and bold revolutionary response to this and other agricultural aspects of its environmental crisis, by embarking on the world’s most rapid expansion of organic farming. In contrast, Australia has responded to pesticide residue claims with denial, diplomacy, dilution, dissembling and a stance of business-as-usual.

The Chairman of AUSVEG, Michael Badcock, reports that “the industry” is “in danger of becoming unviable” (Angevin-Castro, 2005a, p. 11). He identifies four “key elements”: a “highly concentrated retail market”; “a dysfunctional wholesale market”; “a regional economic environment that puts us head to head with overseas economies that do not have the same regulatory requirements”; and, “lack of support from successive Australian governments”. His analysis is that there is a danger of extinction for the Australian vegetable growers because of what someone is doing elsewhere. If he was in a counselling session he would be taught to change the perceived locus of control from external to internal, and to take responsibility for the situation (Lefcourt, 1982).

When we read the headlines “Vegetable industry faces national crisis” (Angevin-Castro, 2005a) and “Free Trade Crisis” (Angevin-Castro, 2005b), they can be mentally morphed (Bander & Grinder, 1982) into “Vegetable industry faces national opportunity” and “Free Trade Opportunity” as an aid to identify where changes may bear fruit.

“The Tyranny of Distance” (Blainey, 1977) as de facto protection for Australian, and especially Tasmanian, growers is over. The world is awash with food and every food item that Australia and Tasmania can produce can surely be landed here cheaper than “home grown”. Chinese apples can
be landed here for 49c per kilo, and China grows more than half of the world’s apples. China with 21% of the world’s population produces 49% of the world’s carrots and at 50% to 55% of the Australian cost of production. (McKay, 2004, 2006b). Chinese growers can retail a lettuce for 30 cents, compared to an Australian grower who requires 68 cents per head wholesale (Poole, 2005).

The AusVeg response to their self-declared crisis is to call for the implementation of nine government actions. The first four of these call for changes to Country of Origin Labelling (CoOL), one claim is for access to ammonium nitrate fertilizer, one claim is for a mandatory horticulture code of conduct and three claims call for bureaucratic barriers to entry of imported food, specifically “microbial testing” of imported food (AusVeg, 2005, 1.2, p. 13).

The argument presented for CoOL is “the right of consumers to know the origin of the product that they are buying” Badcock, quoted in AusVeg, 2005, p. 14). The claims are that “free markets work best with perfect knowledge” and that “existing labelling laws enable the distortion of information” (AusVeg, 2005, p. 14). The assumption that consumers value Australian produce over imported produce underlies this argument; the present study tests that hypothesis.

Jokes are sometimes revelatory. “How many farmers does it take to change a lightbulb? None, because the farmers don’t want to change”. The Fair Dinkum Food Campaign approach has been to lobby government to transform food labelling rules and implement new border protection measures, and leave their own practices unchanged. In contrast, the Chinese response to crisis has been revolutionary (refer background briefing: §2.3 China’s Organic Revolution).

1.6 Adjunctive Labelling

The term adjunctive labelling I use to describe any items on the label other than the generic description of the food. Adjunctive labelling falls broadly into two classes: controlled and not controlled. A label element is controlled where there is oversight by some governing body. This might be a government agency or a certifying agency. Declarations of provenance, of organic status and of ecolabelling are all examples of adjunctive labelling of food, and are the subjects of the present study.

In Australia any product description falls under the Trade Practices Act (1974) (Cth.), in particular the “passing-off” provisions and the “misleading and deceptive conduct” provisions. Invoking these
provisions would be expensive and fraught, and private actions are rare. Since its inception the ACCC has taken 17 actions pertaining to food and beverage labelling (refer background briefing: §2.7 ACCC: Australia’s Food Label Watchdog).

Certified Organic competes in an increasingly busy food labelscape. Other controlled adjunctive labels include Fair Trade, Halal and Country of Origin (CoOL) variations, for example *Made in Australia, Made from local and imported ingredients* and its spot-the-difference companion *Made from imported and local ingredients* (FSANZ, 2004, 2006b). Uncontrolled adjunctive labels are proliferating and include *No GM, GM Free, No Additives, No Preservatives, Pure and Dolphin Friendly*, as well as the three which are the subject of this study, namely *Organic, Natural and Eco*.

There is the suggestion that some terms, including *Natural* and *Eco* should be subject to international regulation (Daboh, 2004). Although Daboh (2004) speculates that these two terms may add value for consumers, this, and the impact of Type I *versus* Type II labels, on consumer response, has not been quantified.

*Organic* is not a controlled term in Australia, so that any producer or seller can freely label a product as “organic”, risking only an unlikely action under the *Trade Practices Act*. Dawkins (2005, p.31) identified “the lack of domestic regulations governing the use of the word ‘organics’” as an issue of concern to certified organic growers. New provisions in China, provide that “organic” is now a controlled term, and its use is restricted to the state-sanctioned and designed “Organic” or “Conversion to Organic” logos; the labels are specified in both English and Chinese characters (see Figure 2.9).

For its early proponents organic farming was not about labelling, the shopping experience, meeting the market, nor consumer demands, but rather it was about “the future of civilization” (Howard, 1940, Ch. XV). “Can mankind regulate its affairs so that its chief possession - the fertility of the soil - is preserved? On the answer to this question the future of civilization depends” (Howard, 1940, Ch. 1).

Sixty five years on from Northbourne’s original championing of the idea, the benefits of organics are well established, though still contested. Organic agriculture could feed the world (Badgley *et al.*, in press; Halweil, 2006). Organic food contains less pesticide residues (Baker, Benbrook, Groth & Benbrook, 2002) and tests of organic food regularly report “no residues were detected” (NSWFA,
2005, p. 2). Organic farming is better for the environment and produces sweeter and more profitable apples (Reganold, Glover, Andrews & Hinman, 2001). Children who consume an organic diet have lower pesticide residues (Curl, Fenske & Elgethun, 2003). Organic farming increases rural employment opportunities (Giovannucci, 2005), increases biodiversity on farms (Scialabba & Hattam, 2002), uses less energy per unit of food (OECD, 2003), and reduces pollution of soil and water (Sundrum, 2001). Compared to non-organic food, organically grown food is more nutritious, based on measuring total phenolic content (Asami, Hong, Barrett & Mitchell, 2003), and is higher in antioxidants (Ishida & Chapman, 2004). Schmutz (2006) has produced a list of 90 reasons to adopt organic agriculture.

The present study is not however about agriculture per se, and nor is its role to make an apologist case either for or against organic agriculture, but rather to understand how consumers value three factors of food adjunctive labelling, including organic labelling. The knock-on effects of such consumer responses have the potential to directly shape agricultural practices, and, indirectly, environmental management practices, whereby consumers exercise informed choices and vote with their purse, based on their access to veridical information. The efficiency of such knock-on effects as instruments of environmental management are beyond the scope of the present study.

1.7 Review of Research Questions

Four research questions are identified for the present study:

4. Is there an interaction effect, for consumers, between provenance and organic status? (refer Vogl et al., 2005).

Chapter 2 presents a series of background briefing papers that provide additional context to the issues of the present study; the reader has the option of proceeding directly to Chapter 3, which describes the methodology of the study.
Chapter 2: Background Briefing Papers

This chapter presents a series of background briefing papers, each of which is salient to one or several aspects of the present study. They inform the present study; they can be read in sequence, or not, in whole or in part, or not at all.

A century ago, one of America's leading agricultural scientists and the United States Department of Agriculture (USDA), parted company over disputed, and since then discredited, agricultural theories promulgated by the USDA. Professor Franklin King subsequently toured Asia, and wrote *Farmers of Forty Centuries, or Permanent Agriculture in China, Korea and Japan* (1911). The debt that organic agriculture owes him, and the prescience of his thinking, is reflected in the Dover (2004) republication of this work under the revised title: *Farmers of Forty Centuries, Organic Farming in China, Korea and Japan*. An introduction to this precursor of organic agriculture is presented in §2.1.

It was an Englishman in 1940 who gave organic agriculture its name. Walter Northbourne introduced the term “organic farming” in his book *Look to the Land*. The foundational idea of organic agriculture is the “farm as organism” (Paull, 2000b). Trained at Oxford University in agricultural science, and managing a farm in Kent, his account is informed by both theory and practice. Organic agriculture was born of a conflict, characterised by Northbourne as “organic versus chemical farming”. In this seminal work, Northbourne, introduces most of the issues currently relating to discussions of organics, including: food-miles, maintenance of soil fertility, feeding the world, farm conversions, public health, food quantity, food quality versus marketability, the principle of care and farming of the future, and the foolishness of a quest to “conquer” nature (although his choice of words is often different from contemporary usage). An account of Northbourne’s work is presented in §2.2.

As of 2006, China has more horticultural land under organic management than any other country (3.5 million hectares). The issues investigated in the present study, the future of Australian agriculture, the current Australian market dynamics, both organic and non-organic, cannot be considered without a grasp of the dramatic achievements and changes occurring in China. An account of the explosive and revolutionary agricultural developments in China is presented in §2.3.
Australia has more land under organic management that any other country (12.1 million hectares), and that amounts to more than one third of the world’s organic hectares (31.5 million hectares). Most of such land in Australia is used for low intensity beef grazing (McKinna, 2006); as a consequence, other than this stellar performance on total hectares, on other measures, Australia is, on an international basis, an under-performer. A summary of the Australian organic sector, and its place in the world, is presented in §2.4.

The potential for organic agriculture in Tasmania seems obvious for a state with a “clean green image” where it is reported that “Tasmanian products cost 30% more to produce than competing products” (Vegetable Industry Taskforce, 2005, p. 21, p. 18). Yet manifesting that potential has been elusive. §2.5 presents an analysis, Tasmanian Organics: Leader or Lagger?, based on a performance measure proposed by the local industry.

The International Standards Organisation introduced eco-label definitions in 1999, and expanded them in 2006. The ISO typology of eco-labels is introduced in §2.6. In the present study where the term eco-label has been used, it is used consistent with the ISO definitions. Of the seven terms tested in the present study, four fall within the ISO eco-label definitions (Organic, Certified Organic, Eco and Natural), and three fall outside (China, Australia, Tasmania). The author has used the term adjunctive labelling as an omnibus term to refer to label elements over and above the generic description of the food item, and thus all seven test terms fall within its compass. The ISO definitions are deficient, and insufficiently inclusive; particularly in their specification that the claim needs to be “made by… anyone… likely to benefit from such claims”. In the present study, where the term adjunctive labelling has been used, it is intended to be self-explanatory, in any event, where it has been used, the use is consistent with that outlined in §2.6.

The responsibility for policing the veracity of food labelling claims, such as those investigated in the present study, rests with Australian Competition and Consumer Commission (ACCC). False and misleading food and beverage labelling can be referred by an individual or company to the ACCC for investigation. For this reason, together with the unlikelihood of costs recovery, and the uncertainty of a successful prosecution, private legal actions, by individuals or companies, are rare or unknown (none were discovered). Since it was founded, the ACCC has initiated 17 actions for false and misleading food and beverage labelling, sixteen of these for misleading provenance, and one for misleading organic labelling; a summary of these cases is presented in section §2.7. The ACCC has a history of 1.5 actions per year, and that rate is stable across the past 10 years. The ACCC only
provides data on cases where it takes legal action; it does not report data where it may intervene, and, without initiating legal action, negotiate a resolution. The single case pertaining to organic labelling (ACCC, 2006a), is currently unresolved.
2.1 Permanent Agriculture: Precursor to Organic Farming

A century ago, the pre-eminent American soil scientist of his day wrote an eye-witness account of what he called permanent agriculture. Franklin Hiram King was recently retired as Professor of Agricultural Physics at the University of Wisconsin, when he embarked on a journey to the East. The resulting book, Farmers of Forty Centuries, or Permanent Agriculture in China, Korea and Japan, (1911), has been described by the founder of Organic Agriculture as a “classic” which “no student of farming or social science can afford to ignore” (Northbourne, 1940, p. 17, p. 55).

Permanent Agriculture is a concept that predates Bio-dynamic and Organic Agriculture, and like them, was, in part, a response to governmental agricultural orthodoxy. Shulman (1999) comments that early in the twentieth century, “Existing institutions, such as the United States Department of Agriculture, were not considered adequate guardians of the food supply” (p. 401). The Professor of Agronomy at the University of Illinois, Cyril Hopkins, wrote:

In recent years, Whitney and Cameron have revived [the] theory of toxic excreta from plant roots, in support of a more radical theory announced by them, to the effect that soils do not wear out or become depleted by cultivation or cropping. While this theory is advanced with no adequate foundation and in direct opposition to practical experience and to so many facts of mathematics, chemistry, and geology, that it is in itself quite unworthy of further consideration, the fact is that it has been promulgated by Professor Whitney as Chief of the United States Bureau of Soils, and by Doctor Cameron as the chief chemist of the same Bureau; and, consequently, it cannot be ignored (Hopkins, 1910, p. 313).

King worked briefly at the USDA Bureau of Soils in Washington, from 1902 to 1904 and is reported (Tanner & Simonson, 1993) to have vigorously objected to the Whitney and Cameron (1903) theory that the supply of nutrients in soil will last indefinitely without replenishment, and the Whitney (1906) proposition, that manures work by offsetting the toxic excreta of plant roots. According to Hopkins (1910), Whitney boasted that USDA Soil Bulletins were used as text books in US agricultural colleges.

Two books resulted from this clash. Hopkins wrote Soil Fertility and Permanent Agriculture (1910) citing the first reports of King’s 1909 excursion to the East. The following year, King’s Farmers of Forty Centuries, or Permanent Agriculture in China, Korea and Japan was published, citing Hopkins’ 1910 work.
King’s oriental tour occupied the first eight months of 1909 (Allen, 2000); it seems that Conford (2001) is mistaken in twice reporting the year as 1907. King wrote:

We had long desired to stand face to face with Chinese and Japanese farmers; to walk through their fields and to learn by seeing some of their methods, appliances and practices which centuries of stress and experience have led these oldest farmers in the world to adopt. We desired to learn how it is possible, after twenty and perhaps thirty or even forty centuries, for their soils to be made to produce sufficiently for the maintenance of such dense populations … we were instructed, surprised and amazed at the conditions and practices which confronted us whichever way we turned; instructed in the ways and extent to which these nations for centuries have been conserving and utilizing their natural resources (ch. Intro).

King reported the sale of night soil (human excrement) that was daily returned from the cities to the farms, and in Japan was applied at the rate of 1.75 tons per acre per annum. He described the early morning procession of cartloads heading from Kobe, for sale to farmers. He related that Government subsidies encourage the use of composts, and that “prizes are awarded for the best compost heaps in each county” (ch. XVII).

The annual wheat production in the USA, is quoted by King as 19 million tons, and he commented that “China’s output of rice was certainly double and probably three times this amount from nearly the same acreage of land; and notwithstanding this large production per acre, more than fifty percent, possibly as high as seventy-five percent, of the same land matures at least one other crop the same year, and much of this may be wheat or barley, both chiefly consumed as human food” (ch. XII).

King reported intercropping of “two rows of maize, kaoliang or millet alternated with soy beans” and commented on the nitrogen fixing ability of the soy (ch. XVI), and that rice crops were followed by red clover (ch. XII). He reports the “planting of cotton in wheat fields before the wheat is quite ready to harvest … without plowing … the growing of multiple crops is the rule. Sometimes as many as three crops occupy the same field in recurrent rows, but of different dates of planting and in different stages of maturity”(ch. XI).

“The intense individual economy, extending to the smallest matters” impressed King (ch.VII); “in their systems of multiple cropping; in their extensive and persistent use of legumes; in their rotations for green manure to maintain the humus of their soils and for composting; and in the almost
religious fidelity with which they have returned to their fields every form of waste which can replace plant food removed by the crops, these nations have demonstrated a grasp of essentials and of fundamental principles which may well cause western nations to pause and reflect” (ch. XII).

King reported “their domestic animals receive kind, thoughtful treatment” (ch. XII). He quotes from Hopkins (p. 234) that “1000 bushels of grain has at least five times as much food value and will support five times as many people as will the meat or milk that can be made from it” (ch. 1). He quotes Rothamsted experiments where 100 pounds of dry food fed to cattle, converts to 6.2 pounds of flesh, of which less than two thirds is suitable as human food, and comments that the adoption of a vegetarian diet leads to agricultural efficiency.

Foreseeing a world movement for agricultural reform, King wrote: “China, Korea and Japan long ago struck the keynote of permanent agriculture, but the time has now come when they can and will make great improvements, and it remains for us and other nations to profit by their experience, to adopt and adapt what is good in their practice and help in a world movement for the introduction of new and improved methods” (ch. XII).

Long out of print, King’s book has recently been republished by Dover (March, 2004), with an interesting title revision: Farmers of Forty Centuries, Organic Farming in China, Korea and Japan. It is also available as a free download from Project Gutenberg <www.gutenberg.org>; it was prepared as an eBook by Charles Aldorondo and Tasmanian, Steve Solomon, and also released March 2004.
2.2 The Farm as Organism: The Foundational Idea of Organic Agriculture

The term organic farming was coined by Oxford University agriculturalist Lord Northbourne, in his book Look to the Land, published in wartime England in 1940. It was a response to what he dubbed chemical farming, and from the outset he presented these as two mutually incompatible, and contesting, agricultural methodologies. The terms are introduced in contention: “organic versus chemical farming” in the Chapter 3 heading (Northbourne, 1940, p. 81).

Northbourne’s key contribution is the idea of the farm as organism. He wrote of “the farm as a living whole” (p.81). In the first elaboration of this concept, he wrote that “the farm itself must have a biological completeness; it must be a living entity, it must be a unit which has within itself a balanced organic life” (p. 96). A farm that relied on “imported fertility … cannot be self-sufficient nor an organic whole” (p.97). For Walter Northbourne “the farm must be organic in more senses than one” (p. 98), and he presents the holistic view that “The soil and the microorganisms in it together with the plants growing on it form an organic whole” (p. 99).

Northbourne was influenced by the thoughts of Rudolf Steiner (1924), and he implemented those ideas on his own estate in Kent. He wrote that: “the bio-dynamic method, evolved in accordance with the recommendations of the late Dr. Rudolf Steiner. The ... method has been highly developed in the course of some fifteen years’ work on the Continent, and its effectiveness can be said to be proved” (Northbourne, 1940, p. 173). In his bibliography he includes Dr. Ehrenfried Pfeiffer’s: Bio-dynamic Farming and Gardening, which he describes as an account of Steiner’s methods.

The first occurrence of organic farming as a distinct phrase appears where he warns: “In the long run, the results of attempting to substitute chemical farming for organic farming will very probably prove far more deleterious than has yet become clear. And it is perhaps worth pointing out that the artificial manure industry is very large and well organized. Its propaganda is subtle, and artificials will die hard” (p. 103). It appears again in the Chapter 5 heading “organic farming a practical proposition” (p. 148).
Look to the Land begins with an account of “the interdependence of living creatures” (Ch 1 heading, p.1). Northbourne writes of “the uselessness of considering the situation of any man or association of men or geographical unit as if it were isolated from all others … Besides being bound up with the lives of his fellow-men, every man’s life is bound up with the lives of innumerable non-human creatures … there is a very real economic and biological linkage, comprehensive and of infinite complexity, between all living creatures in the world” (pp. 1 & 2). In this chapter he introduces the concept of organism: “the mechanism of life is a continuous flow of matter through the architectural forms we know as organisms. The form alone has any life or any organic identity” (p. 3).

Many of the issues that concern, and preoccupy, organic and bio-dynamic farmers of the twenty-first century, were introduced by Northbourne two thirds of a century ago. He identified that food quality is “a very subtle matter involving something more than appearance and taste, and more than the chemical composition as revealed by analysis” (p. 8). For Northbourne “Food of better quality is food which has vitality, individuality, freshness; food which is grown right, not only food that looks right; food which is effective as a vehicle of life and is not either mere stimulant or mere filling” (p. 129). He conceded that “‘Vitality’ is a very unscientific term” (p. 166). He railed against focussing on cosmetic considerations, “the things that really matter in food [are] those which make it effective as a vehicle of life” (p. 62), and he expressed concern that “real quality is giving way to cheapness” (p. 66).

Northbourne addressed biodiversity and warned against monocultural farming: “large sale monoculture (the growing of one crop only) upsets the balance of factors in the soil in many ways. There is no give and take between crops. Disease spreads easily. Nature always provides a mixture of plants, and of animals; only so can living matter be kept constantly in circulation without wastage” (p. 21).

Localism was already identified as an issue of salience: “it is ludicrous to cart stuff about all over the world, so someone can make a ‘profit’ out of doing so, when that stuff could much better be produced where it is wanted” (p. 104).
On the limitations of economics he wrote: “we have come to have no idea of profit other than financial profit … the delusion is that cheapness leads to plenty. But what use is plenty of rubbish?” (p. 66). He pointed out that “the relation of financial cost to what may be termed ‘biological cost’ has not been considered, still less estimated” (p. 28). On farm-gate prices, he lamented “the power and predominance of the distributive trades, with its accompaniment of a very big difference between the price paid by the consumer and that received by the producer” (p. 37). He was critical of chemical farming as a process of “trading in, or processing of, stolen fertility” (p. 148), and he rued that “soil fertility is being ‘mined’” (p. 157).

On the limitations of scientific reductionism: “No chemist has ever analyzed or described in chemical terms a living creature, however humble; and there is not the slightest chance he ever will” (p. 160). He was critical that “‘scientific’ farming implies farming regulated mainly according to the combined recommendations of the farm economist, with his calculating machines and ledgers, and the chemist” (p. 157). For Northbourne, “farming cannot be treated as a mixture of chemistry and cost accountancy, nor can it be pulled into conformity with the exigencies of modern business, in which speed, cheapness, and standardizing count most. Nature will not be driven. If you try, she hits back slowly, but very hard” (pp. 90 & 91).

Northbourne gives an early and lucid account of the Precautionary Principle: “if we waited for scientific proof of every impression before deciding to take any consequential action we might avoid a few mistakes, but we should also hardly ever decide to act at all. In practice, decisions about most things that really matter have to be taken on impressions, or on intuition, otherwise they would be far too late … We have to live our lives in practice, and can very rarely wait for scientific verification of our hypotheses. If we did we should all soon be dead, for complete scientific verification is hardly ever possible. It is a regrettable fact that a demand for scientific proof is a weapon often used to delay the development of an idea” (p. 41).

Looking to the future, Northbourne wrote of “farming of the future” and warned that “it will be left to future generations to pay for our mistakes, but they may not have the wherewithal” (p. 31). Of traditional farming he recorded that “there exist a few people who still cultivate intensively with little trouble from disease, without recourse to specific defensive measures against disease, and without artificial manures, and without the loss of fertility of the soil” (p. 51). He was critical of ap-
Northbourne wrote of a taste for wildness: “Good cultivation is always beautiful, but most of us have a taste for wildness as well. It is pleasant that the best cultivation of all should be that which is not without its touch of wildness, so that it should present that picture of wildness and intimacy in association which is the most attractive picture of all” (p. 169). Northbourne consistently took a holistic view, he was critical of “Modern doctoring” for “seeing only the bits and not the whole” (p. 47), and “seeking that imitation of health which can be a result of the suppression of diseases” (p. 48).

Of the chemical conquistadors he commented “the idea of conquering nature is as sensible as if a man should try to cut off his own head so as to isolate his superior faculties … we have invented a fight between ourselves and nature; so, of course the whole of nature, which includes ourselves as well as the soil, suffers … We have tried to conquer nature by force and by intellect. It now remains for us to try the way of love” (p. 192).

In the UK, Albert Howard adopted Northbourne’s terminology, and published The Soil and Health: A Study of Organic Agriculture in 1947, the first book with “organic farming” in the title. In the USA, Jerome Rodale (aka Cohen) published Pay Dirt in 1945 in which he adopts Northbourne’s term organic farming, describing it as “the system of agriculture proposed here” and contrasting it with chemical-dependent farming: “systems that depend overly on chemicals, find eventually a hardpacked soil unfriendly to soil organisms” (p. 4). He claimed that “a farm that was run on the organic basis would have a distinct advantage” due to the presence of “the beneficent soil organisms” (p. 211). Rodale published a magazine The Organic Farmer from 1949 to 1953 and he is reputed (Conford, 2001) to have published magazines titled Organic Farming and Gardening and Organic Gardening and Farming in 1942 although no copies appear to be extant (Frey, 2006).
Scofield (1986) noted that Northbourne was the first to use the term *organic farming* and describes his book *Look to the Land* as a “forgotten classic”. It has now recently been republished by Sophia Perennis, New York, (2003) and deserves to be well known and well read, the message remains coherent, articulate and timely. Unfortunately, in the reprint the Index and the Bibliography have been omitted; and, curiously, ‘navvy’ has been changed to ‘navy’, which will surely mystify readers.

*Look to the Land* is the canonical work that introduced the term *organic farming*, and the concept of *the farm as organism*. Northbourne went on to introduce many ideas that pepper current discussions of organic and bio-dynamic farming, including farmers’ markets, the relationship between food and health, the precautionary principle, the principle of care, the interconnectedness and interdependence of all living things, and warning against mining the fertility of the soil. If we are to attribute the title of father of Organic Agriculture, the title must be given to Walter Northbourne.
2.3 China’s Organic Revolution

China has two organic agriculture histories, the long one and the short one. The long one is millennial, and the short one is revolutionary. King (1911), in *Farmers of Forty Centuries*, has helpfully provided a window into the long history of organic farming in China. He describes an agriculture without toxic inputs or outputs, and strategies including crop rotation, inter-cropping, low external input reliance, and the implementation of zero waste.

The short history of organic agriculture in China is built on two foundations, firstly the toxic legacy of the so-called Green Revolution (Kimbrell, 2002), and secondly, those farmers, mostly poor, and mostly remote, who managed to miss that coloured revolution altogether. As Sanders (2006, p. 118) points out, “at the end of the twentieth century “there still existed instances of organic farming in China, despite years of grain monoculture and the Green Revolution”.

The new embrace by China of organic agriculture has been dramatic. There was an eleven-fold increase from 2005 to 2006 in land reported under organic management; from 298,990 hectares to 3,466,570 hectares (Willer & Yussefi, 2005; Willer & Yussefi 2006) (see Figure 2.1). This increase has catapulted China from sixteenth in 2005, to number two in the world in 2006, for organic hectares, trailing only Australia. The two largest markets for organic produce are Germany and USA. China’s current area under organic cultivation is four times the USA organic hectares, and four and a half times the German organic hectares (Willer & Yussefi, 2006) (see Figure 2.2).

That 2005/2006 annual increase in China added 12% to the world’s area of land under organic management, and China accounted for 63% of the world’s increase in organic land in that year; China now has 11% of the world’s organically managed land. Only Australia has more such land, and most of Australia’s organically managed land is sparsely stocked grazing land. Consequently, China’s Organic Revolution of 2006, has put it at the forefront of the worldwide organic movement, with more organic farms, more organic farmers, and more land under organic horticulture, than any other country.
Figure 2.1: Organic hectares in China 1999 to 2006; no data available prior to 1999. (Data sources: Willer & Yussefi, 2000a; Willer & Yussefi, 2000b; Willer & Yussefi, 2001; Yussefi & Willer, 2002; Yussefi & Willer, 2003; Willer & Yussefi, 2004; Willer & Yussefi, 2005; Willer & Yussefi, 2006).

Figure 2.2: Total area under organic management, 2005 & 2006 for top organic countries, #2 to #10. Australia is #1 with 12,126,633 Ha in 2006 and 11,300,000 Ha in 2005, of which most is low intensity cattle grazing country. (Data sources: Willer & Yussefi, 2005; Willer & Yussefi, 2006).
Chinese wisdom declares that “there are many paths to the top of the mountain” (Andrews, 1996) and as we shall see, China has discovered a new and different path up the organic mountain; assuming we accept, that the organic journey is a metaphorically upward journey, and perhaps accept that at least for some of its history, it could truly be characterised as carrying manure and night-soil up hill.

It is instructive to look at the aetiology and ontogeny of China’s journey from 45th in world organic hectares in 2000, to 2nd in the world in 2006; the path from zero value in 1989 (Zong, 2002) to a reported A$10.7 billion in 2004, compared to the US total value of A$14.7 billion and the European value of A$17.3 billion (Leu, 2006).

China has just 8% of the world’s farmland, 23% of the world’s population (Li, 2005), and food production statistics best described as a J-curve, (see Figures 2.3, 2.4, 2.5, 2.6, and 2.7).

![Figure 2.3: China annual apple production figures, 1970 to 2004. (Data source: USDA Economic Research Service, 2006b).](image-url)
Figure 2.4: China annual grape production figures, 1970 to 2004. (Data source: USDA Economic Research Service, 2006b).

Figure 2.5: China annual fruit production figures, 1970 to 2004. (Data source: USDA Economic Research Service, 2006b).
China has rapidly expanded its agricultural output. By 2004 corn production had increased to 394% of the 1970 level, peanut production had increased to 668%, banana production had increased to
3648%, citrus production had increased to 6180%, grape production had increased to 6676%, and
total fruit production had increased to 4096% (USDA, 2006b).

These figures are all the more remarkable when we consider that China’s “farmland per capita is
only 1/3 of the world’s average level” and water resources are only 1/4 of the world average level
(Li, 2005). The flip side of China’s trajectory, is what Australian producers have dubbed their “cri-
sis” (AusVeg, 2005), with imports to Australia of fresh vegetables from China up 43% (AusVeg,
2006a) and “a continual decline of exports” from Australia (AusVeg, 2006b).

China produced 49% of the world’s vegetables in 2005, up from 36% in 1995 (McKay, 2006), and
50% of the world’s apples (Skorburg, 2001). China is the world’s largest producer of pears, ac-
counting for 60% of the world production, soon to be 70% (USDA/FAS, 2006b). China is the
“world’s largest tomato paste and puree exporter” (USDA/FAS, 2005, p. 1). China produces 49%
of the world’s apple juice exports, with other countries’ production levels shrinking, continuing a
ten year downward trend for US production and a similar incline for Germany, with an expected
40% reduction in the current year (USAD/FAS, 2006a).

Figure 2.8: China with 8% of the world’s land and most of the world’s farmers, produces 60% of the world’s pears
(Data sources: Li, 2005; Willer & Yussefi, 2006; McKay, 2006; Skorburg, 2001; USDA/FAS, 2006b).
China’s organic great-leap-forward has come with a mortgage. Environmental degradation, farmer and consumer health compromises, and international resistance to Chinese-grown food, are the three issues that have focussed the greatest attention on the dysfunctions of the Green Revolution in China, and the need to develop agricultural alternatives. “Poisoned food” (Zong, 2002), farmer deaths from pesticide poisoning (Giovannucci, 2005), and consumer deaths by farm produce (McKinna, 2006), are stories that are readily grasped, reported and relayed, even in a totalitarian state. Pesticide residues keep Chinese tomatoes off the menu of Japanese householders (Latner & Lei, 2006); reputationally such bans have the potential to hurt all Chinese agriculture which, although it currently only exports 2% of its vegetable production (McKay, 2006c), is increasingly looking to export. “The government has seen organic farming as an effective way to face the challenges of international trade barriers” (Chen, 2006, p. 17).

A milestone for organic agriculture in China was the March 2001 speech by Communist Party General Secretary, Jiang Zemin, to China’s top leaders urging a “vigorous adjustment of agricultural structure”, and urging that “top priority” be given to “establish quality standards for farm produce, a move to a system for examining and testing farm produce and to develop organic and pollution-free food”, (People’s Daily, 2001); a Chinese epiphany of Kirkpatrick’s “there is not much of a long term future in industrial agriculture” (2006, p. 98).

In the 1980s an early step towards organics was the development by the government of “Chinese ecological agriculture (CEA)”, zhongguode shengtai nongye, (Sanders, 2006, p. 117). The government “prescribed its technical features, to include specific limits on the inputs of chemicals”; there was “only limited success in persuading farmers to adopt CEA per se in the 1980s” (Sanders, 2006, p. 117). By 1990 there were however, 1200 eco-villages in China, “pilot ecological agriculture villages” (Zong, 2002, p. 54).

The Ministry of Agriculture created the Green Food program in 1990, (Mei et al., 2006). Green Food has been a remarkably successful Chinese innovation in quality food production, that has subsequently paved the way for China’s Organic Revolution, a strategy that may usefully be replicated elsewhere.

That same year, 1990, witnessed the birth of China’s fledgling organic industry. The first organic certified export was a shipment of green tea, certified by the Dutch certifier SKAL, and exported to the Netherlands (Zong, 2002).
Green Food is a government food certification program created to bring to market San Pin or “no-public-harm food” (Chen, 2006). This was achieved by creating a regime of produce testing, networks of inspectors and testing stations, a schedule of farm inspection and certification procedures, as well as fees, a Green Food logo for use on certified produce, a premium price structure, and a public awareness program. In contrast to the traditional organic agriculture approach, the emphasis for the Green Food program was always on the product, the outcome, rather than on the process. Green Food is administered by China Green Food Development Centre (CGFDC) under the control of the Ministry of Agriculture (MoA). It has been marketed as “high quality and pesticide-controlled food” (UNESCAP, 2002, p. 5).

The Ministry of Agriculture, via the CGFDC, owns the Green Food label in China. By 2003 there were more than 3000 products, with certified land of 5.14 million hectares. Retail sales “make Green Foods one of the largest such sectors in any country of the world, approximating the retail value of the United States USD 12 billion organic market”; of this production, approximately US$1.2 billion was exported to Japan and Europe in 2003 (Giovannucci, 2005, p. 10).

Green Food is a Chinese innovation, it certifies food safety, by certifying product standards. It involves field inspections, inspections of processing procedures, and residue testing. There are also tracking and traceability systems in place, including “electronic identification” systems (Chen, 2006).

Concurrently with Green Food developments, China’s State Environment Protection Agency (SEPA) set up the Organic Food Development Centre (OFDC) in 1994 (Sanders, 2006). There were two motives for this move: the “high potential for high-quality exports”, and “to encourage innovative farming practices that allowed for a more environmentally sustainable agriculture” (UNESCAP, 2002, p. 5). From the outset OFDC focussed on complying with international organic standards. Thus the MoA’s Green Food program, and the SEPA’s Organic food program were based, from the outset, on divergent philosophies; the former concentrating on product certification, to Chinese specifications, and excluded neither GMOs (Zong, 2002), nor pesticides, and with the organic certification concentrating on process certification and harmony with international organic standards.

In 2002 OFDC was “finally given full accreditation by IFOAM ... Chinese organic products certified by OFDC can be sold in the lucrative and growing markets around the world” (Sanders, 2006,
The International Federation of Organic Agriculture Movements (IFOAM) is based in Bonn, Germany and a certifier requires IFOAM accreditation to have international market credibility. IFOAM certification procedures include a three year in-conversion period for converting farms.

The wisdom of the Chinese experience has been to set up a local standard, the Green Food standard, and proliferate it, test it, hone it out of the international spotlight, and to then differentiate certification into Grade A, and Grade AA, and then to incrementally converge the local Green AA standard with international Organic standards.

This strategy has facilitated the rapid uptake of organics in China. Green Food Grade A “will be the de facto basis of all Chinese agriculture” and the Green AA standard will “be phased out in favour of organic certification” (Giovannucci, 2005, p. 34). This successful strategy of articulating from the national Green Food AA certification, to the international organic standard certification, is a model that other producer countries could learn from, and emulate. For example Australian vegetable growers are introducing a new national, though optional, standard “EnviroVeg” (Whitman, 2006); possibly “green” was seen as going a little too far, in any event, this initiative, if pursued with integrity rather than puffery, could be used as a stepping stone for the industry to convert to organic.

Pesticide use in China peaked in 1982 at 1,582,000 tons (Fan, 1997) and was 1,312,000 tons in 2003 (ZHB, 2004). China’s imports of biocides were US $620,565,000 in 2004, compared to Australia’s US $530,256,000, just 15% less than China (author’s aggregations of FAOSTAT data, 2006).

Machinery input in Chinese farming grew sixteen times in the 25 years between 1970 to 1995, from 22 billion watts to 361 billion watts (Fan, 1997). The total power of agricultural machinery grew by a factor of 28, from 1970 to 2003, with government subsidies covering 20% to 40% of the costs of new machinery. While farm mechanization is “still in the elementary stage”, the government has adopted “the mechanization of agricultural production as one of its vital strategic targets” (Li, 2005, p. 1). China is currently manufacturing approximately 2 million new tractors per year (from figures in Li, 2005).

Green Food specifications and certification of product, is quite different to, but in no way incompatible with, Organic certification, which certifies process. By building infrastructure for Green...
Food standards, the incorporation and/or migration to Organic process standards is facilitated, and adoption of these twin standards has the potential to raise the bar, so that Chinese Organics are of the highest international standard.

The uptake of organics in China has been rapid. The Environmental Protection Agency (SEPA) issued *Organic Food Certification and Management Measures* in 2001 (Giovannucci, 2005). In 2005 the newly formed Certification and Accreditation Administration of China (CAAC) issued the first national standard: the *Chinese National Standards for Organic Produce* (Mei et al., 2006), thereby controlling and restricting the use of the term “organic” to certified produce (Bugang, 2005). Eight key difference between the European and the Chinese model of Organic Agriculture are presented in Table 2.1.

<table>
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<tr>
<th>EU OA model</th>
<th>China OA model</th>
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<td>Local market focus</td>
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<td>Native idea</td>
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<td>Farm as organism</td>
<td>Farm as economic enterprise</td>
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Table 2.1: Eight key differences between the Chinese and European experience of Organic Agriculture (OA).

For Chinese farmers, the issues of converting to organic, are as for farmers elsewhere. Chemical inputs are expected to go down, labour inputs are expected to go up, yields may go down, especially in the three year conversion period, there are costs involved in inspection and certification, there is the nuisance value of additional paperwork, the uncertainty of the size of, and even the achievement of, a market premium for the produce, there is the probable lack of a premium during the conversion period, and knock-on health and farm environmental benefits from eliminating pesticides are expected.
One appeal of organics for China is “lower production costs and higher prices” (Mei et al., 2006, p. 5), and so organics can be a tool to alleviate rural poverty (Giovannucci, 2005). There have been many studies of the economics of conversion. The International Fund for Agricultural Development, and the United Nations, advocate conversion to organics as a strategy for alleviating poverty in third world countries (Giovannucci, 2005; Hak-Su, 2002). Economics may dominate the convert-or-not decision process for third world farmers; “receiving greater income is by far the most important reason given by farmers for converting” (Giovannucci, 2005, p. 57), and improved profits are reported as the major driver of organic conversion in China (Sanders, 2006). Zong (2002) presented a case study analysis of rice production in China and reported a net 50.74% improvement in profitability after conversion.

China’s first eco-village, Liu Min Ying, won a UN environmental protection (UNEP) award in 1987. It is an organic village that has prospered, and has branched out into eco-tourism and eco-training, and is now “one of the richest villages in the Beijing Municipality” (Sanders 2006, p. 127).

There is one other factor that may be impinging on the attractiveness and uptake of organics in China. There is a farm offsets system in place in 24 provinces. Where an urban or industrial development is proposed for farmland, there is a planning approval requirement, to offset that loss of farmland by bringing an equivalent area of new farmland into production (ZHB, 2004). This requirement favours the adoption of remoter, and hence cheaper, sites for farmland recovery, and can dovetail with organic development needs whereby “government and investors chose remote and underdeveloped areas in the mountainous region, where manufacturing, pollution or contamination is relatively low” (Chen, 2006, p. 12).

As of 1 April 2005, there is only one organic label for all of China and for all products. It is bilingual Chinese and English; there are two versions “Organic” and “Conversion to Organic” (Chen, 2006) (see Figure 2.9); the word “organic” is now restricted to use only on certified produce. This is expected to substantially resolve the confusion, identified by Wong (2005), in the domestic Chinese market caused by the proliferation of labeling variations, and the reported substantial amount of “self-claimed organic” i.e. non-certified organic.
The newly developing Shanghai suburb of Dongtan is designed to be home to 500,000 residents and to be surrounded by forest and organic farms, to be “zero-pollution” and powered by renewable energy (Pearce, 2006). Dongtan with its organic farming integration and gardens on roofs has been described as “the world’s first purpose-built eco-city” (Allenby, 2006, p. 15).

China is another strand of what Alroe & Noe (in press) describe as “the heterogeneous trends and patterns in the development of modern organic agriculture”. Rahman & Nieberg (2005) report that the main reasons given by German farmers for conversion to organics, were environmental (38%), economic (29%) and political (20%). It is an interesting question for future research to examine the political motivations in China for conversion to a system of agriculture that is an open (public-domain) system, compared to increasingly proprietarised, chemical and patented, agribusiness options.

China may be the newest organic kid on the block, but she is a very serious player with the potential to greatly raise the market presence and profile of Organics around the world. Mei et al. (2006) report that “It is expected that by 2010 over one third of the total agricultural land in production will be converted to organic production” (p. 4), and that “China is well on the way to becoming one of the largest organic food producers in the world” (p. 5). There is the potential for China to redefine the standard for internationally traded food, as certified organic.
2.4 Organic Australia

With 12,126,633 organic hectares, Australia leads the world (Willer & Yussefi, 2006) (see Figure 2.10). Most of this area is in the Queensland outback (see Figure 2.11), and is applied to low intensity beef grazing (Brook, 2005). Australia fares less well on other organic metrics. Australia ranks twentieth in the world, with 2.71% of its agricultural land organically managed (see Figure 2.12). With a total of 1832 organic farms, Australia ranks 43rd in the world (see Figure 2.13) (Halpin, 2004).

The organic sector in Australia has been estimated to be worth AU$128 million, based on farm gate value (Halpin, 2004). Of this total, the top five product categories are: beef (AU$53.3m), vegetables (AU$24.4m), fruit & nuts (AU$21.4m), cereals (AU$17.6 m), and milk (AU$7.4m). These figures are estimates; organic data is not collected by the Bureau of Statistics or other government agencies (Halpin, 2004).

![Figure 2.10](image_url): Australia, number 1 in top 10 countries, ranked by organic hectares (data source: Willer & Yussefi, 2006).
Figure 2.11: Distribution of Australia’s organic hectares (data source Halpin, 2004) and farms (data source DAFF, 2004) by state.

Figure 2.12: Australia (world ranking 20th) plus top 10 Countries by % organic hectares vs total agricultural land (data source: Willer & Yussefi, 2006).
Organic export data are collected by volume not value (DAFF, 2004). By volume, cereals and processed products are the top two categories for organic exports. The top destinations are respectively, Japan, UK, France and New Zealand (DAFF, 2004).

There is an Australian National Standard for Organic and Bio-Dynamic Produce. The first edition was issued in 1992, the second edition in 1998, and the third and current edition in 2002 (Organic Produce Export Committee, 2002). The national standard is a regulatory instrument of the government authority, the Australian Quarantine and Inspection Service (AQIS). The standard was developed for exported products, labelled “organic” or “bio-dynamic”. AQIS currently serves two roles, firstly as competent authority for accreditation of certifiers, and secondly, as secretariat and convenor of the Organic Industry Export Consultation Committee; AQIS has recently indicated its preference to relinquish these standards support roles in 2007 (Kinnear, 2006).

There are seven organic certifiers in Australia (McKinna, 2006). The peak body is the Organic Federation of Australia, established in 1998 (May & Monk, 2001). Domestic certification is the responsibility of the certifiers. For a product to be exported as organic, the certifier has previously been required to be accredited with AQIS. The Australian National Standard has equivalence status with

![Graph: Organic farms distribution among countries]
the EU standard (May & Monk, 2001), and is regarded as consistent with the Codex Alimentarius, although it is tighter and has a greater level of detail than the Codex (May & Monk, 2001). The practice has been for all the Australian certifiers to adopt the National Standard. This process has faltered recently with ACO/BFA (Australian Certified Organic/Biological Farmers of Australia) departing from the Standard by certifying water (excluded under the Australian Standard) and creating a diluted “for domestic sale only” organic label for poultry, which fails to meet the Standard (Burke 2006a; Burke, 2006b). This development “has the potential to damage the credibility of certified organic products” (Leu, 2006c, p. 1).

Each of the seven AQIS accredited certifying organisations has their own distinctive logo. Additionally, there is an “Australian Government Certified” regulatory mark, the use of which is optional (DAFF, 2004). The logo appears to be ill conceived; rather oddly for a green food logo, it is orange in colour, nor does it include the word “organic”. Perhaps unsurprisingly, there has been very little uptake of this logo for domestic retail use, and the author has found it to have no public recognition. With its lack of specificity, “Australian Government Certified” could just as well be certifying genetically modified, or irradiated, as organic.

Australian Certified Organic (ACO), the certification subsidiary of Biological Farmers Australia (BFA), claims to certify 55% of the Australian organic industry and their claim is that their logo appears on 70% of certified products in Australia (ACO, 2004). ACO is accredited to certify producers in Europe, Japan, USA, and Switzerland (ACO, 2006).

Australian supermarket Coles began stocking organic products in 2003 (Heaton, 2005) and now carries a small selection, as does its main competitor, Woolworths. Macro Wholefoods in 2003 began development of the first Australian chain of specialist organic supermarkets, with stores now in Sydney and Melbourne and plans for 40 stores (Jaremkiewicz, 2006).

Threats to the rapidly growing organic industry are GM crops, probably the US-Australia free trade agreement, and the haphazard approach to domestic organic labelling. GM food is excluded from certified organic produce. The risk to organic growers is contamination from wind-blown pollen and GM contaminated seed (Wynen, 2006). The Agriculture and Food Policy Reference Group (2006) recommends that “state governments should lift their moratoriums on the commercial use of GM crops immediately”, that “in view of the potentially significant human health, environmental and economic benefits from using biotechnology on agriculture and food production … governments
must give higher priority to communicating the benefits of current and emerging biotechnology, and
to publicising the robustness of the regulatory regime for the safety of research and the resulting
products … to facilitate the rapid uptake of agrifood biotechnologies that will contribute to better
health, to cleaner environment and more globally competitive industries” (p. 102). The US-
Australia Free trade agreement risks the US forcing GM produce onto the Australian market, de-
manding market access for US GM produce, and claiming that resistance is a barrier to trade. There
is also the risk that the US Department of Agriculture captures or influences a future Australian or-
ganic standard by, for example, demanding congruence with the US organic standard, which the
USDA now controls. The author also notes that there is a haphazard and inconsistent approach to
domestic organic labelling, this is unfortunate for an industry that relies largely on labelling, and
trust in its veracity; it is a topic for a future research report.
2.5 Organic Tasmania, Leader or Lagger?

Organic agriculture in Tasmania accounts for less than one percent of agricultural land and less than one per cent of farm gate dollar value. Of the certified organic hectares in Australia, 75% are in Queensland, 20% are in South Australia and a mere 0.1% are in Tasmania (Halpin, 2004). When I suggested at a recent Organic Coalition of Tasmania (OCT) forum that, in the light of the dramatic growth worldwide of organics (McKinna, 2006), Tasmania was lagging, Graeme Stevenson of the Organic Gardening & Farming Society of Tasmania, suggested I review the data on the basis of organic farms per capita.

Tasmania appears to have a huge potential for organic agriculture. The state has a higher proportion of rural dwellers than other Australian states. It has a long tradition of successful agricultural pursuits dating from the earliest European settlement, it is the only state with its own organic certifier, and geographically, it is well placed to capitalise on its clean and green image.

International organic data is reported by Willer & Yussefi (2006). For each country, three key organic indices are presented: total organic hectares, organic hectares as a percentage of total agricultural hectares, and total organic farms. Organic farms per capita has not been a typical metric, it is not reported by Willer & Yussefi, yet it seems an interesting and promising approach.

A lack of data on Tasmanian organics was noted by Dawkins (2005). Halpin (2004) reports 54 organic farms in Tasmania. Using a population figure of 500,000, this yields 108 organic farms per million for Tasmania. Local sources, including Brunswick-Hullock (2006) and Stevenson (2006), suggest the figure is closer to a total of 100 organic farms in Tasmania, and this yields a statistic of 200 organic farms per million, and that is the figure used in Figure 2.14.

New Zealand with 820 certified organic farmers and a population of 3.9 million yields 210 organic farmers per million, and is comparable to Tasmania. Other countries comparable to Tasmania on this measure, are Germany with 200, Indonesia with 195, Turkey with 190, and France with 185 organic farmers per million of population.

Australia has 92 organic farms per million, the UK has 67, the US has 29; Albania lags with a mere 16 organic farms per million of population.
Austria yields the highest metric with 2418 organic farms per million of population. If Tasmania had the same density of organic farms as Austria, there would be 1209 organic farms. This confirms the view that there is a huge opportunity in Tasmania to grow the organic sector, and suggests a potential for 1000% growth.

Countries with a diversity of geographies, economic structures, governance, climate, ethnicity and farming traditions have a considerably higher penetration, than Tasmania, of organic farming based on the metric of organic farms per million of population. Located in Europe, Africa, Asia, South America, and Central America they set the example for what can be achieved. The mission of the International Federation of Organic Agriculture Movements is that all agriculture will be organic (IFOAM, 2006). Based on what has already been achieved in other countries, the bar can be raised for what is achievable, so that Tasmania claims a place as an organics world leader.
2.6 ISO Eco-labels & Adjunctive Labelling

The International Standards Organisation introduced eco-label definitions in 1999, and expanded them in 2006. Of the seven terms tested in the present study, four fall within the ISO eco-label definitions (*Organic, Certified Organic, Eco and Natural*), and three fall outside (*China, Australia, Tasmania*). In the present study where the term *eco-label* has been used, it is used consistent with the ISO definitions.


*Type I environmental labels are multi-criteria third party programmes that award environmental labels to products meeting a set of predetermined requirements.*

*Type II environmental labels specify requirements for self declared environmental claims made by manufacturers, importers, distributors, retailers or anyone else likely to benefit from such claims.*

*Type III environmental declarations provide quantified environmental information about products, using predetermined parameters based on the ISO life-cycle assessment series of standard* (Frost, 2006, p. 1).

The ISO labelling typology can be applied to any product. Food labelling represents a small percentage of total eco-labelling usage (Pahl, 2004), although Smith & Stancu (2006, p. 1) report that “more than 100 eco-labels for food and beverage alone” in New Zealand.

Eco-labels have been classed with eco-taxes and tradable permits, as “voluntary agreements and market-based as instruments” and collectively described as “new environmental policy instruments (NEIPs)” (Jordan, Wurzel, Zito & Bruckner, 2003a, p. 3). To be effective eco-labels rely on transparency, independence and consumer awareness and it is claimed they “are largely ineffective in markets which are characterized by a low degree of environmental awareness” (Jordan, Wurzel,

Despite the enthusiasm of some authors, the ISO standards have “largely been ignored” (Daboh, 2004, p. 38), and the ISO definitions are deficient, and insufficiently inclusive; particularly in their specification that the claim needs to be “made by… anyone… likely to benefit from such claims”. The test for an ISO Type II eco-label is that there is a benefit to the labeller; rather than a benefit to the environment, to the labellee (the label reader), or to the the purchaser. It is an asymmetric definition, and reflects the industry-centric focus of the ISO. It is claimed that the ISO eco-label concepts were developed in close association with multi-nationals (Proctor & Gamble, 2005), and perhaps the possibility of them acting altruistically, or for the public-benefit, and other than in a self-serving manner was so entirely anathema, that it was definitionally excluded. ISO eco-labels definitions also lack a provision for smart labels, e.g. an RFID-enabled label, that captures and records in-transit environmental history data, for example distance travelled (food miles), fumigation exposure or radiation exposure. After-market food-guerilla labelling, for example, also appears to be excluded; “This is a product of a Gunns subsidiary” or “Boycott 1080 farmers” and “Nanoparticles used in production”, clearly have an environmental aspect, fail the benefits test (certainly in the monetary sense, and there is no direct benefit to the food-guerilla or the supermarket-insurgent who might apply such labels). These are some reasons why, if ISO eco-labels are necessary, they are certainly not sufficient.

The term adjunctive labelling is adopted by the author as an omnibus term to refer to any label element other than the generic description of the food item, and thus all seven test terms used in the present study fall within its compass. It is introduced as a broader and more inclusive term than ISO’s eco-labels. In the present study, where the term adjunctive labelling has been used, it is intended to be self-explanatory, and in any event, where it has been used, the use and intent are consistent with that outlined here.

Adjunctive labelling falls broadly into two classes: controlled and not controlled. A label element is controlled where there is oversight by some governing body; this might be a government agency, (as for example where there is a requirement for provenance or nutrition labelling), or an NGO certifying agency (for example by an organic certifier or Fair Trade certification).
Narrative is used for product differentiation with the intention of adding value or glamour, so that a restaurant describes its offerings as “line-caught yellowfin”, “wild barramundi”, and “diver-caught scallops” (Meryment, 2006). These adjunctive labels are clearly designed to enhance consumer perceived value; compare, for example, some alternatives, of equal or superior veracity, that are unlikely to appear on the menu: offal-fed tuna, debeaked chicken (apparently no chooks ever reach the market place) and triple-pesticided strawberries.

In Australia any product description falls under the Trade Practices Act (1974) (Cth.), in particular the “passing-off” provisions and the “misleading and deceptive conduct” provisions. Invoking these provisions for food-labelling malfeasance, other than by the ACCC, would be expensive and unlikely.

The adjunctive label organic is not a controlled term in Australia, so that any producer or seller can freely label a product as organic, risking only an unlikely action under Trade Practices. Under the new provisions in China, organic is now a controlled term and its use is restricted to the state-sanctioned and designed “Organic” or “Conversion to Organic” logos; the labels are specified in both English and Chinese characters (see Figure 2.9)

ISO eco-labels have as their raison d’etre standardization and labeller-benefit. Adjunctive labelling is a broader term with a greater emphasis on diversity and information. Both terms are used in the present study; four of the seven treatment terms can be described as eco-labels (Organic, Certified Organic, Natural and Eco) and all seven treatment terms can be described as adjunctive labels.
2.7 ACCC: Australia’s Food Label Watchdog

The NSW Food Authority notes that “as organic products cannot be readily distinguished from conventionally produced products, a heightened potential for fraud exists’’ (NWSFA, 2005, p. 2). The facilitating condition precedent for such a fraud is the price differential between organic and non-organic food. Some fraudulent passing-off has been reported (Meikle, 2006), with a single case in Australia (ACCC, 2006b; see Table 2.2). As with organic products, products of different provenances can also not readily, or at all, be distinguished from each other, and where price premiums attach to different provenances, the same potential for fraud exists as reported by the NSWFA for organic produce.

A producer intent on labelling processed food for the Australian market is advised to refer to both the FSANZ standard 1.2.11 specifications (FSANZ, 2006b) together with the ACCC guidelines to the interpretation of the Trade Practices Act (ACCC, 2005).

There have been 17 public actions by the Australian Competition and Consumer Commission (ACCC), under the Trade Practices Act (1974), for false and misleading food and beverage labelling. Private actions are possible under the Act; none were identified. The ACCC was set up as the Trade Practices Act “watchdog”, it can initiate its own actions and it can accept complaints from the public.

There is no mandatory labelling required under the Act, but if there is labelling, it is required to be neither false nor misleading. Where labelling is required, it is mandated under the Australia New Zealand Food Standards Code which is adopted without variation by the Imported Food Control Act (1995) and the various state and territory food acts, and is administered by FSANZ (ACCC, 2005).

The salient sections of the Act are: Section 52 (deceptive and misleading conduct); Section 53(a) and Section 75AZC(1)(a) (false claims of a products history); Section 53(eb) and Section 75AZC(1)(i) (place of origin); and Section 55 and Section 75AZH (misleading of the nature, manufacturing, characteristics, or suitability for purpose). The Act includes defences, described as “safe harbours”, for “Made in Country of Origin” and “Product of Country of Origin” claims (ACCC, 2005, p. 6, p. 8).
Of the 17 food and beverage labelling actions taken by ACCC, 13 relate to Country of Origin Labelling (CoOL), four involve regional of origin labelling claims (RoOL), one relates solely to misleading content and processing, and only one relates to Certified Organic. Table 2.1 presents data on each of the 17 actions, the year, the claim, the finding and the ACCC reference; the final action in the list remains unfinalised.
<table>
<thead>
<tr>
<th>Year</th>
<th>Claim</th>
<th>Finding</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>Product of Australia</td>
<td>From USA</td>
<td>ACCC, 1996</td>
</tr>
<tr>
<td>1997</td>
<td>Tasmanian</td>
<td>From Scotland</td>
<td>ACCC, 1997a</td>
</tr>
<tr>
<td>1997</td>
<td>Australian-grown</td>
<td>From Thailand</td>
<td>ACCC, 1997b</td>
</tr>
<tr>
<td>1997</td>
<td>Product of Australia Product of Port Lincoln, South Australia</td>
<td>From Thailand</td>
<td>ACCC, 1997c</td>
</tr>
<tr>
<td>1998</td>
<td>100% Australian pork</td>
<td>From USA</td>
<td>ACCC, 1998a</td>
</tr>
<tr>
<td>1998</td>
<td>100% Australian Owned</td>
<td>USA owner</td>
<td>ACCC, 1998b</td>
</tr>
<tr>
<td>1999</td>
<td>Product of Australia</td>
<td>Imported</td>
<td>ACCC, 1999</td>
</tr>
<tr>
<td>2000</td>
<td>Product of Australia Product of Greece</td>
<td>From Spain</td>
<td>ACCC, 2000a</td>
</tr>
<tr>
<td>2000</td>
<td>Produce of India</td>
<td>From Pakistan</td>
<td>ACCC, 2000b</td>
</tr>
<tr>
<td>2001</td>
<td>Product of Australia</td>
<td>Imported</td>
<td>ACCC, 2001a</td>
</tr>
<tr>
<td>2001</td>
<td>Made in Australia from Australian Fruit Juice</td>
<td>Imported</td>
<td>ACCC, 2001b</td>
</tr>
<tr>
<td>2001</td>
<td>Product of Australia Darwin Squeezed Pure Australian fruit</td>
<td>From Brazil</td>
<td>ACCC, 2001c</td>
</tr>
<tr>
<td>2001</td>
<td>Product of Australia</td>
<td>Imported blend</td>
<td>ACCC, 2001d</td>
</tr>
<tr>
<td>2002</td>
<td>Australian</td>
<td>Imported blend</td>
<td>ACCC, 2002</td>
</tr>
<tr>
<td>2003</td>
<td>Product of Australia A gift from Tasmania 28% Leatherwood propolis</td>
<td>Manufactured and bottled in China, no Leatherwood propolis</td>
<td>ACCC, 2003b</td>
</tr>
<tr>
<td>2006</td>
<td>Made with 65% real fruit</td>
<td>Misleading</td>
<td>ACCC, 2006b</td>
</tr>
<tr>
<td>2006 ongoing</td>
<td>Organic free range eggs Certified organic by NASAA</td>
<td>Complaint: Not organic &amp; Not certified by NASAA</td>
<td>ACCC, 2006a</td>
</tr>
</tbody>
</table>

**Table 2.2:** ACCC public actions on food & beverage labelling.
Chapter 3: Methodology

3.1 Experimental Design

A Rubiks cube experimental design was adopted, using three variables each at three levels (see Table 3.1). The full factorial design, using three variables, each at three levels, generates $3 \times 3 \times 3 = 27$ treatments. Each treatment is one of 27 food scenarios, each scenario being a 3-tuple, in each case, described by one level of each variable.

<table>
<thead>
<tr>
<th>Organic Label</th>
<th>Provenance Label</th>
<th>Eco Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;null&gt;</td>
<td>China</td>
<td>&lt;null&gt;</td>
</tr>
<tr>
<td>Organic</td>
<td>Australia</td>
<td>Eco</td>
</tr>
<tr>
<td>Certified Organic</td>
<td>Tasmania</td>
<td>Natural</td>
</tr>
</tbody>
</table>

Table 3.1: Three treatment variables, each at three levels.

An instrument was developed for presenting these 27 treatments to respondents. Respondents were invited to value each treatment in the range $5.00 to $10.00. Dollars were chosen as the response variable (the dependent variable) because it is a ratio scale, and all consumers are familiar with this monetary scale; it is the common scale used for both food pricing and for valuation purposes. The range was chosen because trialling revealed that prices in this range are familiar to consumers, consumers are experienced in discriminating within this range, and many food items fall within this range. The starting and ending points of the scale are not critical in this study, because this study was interested in the relative differences between treatments. What is critical is that subjects can exercise their discrimination on the chosen scale. Trialling, retail realities, and research requirements indicated that the scale should start at other than zero, on the basis as one trialer put it “something is worth something”. Trialling indicated that a scale stepping in 25 cent increments, generating a 21 point scale ($5.00, 5.25, 5.50 \ldots 9.75, 10.00$) served the purpose of being simple and easy for respondents to use and understand, while catering for respondent discriminability. The scale $5.00 to $10.00 allowed respondents to assign a premium up to 100% across the treatments; in the light of reports including Halpin (2004), Meldrum (2005) and Giovannucci (2005) a potential 100% premium was considered an adequate range, with respondent premiums anticipated to lie in the range 0% to 100%.
Eight demographic questions were incorporated into the instrument, based on a typical demographics set, with the intention of revealing the characteristics of the sample, and to allow post hoc analysis of demographic effects. Since a full factorial design determined the instrument at 27 treatment questions, demographic questions were limited to eight, to not overburden the demand on respondents. The demographic variables incorporated were: gender, age, residence location, income, education, main food shopper, organics purchase frequency, and relationship with the organics industry. The purpose of the “relationship with organics” was primarily as a screening question, as a precaution that those with a relationship (grower, retailer, wholesaler or manufacturer) were not overrepresented, and could be excluded from the analysis if necessary. An optional comments box was included to allow respondents to volunteer feedback.

The instrument was trialled, and revised until there was an instrument that required minimal instructions and was near self-explanatory.

All subjects received all 27 treatments. This avoids recipient effect confounding (Reichardt, 2006). Choosing a factorial design enables the simultaneous measurement of a number of variables, and their interactions.

3.2 World Wide Web

Presenting the instrument via the World Wide Web (WWW) seemed like an interesting and challenging option, was investigated, and was adopted.

3.2.1 World Wide Web: Why?

Linking respondents to the research instrument via the WWW is congruent with the original vision of Tim Berners-Lee (1999) who invented the WWW with the vision of it as a research space in which anything could be linked to anything.

There are many benefits in using the Web for research. Some of these benefits are researcher-benefits, some are respondent benefits, and all are benefits for the research project. Some of these benefits accrue from opting for computer mediation, while others are uniquely Web advantages (see Table 3.2).
<table>
<thead>
<tr>
<th>Feature</th>
<th>WWW</th>
<th>Interviewer</th>
<th>Mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any time</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Any place</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Any pace</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>No interviewer bias</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Randomization of questions</td>
<td>Yes</td>
<td>Maybe</td>
<td>No</td>
</tr>
<tr>
<td>Randomization of response options</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Completeness validation</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>No interviewer costs</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>No collection costs</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Concurrent analysis possible</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Progressive reveal</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Single handling of data</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Digital capture of data</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Reach unlimited</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Anonymity of respondent</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Avoids ballot stuffing</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 3.2: Comparisons of presenting a research instrument using three alternative media: WWW, interviewer and mail.

The Web gives respondents confidence that they can answer anonymously. It is known that “direct questioning leads to biased results” and that “Obtaining valid and reliable information depends on the cooperation of the respondents, and the the willingness of respondents depends on the confidentiality of their responses” (Fox, 2005, p. 189). Protecting the respondent’s privacy improves truthful responding (Huang, Lan & Kuo, 2005). The Web offers respondents a greater level of privacy than other data collection strategies.

Non-social data collection conditions, such as computer mediated questioning, are known to produce more accurate responses from respondents than interviews (Martin & Nagao, 1989). This is consistent with the result that privacy and confidentiality avoids false responding (Fox, 2005).
The order of questions effect (Suchman & Guttman, 1947) can be overcome using the Web, by freshly randomizing the questions for each respondent. With other survey techniques, it is challenging to re-randomize the questions for each respondent, and without computer mediation, the subsequent data collation is also a challenging task. Order of questions effects continue to be reported for other survey techniques (Hauksdottir, Steineck, Furst & Valdimarsdottir, 2006).

Two artifactual effects, the size of which is usually unknown, are avoided by choosing the Web over other presentation options. Avoiding the effect of setting, and the effect of time, improves the quality of research designs (Reichardt, 2006) since the size or even the existence of the effects are likely to be unknown. Using the Web, a subject chooses their own time and own place, as well as their own pace for responding.

The treatments in this survey were presented in five blocks, each of five or six treatments; this has the advantage that the questions in a block can be viewed, and responded to, on a single screen (without scrolling). Manfreda, Batageli & Vasia (2003) report that, although such a multipage presentation takes 30% longer for respondents to complete, there are less missed questions. In a computer mediated questionnaire, the instrument can be designed to allow skipped questions, or designed to detect missing responses, and to iteratively re-present the unanswered questions to the subject, until all questions have attracted a response. The latter approach was adopted for this study. Treatment questions presented in blocks meant that all questions within a block, were visible on a screen (without requiring scrolling, for typical computer screen defaults), thus enabling a simpler navigation path for subjects, and consequently less missed responses. This was an important consideration for our design, since the survey was coded to validate that each question had a response, and where there was a missing response detected, the question block was re-presented to the subject, indicating the site of the missing response; this process continued iteratively if necessary, until there were no missing responses detected.

The Web overcomes known disadvantages of traditional data collection. It reduces collection cost by eliminating interviewers and consumables, it protects respondent privacy, it eliminates data transcription and data double-handling by digitally capturing data, it enables concurrent response validation, and allows the controlled progressive reveal of questions. Interviewer bias, order-of-question biases, and direct questioning biases including socially desirable responding (SDR), are eliminated by migrating a research instrument to the Web. Confounding treatment effects attribut-
able to setting and time are eliminated, and it is known that computer mediation leads to more accurate reporting. The web is increasingly used for surveys for reasons of cost, convenience and immediacy; using it for a factorial design appears to be novel.

### 3.2.2 World Wide Web: How?

There are three key issues in presenting a research instrument via the WWW: firstly, how to technically achieve it, secondly the creation of a workable portal and navigable site, and thirdly, the recruitment of respondents.

One technical option is to write the code from scratch, or alternatively use ready-built code. A search revealed at least two sites offering built code. SurveyConsole (www.surveyconsole.com) and QuestionPro (www.questionpro.com) offer very similar functionality and versatility, they both offer a licence to use, ranging from free (for universities) to hundreds of dollars per month, and there are various levels of service available. Both were trialled for this project. Both allow multiple surveys to be set up (useful for trialling), both were found to be suitable for a factorial design, for functionality and respondent ease of use, and for our purposes there was little to choose between them.

When a survey instrument is set up on either of the above facilities, the survey is allocated a unique URL, for example:

http://www.surveyconsole.com/console/TakeSurvey?id=123456

In this study the objective was to recruit subject volunteers from the general population via the media. This required each subject to go to a web site, and hence the researcher set up a simple portal URL for respondents to use.

Two domain names were registered, utas-survey.org and utas-survey.com and set up as URLs, www.utas-survey.org and www.utas-survey.com. Both of these URLs were linked to a single simple user interface created by the researcher in HTML, and loaded onto a web server. A visitor to either URL was thus presented with a one-click entry to the survey. For the visitor, intervening URLs were masked, so that the respondent only saw the web badging that they entered, namely www.utas-survey.org or www.utas-survey.com, and the ultimate URL, of the type http://www.surveyconsole.com/console/TakeSurvey?id=123456 was masked (hidden).
The Media Office of the University of Tasmania prepared a one page press release, and distributed it to Australian media, mostly print media, announcing a survey about “food labelling” and listing the URL as [www.utas-survey.org](http://www.utas-survey.org). The press release was intentionally vague and non-specific, and no mention of organic was made. Because “disclosing the purpose of the study can create bias” (Bhaskaran, 2005, p. 7), emphasis was placed on avoiding indications that this study was about organics, or country of origin labelling (CoOL). See Appendix 1 for an example of a press release, and Appendix 2 for examples of how the media carried the story. As a consequence of the press release process, the survey URL appeared in print in Tasmania and on the Australian mainland, was mentioned on *ABC* radio, and was included on various media web sites, including *Tasmanian Times* and the *ABC* web sites.

For the purpose of announcing the survey only [www.utas-survey.org](http://www.utas-survey.org) appeared on any press release; the three elements of this URL indicating the university link (utas), the purpose (survey), and non-profit (org). A second domain, [www.utas-survey.com](http://www.utas-survey.com), was registered and set up as a functioning URL because .com is the dominant www suffix, and it was anticipated that users typing a URL are likely to inadvertently type .com (in lieu of the correct .org). By registering and making both URLs (.org and .com) functional, the probability of capturing respondents is increased.

The 27 questions were set up to present in alternating blocks of five or six questions, and the instrument was set to auto-validate that a response was recorded for each question within a block. Multiple responses for a single question were software-disallowed. Missing responses were also software-disallowed; in the event a respondent missed answering a question or more within a block, the question block was re-presented to the respondent with the missing response item/s identified. Questions were randomized, so that each respondent was presented with the 27 treatments, and subsequently with the 8 demographics, in different randomized order for each subject.

The respondent was advised on the survey entry page that the survey was anonymous. Security was set to stop “ballot stuffing”, i.e. to stop a respondent submitting several surveys. A respondent attempting to do the survey again was presented with a screen with a message noting that this is a once-only survey per respondent.

The survey results were collected in an online database, and additionally the instrument was set up so that each completed survey was emailed to the researcher immediately it was completed; in this
way the researcher received immediate feedback on the progress of the survey, and there was a back-up set of data (see Figure 3.1).

![Diagram showing survey process]

**Figure 3.1:** Respondents were recruited via newspaper stories inviting the completion of a food labelling survey at [www.utas-survey.org](http://www.utas-survey.org) (A second URL was set up, [www.utas-survey.com](http://www.utas-survey.com), for respondents who inadvertently typed .com instead of .org). From the web portal, one click led to the online survey. Responses were databased and each completed survey was emailed, in real time, to the researcher.

### 3.3 Statistical Analysis

All data were captured online *via* SurveyConsole software, all responses were data-based online, and the results were downloaded at the end of the data collection period, as a single data file, and thence imported into SPSS. Analysis was conducted offline using SPSS, and additionally online using GraphPad Software.

Responses were analysed as a full factorial 3x3x3 design using a 3-factor repeated measures (within-subjects) general linear model analysis of variance (ANOVA), using SPSS. The design enabled the addressing of seven questions simultaneously, i.e. three main effects, three 2-way interactions and one 3-way interaction (see Table 4.1). Multivariate F test results (using Pillai’s Trace) are
reported. Where ANOVA analysis revealed significant effects, within-subjects pair-wise contrasts, based on differences, were investigated to identify which treatment levels and combinations generated significant differences.

The demographic variables, (Gender, Age, Place of Residence, Income, Education, Main Shopper, Purchaser of Organics, Relationship to Industry) were subsequently systematically investigated for single and pairwise interactions using the general linear model ANOVA analysis, with repeated measures on the three treatment factors, and with demographic variables treated as between-subject factors (i.e. non-repeated measures). Multivariate F test results (using Pillai’s Trace) are reported. Where the ANOVA analysis revealed significant effects, pair-wise contrasts, based on differences, together with t-tests (repeated measures or non-repeated measures, as appropriate), were pursued, in each instance, to identify which treatment/demographic factor combinations and levels were responsible, for the significant effect. Interactions up to 5-way interactions are reported, and significant interactions are reported for all seven demographic variables. Two-way demographic effects are reported in Table 4.9. Three-way demographic effects are reported in Table 4.10. Four-way and five-way interactions are presented in Table 4.11 and Table 4.12.

The significance level adopted in the present study is 0.05, and unless specifically identified otherwise, (as for example: “significant at 0.1”), “significant” in the present study means “significant at the 0.05 confidence level”. For all graphical presentations, responses are reported denominated in dollars ($) as per the research instrument. (The values reported are, in all cases, generic or notional dollars; the experimental design required a monetized ratio-scale to reveal factor-induced value increments and decrements, it did not rely on a particular species of dollar, (e.g. AU$), and none was specified in the research instrument or to the respondents, and no respondents commented about this.) Where cell or marginal means are presented in a table, with standard errors, (e.g. Table 4.1), the expedient has been adopted to present the means denominated in cents (i.e. $ x 100). This stratagem facilitates ease of calculating confidence bounds for the reader so inclined; a 95% confidence interval can be readily mentally approximated by using the Mean +/- the Standard Error (SE) times 2 (i.e. SE x 2), or calculated more precisely employing 1.96 as the multiplier (i.e. SE x 1.96).
3.2 A Note on Sampling Methodology

The volunteer sampling methodology used in this study may offend the sensibilities of some researchers who take a more authoritarian, as compared to a libertarian, approach to sampling. For the present study, invitations to participate in a survey “about food labelling” were broadcast by public media (press, radio and online public media) and subjects were self-selected.

The value and probity of list-based surveying is acknowledged from the outset, where the purpose of the survey in question pertains to the purpose of the list; for example surveying members of an association about association matters, such as fees or policies. However, the repurposing of lists (telephone books and electoral rolls are popular) for the soliciting of business, be they fitness-club deals, holiday spiels, or university surveys, is increasingly viewed as an abuse of process, and an invasion of privacy, described as “the right to be left alone” (Bussian & Levine, 2004). Champions of those who re-purpose such lists frequently cite the supposed inclusivity of such lists. There are 1,138,500 telephone connected households with functioning listed numbers in Queensland (ABS, 2004) for a population of 3,963,968 (ABS, 2005a), that is 29 contacts per 100 of population. The Queensland electoral roll lists 2,471,372 names (AEC, 2006), that is 62 electoral roll listings per 100 of population. Other than where intimidation is used, the majority of selected targets, whether for fitness-club deals, holiday spiels, university surveys, or otherwise, decline or refuse to participate. As a consequence, experimental designs that originate as probabilistic sampling strategies, devolve by dint of the non-response of the majority of the contacted sample, to a volunteer sampling subset.

Legislators are under increasing pressure to make such unsolicited mail and telephone calls illegal. Privacy is an active area of new regulation and legislation (EPIC, 2006; Office of Privacy Protection, 2006). There is mounting consumer group lobbying for unsolicited mail, phone calls, and visits to cease, on a variety of grounds, including intimidation, pester-power and invasion of privacy. This is a matter of more than theoretical interest; the matter has a long history, and in politically riven times, defiant statisticians have been executed for resisting the process of re-purposing lists (Black, 2001). Bruno (2000) cites a figure of 83% of respondents nominating that there ought to be an law requiring an opt-in to a mailing list.
For the present study, no unsolicited mail, and no unsolicited calls were made. Recruitment was via invitations in the public media (press, radio, media web sites) and response was via the internet (71% of the Australian population are reported to have online access (IWS, 2006)). Ballot stuffing (multiple submissions) were technically blocked, solving a common shortcoming of volunteer sampling (Legge, 2006).

Web based surveying is an emergent technology which presents new issues and opportunities for researchers. It is worthy of serious study in its own right, including socio-political aspects, and for a variety of reasons including cost, validity, probity and privacy, it can be expected to increasingly replace twentieth-century survey methodologies. As with all surveys, the results reported here, are the responses of those willing to participate, and the data of those unwilling to participate are unavailable. Demographics of the sample are reported in Appendix 6.

3.5 A Note on the Graphical Presentation of Data

Presenting the data from the present study raises some interesting issues. Figure 3.2 presents an unexceptionable, though not particularly helpful, presentation of the 27 treatment means (see Table 4.2) as a scatter plot. Bar graphs have their place in the pantheon of graphical options, and can be effective, for example in Figures 2.2, 2.8, 2.10, 2.11, 2.12, 2.13, 2.14. The data presented in Figure 2.2 are columns of independent, “stand-alone”, data. The datum for UK organic hectares 2005 (Figure 2.2), is meaningful and potentially useful in its own right, since it is externally referenced, in relationship to the Systeme International d’Unites’ standard metre (BIPM, 2006). However, the urban myth that category data cannot, or must not, be presented as line graphs is rejected here; the data from the present study might be presented as a bar chart, as in Figure 3.3 and Figure 3.4, and such a presentation may possibly be appropriate for some purpose, but not ours. Unlike the bar chart data of Figure 2.2, the data presented in Figure 3.2, is internally referenced rather than externally referenced. The data was submitted by respondents as interdependent and comparative data (rather than absolute data), and consequently the absolute values (i.e. the column heights of Figures 3.3 or 3.4) are individually uninformative, and if extracted from a comparative context (for example by presentation as a bar chart) are potentially misleading, since even though the respondents are using a ratio scale, the response range ($5 to $10) is an artifact of the experimental design, whereas the differences between treatments (the matters under investigation) are entirely a function of the respondents, and are, as a consequence, the necessary subject of illustration. The test of bar chart
probity is: can a single bar meaningfully stand alone? The data in the present study fails this test and this consequently determines bar charting as an unsuitable presentation mode for the present study.

In Chapter 4 all data are presented as line graphs, and an appropriate ordering of treatments has been adopted. The practice of category ordination and line graphing adopted here is consistent with the University of Reading’s Statistical Good Practices Guidelines (SSC, 2000) where it is advised that “the method of grouping (of categories) should be determined by the objective of the chart” (p. 4), and it is advised that “Although bar charts are popular, our view is that they are rarely the most appropriate way to present data” and that “equivalent line charts… use far less ink and are perhaps clearer” (p. 5). Line graphs serve best to interpret or reveal main effects and interactions between categories (Shegland, 2002), and hence, of the graphical presentation options available, best serve the purposes of the present study. The ordering of the 27 treatments (categories) adopted for the presentation of data derives from a hierarchical sorting, with a primary sorting by Provenance (China, Australia, Tasmania), the secondary sorting by Organic (null, Organic, Certified Organic) and the tertiary sorting by Eco (null, Natural, Eco). This category sorting order is followed throughout the presentation of results. Alternative sorting algorithms are also valid, and may alternatively be applied to the present study.

Figure 3.2: Scatter plot of mean values; data from Table 4.2. Place of origin versus treatment conditions (plot of 27 treatment means, each mean based on 221 observations, N=221). An unexceptionable presentation of this data, but sub-optimal for revealing main effects and interactions.
**Figure 3.3:** Bar chart of mean values; data from Table 4.2. Place of origin versus treatment conditions (plot of 27 treatment means, each mean based on 221 observations, N=221). This presentation methodology is sub-optimal for the purposes of the present study, it is potentially misleading, and is presented here for the purposes of discussion only. The 27 treatment measures presented are interdependent results (they share a common framing range, and are internally referenced), and consequently the minimum presentation requires a pairwise comparison, and hence a line graph, as in Figure 4.1, is preferable.

**Figure 3.4:** Bar chart of mean values (version 2); data from Table 4.2. Place of origin versus treatment conditions (plot of 27 treatment means, each mean based on 221 observations, N=221). This presentation methodology, like Figure 3.3, is sub-optimal for the purposes of the present study, it is potentially misleading, and is presented here for the purposes of discussion only. The 27 treatment measures presented are interdependent results (they share a common framing range, and are internally referenced), and consequently the minimum presentation requires a pairwise comparison, and hence a line graph, as in Figure 4.1, is preferable.
Chapter 4: Results

4.1 Sample

The sample size was 267, of whom 221 completed the survey, (i.e. 46 respondents completed some questions, but dropped out before completing all questions). All analysis reported here is based on N = 221. The demographics of the sample are as follows: 75% of respondents were female (Australian population is 50.2% female: ABS, 2006b), 47% were aged 40 or under (Australian population median age is 36.4 years: ABS, 2006b), 42% reported below average income, 54% were from Tasmania (Tasmania is home to 2.4% of the Australian population: ABS, 2006b), 72% completed tertiary education (Australian adult population figure is 58%: CIA, 2006), 78% were the main food shopper in their household (mean Australian household is 2.6 people: ABS, 2006b), 5% reported they never purchased organic food, and 3% were affiliated with the organic industry (no comparative statistics available). See Appendix 6 for a full frequency analysis of demographic responses.

The mean time to complete the survey was 6 minutes 2 seconds, and the median time was 5 minutes 8 seconds. Of eleven respondents who checked other for Where you live?, three nominated a foreign country, and eight nominated a mainland Australian city, state or region; for the analysis, these latter eight respondents were recoded as mainland Australia. The respondents who nominated a foreign country, either as a check-box item (N=5) or as other (N=3), were amalgamated into a portmanteau category of Residence: Overseas (N=8). In the Age category, only one respondent checked the 100 & under box; this response was amalgamated into the 80 & under category, creating a new portmanteau category of 61 & over (N=30). For the Relationship to the Organics Industry, the first two response categories were amalgamated to create the Unrelated group (N=214) and the latter two response categories were amalgamated to form the Related group (N=7). At an early stage of the data collection, one respondent who completed the survey, reported in the comments box that “I didn’t understand the survey at all”, and confirmed this by recording the same response for all 27 treatments; this respondent was eliminated from the data set. The comments box was used by 81 respondents, i.e. 37% of the sample (see Appendix 5 for all comments).

In this research, 98.6% of respondents completed the survey online (internet market penetration in Australia is reported as 70.7% of the total population, including children (IWS, 2006)). Of the 221 respondents, 218 completed the survey online and 3 completed on paper, and submitted by mail. The latter three completions arose from a phone call from Victoria to the School of Geography and
Environmental Studies, University of Tasmania, in response to a news item about the survey in a Victorian local paper. The caller was passed on to me, and she confirmed that there was a web address in the article, but that she and two friends who read the story were keen to do the survey, but did not have internet access. Although this had been an unanticipated development, I agreed to print off the survey from the internet and mail them to the caller. Three completed survey forms were subsequently submitted from Victoria, and the responses added to the data set.

4.2 Treatment Factor Results

Of the seven questions, six yielded statistically significant results at 95% (see Table 4.1). The treatment main effects and interactions are reported here, together with a presentation of the 27 treatment results. Subsequently, the effects of demographic variables is presented, up to 5-way interactions.

<table>
<thead>
<tr>
<th>Factor Effects</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic</td>
<td>F(2,219)=178.161</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Provenance</td>
<td>F(2,219)=249.720</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Eco</td>
<td>F(2,219)=55.042</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Organic x Provenance</td>
<td>F(4,217)=21.783</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Organic x Eco</td>
<td>F(4,217)=2.291</td>
<td>0.061</td>
</tr>
<tr>
<td>Provenance x Eco</td>
<td>F(4,217)=2.983</td>
<td>0.021</td>
</tr>
<tr>
<td>Organic x Provenance x Eco</td>
<td>F(8,213)=2.484</td>
<td>0.013</td>
</tr>
</tbody>
</table>

**Table 4.1:** ANOVA results for 3 variables; 6 of the 7 questions yielded statistically significant results at or above the 95% confidence level.

4.3 Results Summary: 27 Treatments

Adjunctive labelling added value to provenance labelling, under all treatment scenarios. The 27 treatment means are presented in Figure 4.1.

The study revealed that adjunctive labelling (labelling other than the bare description of the food type), adds value to provenance labelling, under all treatment scenarios. For China scenarios, ad-
Junctive labelling can add 14.57% value; the treatment China, Certified Organic, Natural attracted the highest valuation, versus China. For Australia scenarios, the highest premium was 20.46%, for the treatment Australia, Certified Organic, Natural, versus Australia. For Tasmania scenarios, the highest premium was 20.75%, for Tasmania, Certified Organic, Eco versus Tasmania (see Figure 4.1 & Table 4.2).

The highest China scenario (Certified Organic, China, Natural) was lower than the lowest Australia scenario (null, Australia, null) (see Figure 4.1). A premium for Tasmania over Australia, held across all 9 treatment pairs (see Figure 4.1).

For adding value, Australia and Tasmania have the most to gain by Eco-labelling, (Organic, Certified Organic, Natural and Eco) and Eco-labelling can thus set them further apart from China (see figure 4.2). On the other hand, from Figure 4.1, it can be seen that China has the opportunity to close much of the valuation gap between Australia and China, by the use of Eco-labelling. The premium of Australia (null, Australia, null) over China (null, China, null) is 22.76%; however nearly two thirds (64.0%) of this premium can be recovered by China by adding Eco-labelling, with Certified Organic yielding the greatest opportunity for China.

\[\text{Figure 4.1: Place of Origin versus 9 treatment conditions, mean values, (plot of 27 treatment means, each mean is based on 221 observations, N=221).}\]
Figure 4.2: Place of Origin versus 9 treatment conditions, percentage increments, (27 treatments, 24 increments, N=221).
<table>
<thead>
<tr>
<th>Organic</th>
<th>Provenance</th>
<th>Eco</th>
<th>Mean (cents)</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>null</td>
<td>China</td>
<td>null</td>
<td>524.774</td>
<td>4.895</td>
</tr>
<tr>
<td>null</td>
<td>China</td>
<td>Natural</td>
<td>535.068</td>
<td>4.531</td>
</tr>
<tr>
<td>null</td>
<td>China</td>
<td>Eco</td>
<td>547.285</td>
<td>4.718</td>
</tr>
<tr>
<td>null</td>
<td>Australia</td>
<td>null</td>
<td>644.231</td>
<td>7.387</td>
</tr>
<tr>
<td>null</td>
<td>Australia</td>
<td>Natural</td>
<td>665.158</td>
<td>7.494</td>
</tr>
<tr>
<td>null</td>
<td>Australia</td>
<td>Eco</td>
<td>676.131</td>
<td>7.631</td>
</tr>
<tr>
<td>null</td>
<td>Tasmania</td>
<td>null</td>
<td>668.439</td>
<td>7.729</td>
</tr>
<tr>
<td>null</td>
<td>Tasmania</td>
<td>Natural</td>
<td>694.683</td>
<td>7.966</td>
</tr>
<tr>
<td>null</td>
<td>Tasmania</td>
<td>Eco</td>
<td>689.819</td>
<td>7.999</td>
</tr>
<tr>
<td>Organic</td>
<td>China</td>
<td>null</td>
<td>560.973</td>
<td>5.206</td>
</tr>
<tr>
<td>Organic</td>
<td>China</td>
<td>Natural</td>
<td>570.362</td>
<td>5.668</td>
</tr>
<tr>
<td>Organic</td>
<td>China</td>
<td>Eco</td>
<td>579.412</td>
<td>5.806</td>
</tr>
<tr>
<td>Organic</td>
<td>Australia</td>
<td>null</td>
<td>705.543</td>
<td>7.761</td>
</tr>
<tr>
<td>Organic</td>
<td>Australia</td>
<td>Natural</td>
<td>718.552</td>
<td>8.170</td>
</tr>
<tr>
<td>Organic</td>
<td>Australia</td>
<td>Eco</td>
<td>717.421</td>
<td>8.228</td>
</tr>
<tr>
<td>Organic</td>
<td>Tasmania</td>
<td>null</td>
<td>733.484</td>
<td>8.434</td>
</tr>
<tr>
<td>Organic</td>
<td>Tasmania</td>
<td>Natural</td>
<td>762.330</td>
<td>8.961</td>
</tr>
<tr>
<td>Organic</td>
<td>Tasmania</td>
<td>Eco</td>
<td>756.222</td>
<td>8.830</td>
</tr>
<tr>
<td>Certified Organic</td>
<td>China</td>
<td>null</td>
<td>592.597</td>
<td>5.522</td>
</tr>
<tr>
<td>Certified Organic</td>
<td>China</td>
<td>Natural</td>
<td>601.244</td>
<td>6.328</td>
</tr>
<tr>
<td>Certified Organic</td>
<td>China</td>
<td>Eco</td>
<td>600.113</td>
<td>6.516</td>
</tr>
<tr>
<td>Certified Organic</td>
<td>Australia</td>
<td>null</td>
<td>759.502</td>
<td>8.657</td>
</tr>
<tr>
<td>Certified Organic</td>
<td>Australia</td>
<td>Natural</td>
<td>780.090</td>
<td>8.832</td>
</tr>
<tr>
<td>Certified Organic</td>
<td>Australia</td>
<td>Eco</td>
<td>773.190</td>
<td>8.751</td>
</tr>
<tr>
<td>Certified Organic</td>
<td>Tasmania</td>
<td>null</td>
<td>797.172</td>
<td>9.263</td>
</tr>
<tr>
<td>Certified Organic</td>
<td>Tasmania</td>
<td>Natural</td>
<td>807.466</td>
<td>9.028</td>
</tr>
<tr>
<td>Certified Organic</td>
<td>Tasmania</td>
<td>Eco</td>
<td>816.855</td>
<td>9.459</td>
</tr>
</tbody>
</table>

Table 4.2: Mean valuations (in cents) for the 27 treatments, N=221 (each mean is based on 221 observations).
4.4 Treatment Main Effects

The three main effects, Provenance, Organic and Eco, all yielded statistically significant results (see Table 4.1).

4.4.1 Main Effect: Organic

The effect of Organic was statistically significant at better than 99.9% (see Table 4.1). Organic scenarios were valued at a premium of 8.12%, and Certified Organic scenarios at 15.63%, compared to the null scenarios (see Figure 4.3). Post hoc pairwise testing reveals Certified Organic is significantly higher than Organic, F(1,220) = 133.611, p < 0.001, and Organic is significantly higher than null, F(1,220) = 283.556, p < 0.001.

Approximately half the Certified Organic premium can be attributed to Organic (52.0%) and half to the qualifier Certified (48.0%).

![Organic Status (ISO Type I & Type II)](image)

**Figure 4.3:** Organic Type I & Type II main effect (Aggregated plot 9x9x9 treatments, N=221). The three treatments are significantly different from each other.
Table 4.3: Organic main effect, mean values denominated in cents (analysis was done in cents; use SE x1.96 to generate 95% confidence intervals; 627.288c = $6.27288)

<table>
<thead>
<tr>
<th></th>
<th>Organic</th>
<th>Certified Organic</th>
</tr>
</thead>
<tbody>
<tr>
<td>627.288c (SE=4.991)</td>
<td>678.255c (SE=5.49)</td>
<td>725.359c (SE=6.088)</td>
</tr>
</tbody>
</table>

Comments by respondents included:

*I value the label ‘organic’ - most particularly where it is ‘certified’ by a suitable body.*

*I prefer organic foods as I’m concerned about agricultural practices contaminating our environment and ourselves.*

*I grow organically for home consumption.*

*Hasn’t organic food been found to be no healthier than chemically treated food?*

*I know that ‘organic’ does not necessarily mean anything, unless the label says ‘certified organic’.*

*It does depend on who certifies the product surely.*

*Would like to see better labelling of ‘organic’ foods in Oz. If it states organic it should have to be certified. Also like see compulsory declaration on labels re GM ingredients.*

*Term certification needs to be backed by reputable certification body.*

*I find some organic stores fruit and vegetables don’t look nice.*

*We will pay more and expect to pay more for organic fruit/veg and meat, as far as the budget extends.*
4.4.2 Main Effect: Provenance

The effect of Provenance is statistically significant at better than 99.9% (see Table 4.1). Australia scenarios were valued at a premium of 25.98%, and Tasmania scenarios at 31.59%, compared to China scenarios (see Figure 4.4). Post hoc pairwise testing using Type III Sum of Squares reveals Australia is significantly higher than China, $F(1,220) = 413.781$, $p < 0.001$, and Tasmania is significantly higher than Australia, $F(1,220) = 62.857$, $p < 0.001$.

![Provenance main effect](image)

**Figure 4.4:** Provenance main effect (Aggregated plot of 9x9x9 treatments, N=221). The three provenances are statistically different from each other.

<table>
<thead>
<tr>
<th></th>
<th>China</th>
<th>Australia</th>
<th>Tasmania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provenance</td>
<td>567.981c (SE=4.354)</td>
<td>715.535c (SE=6.744)</td>
<td>747.386c (SE=7.312)</td>
</tr>
</tbody>
</table>

**Table 4.4:** Provenance main effect. Cell means are denominated in cents.
Comments by respondents included:

*Prefer to buy Tasmanian but purchase mainland produce as well. Not really happy buying from China even if it is cheaper.*

*My biggest problem is the packaging now states product can have Australian and imported items.*

*I have a preference to support locally grown/sourced items (i.e. Tasmanian) if I cannot provide them myself.*

*Prefer to buy Tasmanian or Australian grown and produced. I will buy good quality products from outside Australia if I cannot get it here.*

*I would never buy Chinese food, as I don’t trust their labelling, what-ever it may say. Or whatever it cost.*

*I get cross with the label ‘made from local and imported ingredients’ - how much imported? Where imported? Don’t buy if we can avoid. The sooner country of origin labelling is compulsory on packaged food the better - Woolworths ‘Home Brand’ labelling is very confusing. The gov’t has to make sure that Australian farmers are batting on a level playing field.*

*I want Australian product. I choose product of Australia label over made in Australia with local and or imported product.*

*I would not buy any food with ‘made in China’ on the label.*

*You can never believe labelling. But prefer to buy what is grown-made-fed in Tasmania.*

*I prefer Tasmanian or Australian provided the price is not too much more than foreign stuff.*
4.4.3 Main Effect: Eco

The effect of the Eco-labels, *Natural* and *Eco*, is statistically significant at better than 99.9% (see Table 4.1). *Natural* scenarios were valued at a premium of 2.48%, and *Eco* scenarios at a premium of 2.84%, compared to the *null* scenarios (see Figure 4.5). *Post hoc* pairwise testing reveals *Natural* is significantly higher than *null*, F(1,220) = 86.392, p < 0.001, and that *Natural* and *Eco* are not significantly different from each other, F(1,220) =1.959, p = 0.163.

![Eco Labelling (ISO Type II)](image)

**Figure 4.5:** Eco main effect (Aggregated plot 9x9x9 treatments, N=221). The Eco-labels *Natural* and *Eco* are statistically different from the *null* condition, not significantly different from each other.

<table>
<thead>
<tr>
<th>null</th>
<th>Natural</th>
<th>Eco</th>
</tr>
</thead>
<tbody>
<tr>
<td>665.191c (SE=4.839)</td>
<td>681.662c (SE=5.109)</td>
<td>684.050c (SE=5.220)</td>
</tr>
</tbody>
</table>

**Table 4.5:** Eco Main effect, cell means in cents.
Comments from respondents included:

*It’s easy to claim to be natural.*

Anyone can write natural or eco on their products and still be produced using nasty chemicals.

*What do ‘eco’ and ‘natural’ mean?*

*I also know that ‘natural’ could mean anything you want it to mean.*
4.5 Treatment Interaction Effects

Of the four interaction effects of treatment variables, three are statistically significant at 95% or better (see Figure 4.1); all four are significant at 90%, and for the purpose of completeness, all four are presented here.

4.5.1 Interaction: Organic x Provenance

The two-way interaction of Organic x Provenance was statistically significant at better than 99.9% (see Table 4.1).

All three provenances gain a premium from the addition of Organic or Certified Organic, as expected from the Organic main effect. However there is an ordinal interaction effect, with Tasmania yielding the greatest premiums from the addition of either Organic or Certified Organic, China yielding the smallest premiums, and Australia yielding intermediate premiums (see Figure 4.6 & Figure 4.7).

Certified Organic (compared to Organic) added an additional 8.62% for Australia, and 8.25% for Tasmania, compared to only 5.17% for China (see Figure 4.7). This Organic x Provenance interaction effect is consistent with comments from respondents who questioned the veracity of Chinese labelling, and/or declared they did not trust Chinese certification.

Post hoc testing reveal that three of the four contrasts are significant:

null vs Organic/China vs Australia: F(1,220) = 15.125 p < 0.001
null vs Organic /Australia vs Tasmania: F(1,220) = 10.801 p < 0.001
Organic vs Certified Organic / China vs Australia: F(1,220) = 33.698 p<0.001
Organic vs Certified Organic / Australia vs Tasmania: F(1,220) = 0.025, p = 0.876 = ns.

Comments from respondents included the following:

Generally I am dubious of any claims of “organic” or “natural” when it concerns a product from China.

I think if it is labelled ‘certified organic’ in Australia there is a fair chance that it IS. Any labels used in China I feel, can not be relied upon.
I wouldn’t buy anything produced in China whether it was organically certified or not because I don’t believe their certification regulations would be as strict as Australia’s.

Labelling on Chinese products are not trustworthy with reports on counterfeit labelling.

I would never buy Chinese food, as I don’t trust their labelling, what-ever it may say.

I believe strongly in paying extra for certified organic goods - especially Tasmanian grown/produced. We need to support the clean/healthy food industry in Tasmania and help it grow as fast as we can - to create more revenue for Tasmania, a larger certified organics industry in our state, and more health and wellness within our community.

China/Certified Organic is impacted negatively by a consumer trust deficit. China/Certified Organic achieved a premium of 11.62%, while Australia/Certified Organic achieved a premium of 16.48% (and Tasmania/Certified Organic yielded a premium of 17.95%). Thus China/Certified Organic achieved 70.5% of the premium achieved by Australia/Organic, suggesting a China “trust deficit” of 29.5%.

![Figure 4.6: Provenance versus Organic, mean values (Aggregated plot 9x9x9 treatments, N=221).](image-url)
Figure 4.7: Provenance versus Organic, percentage increments (Aggregated plot 9x9x9 treatments, N=221). Tasmania yields the greatest premiums from the addition of either Organic or Certified Organic, China yields the smallest premiums, and Australia yields intermediate premiums.

Table 4.6: Organic x Provenance, mean values.
4.5.2 Interaction: Organic x Eco

The two-way interaction of Organic x Eco was not statistically significant at 95% (p = 0.061) (see Table 4.1). The interaction is significant at 90%, and is reported here for purposes of interest, completeness, and because a strictly Pearsonian view of significance is, after all, optional (APA, 2001).

This interaction can be summarized as “the stronger the Organic claim, the weaker is the effect of other Eco-labelling”. *Eco* adds a 4.12% premium when uncoupled from Organic terms, but when paired with *Certified Organic*, it adds only 1.9% and when paired with *Organic* it adds the intermediate premium of 2.65% (see Figures 4.9 & 4.10).

*Post hoc* testing confirms this null/Eco effect. The single pairwise contrast that is significant, albeit at 90%, is: *Organic* vs *Certified Organic* / *Natural* vs *Eco*: $F(1,220) = 2.833, p = 0.094$.

This effect can be interpreted as *Certified Organic* dilutes the effect of other eco-labels, and in particular halves the value of *Eco*.

![Figure 4.8](null/Organic/Cert Org vs null/Null/Natural/Eco.png)

**Figure 4.8:** Organic versus Eco, mean values (Aggregated plot 9x9x9 treatments, N=221).
Figure 4.9: Organic versus Eco, percentage increments (Aggregated plot 9x9x9 treatments, N=221). The effect of Eco is halved when coupled with Certified Organic. The superiority of Eco over Natural is neutralized when either of these terms is coupled with Organic or Certified Organic.

<table>
<thead>
<tr>
<th>Organic x Eco</th>
<th>null</th>
<th>Organic</th>
<th>Certified Organic</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>null</em></td>
<td>612.481c (SE=5.199)</td>
<td>666.667c (SE=5.579)</td>
<td>716.424c (SE=6.045)</td>
</tr>
<tr>
<td><em>Natural</em></td>
<td>631.637c (SE=5.223)</td>
<td>683.748c (SE=5.767)</td>
<td>729.600c (SE=6.269)</td>
</tr>
<tr>
<td><em>Eco</em></td>
<td>637.745c (SE=5.392)</td>
<td>684.351c (SE=5.800)</td>
<td>730.053c (SE=6.570)</td>
</tr>
</tbody>
</table>

Table 4.7: Organic x Eco, mean values.

Comments from respondents included:

*Distrust organic/eco as marketing terminology instead of real information.*

*Would buy only organic, eco-friendly Aussie products IF we could afford it, which we cannot.*
4.5.3 Interaction: Provenance x Eco

The two-way interaction of Provenance x Eco is statistically significant, \( p = 0.021 \) (see Table 4.1). This interaction is a *China/Natural* effect. The Eco treatment (both *Natural* and *Eco*) added 2.80% on average for 5 of the Provenance x Eco treatments (all five premiums are in the narrow band of 2.59% and 2.90%), this compares to *China/Natural* which added only 1.69% (*China/Eco* added 2.89%) (see Figure 4.10 & Figure 4.11).

Post hoc testing confirms a *China/Natural* effect. The single pairwise contrast that is significant is: *China vs Australia / null vs Natural* \( F(1,220) = 4.296, \ p < 0.039 \). The label adjunct *Natural* added only about half the value it added for the other two provenances, this could be interpreted as suggesting that *Natural* lacks credibility for consumers when attached to Chinese produce.

![Figure 4.10: Provenance versus Eco, mean values (Aggregated plot 9x9x9 treatments, N=221).](image)
Figure 4.11: Provenance versus Eco, percentage increments (Aggregated plot 9x9x9 treatments, N=221). Natural added only about half the value for China, as it added for other Provenances.

Table 4.8: Provenance x Eco, mean values.

<table>
<thead>
<tr>
<th>Provenance x Eco</th>
<th>China</th>
<th>Australia</th>
<th>Tasmania</th>
</tr>
</thead>
<tbody>
<tr>
<td>null</td>
<td>559.448c (SE=4.096)</td>
<td>703.092c (SE=6.712)</td>
<td>733.032c (SE=7.436)</td>
</tr>
<tr>
<td>Natural</td>
<td>568.891c (SE=4.807)</td>
<td>721.267c (SE=6.982)</td>
<td>754.827c (SE=7.683)</td>
</tr>
<tr>
<td>Eco</td>
<td>575.603c (SE=4.887)</td>
<td>722.247c (SE=7.187)</td>
<td>754.299c (SE=7.683)</td>
</tr>
</tbody>
</table>
4.5.4 Interaction: Organic x Provenance x Eco

The three way interaction is significant, $p = 0.013$ (see Table 4.1).

Post hoc pairwise analysis reveals two of the contrasts are significant:

- Organic vs Certified Organic/ Australia vs Tasmania/ null vs Natural: $F(1,220) = 5.491$, $p = 0.020$
- Organic vs Certified Organic/ Australia vs Tasmania/ Natural vs Eco: $F(1,220) = 7.458$, $p = 0.007$

There are two separate effects operating to generate this interaction.

Firstly, for Certified Organic scenarios, it is expected from the Eco main effect (see Table 4.1) that Eco will out-perform Natural. This is not consistently the case for Certified Organic, where Australia does not get the expected boost from Eco. For Certified Organic, while Eco generates a significant increment, over Natural, for Tasmania this is the case, as expected from the main effect; is not the case for Australia:

- Certified Organic, Tasmania, Natural vs Certified Organic, Tasmania, Eco: $t(220) = 5.496$, $p < 0.001$
- Certified Organic, Australia, Natural vs Certified Organic, Australia, Eco: $t(220) =-1.086$, $p = 0.278 = ns$

The second component of the Organic x Provenance x Eco interaction, is that for Organic scenarios, it is expected from the main effects, that Eco will out perform Natural. This is not the case for either Australia or Tasmania. For Tasmania, the scenarios Organic/Natural and Organic/Eco do not generate significantly different premiums ($t(220) = 0.973$, $p = 0.332 = ns$). Similarly, for Australia, the scenarios Organic/Natural and Organic/Eco also do not generate significantly different premiums, ($t(220) = 0.282$, $p = 0.778 = ns$).
Figure 4.12: Percentage increments for Australia & Tasmania, Organic & Certified Organic, and Eco & Natural (N=221). Eco yields a decrement for Tasmania/Organic, and a decrement for Australia/Certified Organic (against the main effect of Eco > Natural).

Comments from respondents included:

* Tasmanian items… I believe that people should and probably would buy them instead of overseas items if they were cheaper, especially if they were natural or organic.

* I’d be much happier to have ‘proper‘food labelling, with complete lists of ingredients on all food items. I REALLY want to know what I’m eating & I REALLY want to be able to choose Tasmanian/Australian products, & preferably organic/biorganic.
4.6 Demographic Effects, 2-Way

Eight demographic variables were recorded for each subject. One of the demographic variables, (Relationship to the organic industry), was intended, and used, as a screening question, to ensure this research was a consumer based, and not an industry based data set; 3% (N=7) of respondents indicated a relationship with the organics industry, (grower, manufacturer, retailer or wholesaler). This percentage was deemed acceptable, and consequently these seven respondents have not been excluded from the analysis. Relationship to the organics industry revealed an interaction with Organic and is reported here.

The remaining seven demographic variables, (Gender, Age, Place of Residence, Income, Education, Main Shopper, and Purchaser of Organics) were systematically investigated for single and pairwise interactions using ANOVA analysis. Interactions up to 5-way interactions are reported. Significant interactions are reported for all seven demographic variables.

Five demographic variables (Education, Age, Place of Residence, Purchase Organic and Main Shopper) are reported with significant interactions, in their own right, when crossed with treatment variables, i.e. in the absence of another demographic variable. The remaining two demographic variables (Income and Gender) are reported with significant interactions only when crossed with treatment variables and in combination with another demographic variable.

For each 2-way interaction, firstly, the mean valuations are presented graphically, and secondly, the percentage increments are presented graphically, relative to the null condition for Organic interactions, and relative to China, for Provenance interactions. No 2-way interactions with the treatment variable Eco were significant.
### Table 4.9: Eight 2-way interactions of treatment variables x demographic variables are statistically significant.

<table>
<thead>
<tr>
<th>Demographic Effects, 2-way</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic x Age</td>
<td>F(6,434)=6.821</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Organic x Education</td>
<td>F(4,436)=7.674</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Organic x Purchase Organic</td>
<td>F(4,436)=5.549</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Organic x Relationship</td>
<td>F(2,218)=4.197</td>
<td>p = 0.016</td>
</tr>
<tr>
<td>Provenance x Age</td>
<td>F(6,434)=7.873</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Provenance x Place of Residence</td>
<td>F(4,436)=11.987</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Provenance x Education</td>
<td>F(4,436)=5.032</td>
<td>p = 0.001</td>
</tr>
<tr>
<td>Provenance x Main Shopper</td>
<td>F(2,218)=6.908</td>
<td>p = 0.001</td>
</tr>
</tbody>
</table>
4.6.1 Organic x Age

There is a main effect reported, of increasing valuations on the Organic variable, from null, to Organic, to Certified Organic. The interaction reported here, Organic x Age, is due to this main effect of the Organic variable not holding for the Age \( \leq 20 \) group.

The age group Age \( \leq 20 \) does not attribute a premium to Organic, or Certified Organic. While the three other age groups track upwards quite closely together, the Age \( \leq 20 \) group does not discriminate on the Organic variable.

For the null condition, all pairings of Age \( \leq 20 \), with other age groups, reveal a significant difference:

- Age \( \leq 20 \), null vs Age21-40, null: \( t(101) = 4.6749 \), \( p < 0.0001 \).
- Age \( \leq 20 \), null vs Age41-60, null: \( t(106) = 4.7997 \), \( p < 0.0001 \).
- Age \( \leq 20 \), null vs Age 61+, null: \( t(48) = 3.0239 \), \( p = 0.0040 \).

For both Organic and Certified Organic, all cross age comparisons are not significant.

\[ \text{Figure 4.13: Organic x Age, mean values (N= 20 + 83 + 88 + 30 = 221).} \]
Figure 4.14: Organic x Age, percentage increments. The Age ≤20 group (i.e. 20 years and under) does not discriminate on Organic.
4.6.2 Organic x Education

There is a main effect of increasing valuations on the Organic treatment variable, from null to Organic to Certified Organic. The interaction reported here is due to this main effect not holding for the Primary Education group (see Figure 4.15).

The Primary Education group does not attribute a premium to Organic or Certified Organic. While both the Secondary Education group, and the Tertiary Education group, both conform with the main effect reported, the Primary Education group does not discriminate on the Organic treatment variable.

There is an interesting trend that Organic and Certified Organic may even detract value for the Primary Education group ( -0.6% and -0.3% respectively); these differences are not significant (see Figure 4.16).

*Post hoc* tests also reveal that for the null condition, the Primary Education group valuations are significantly higher than for Secondary and Tertiary education groups:

*Primary, null vs Secondary, null:* $t(60) = 2.2120$, $p = 0.0308$

*Primary, null vs Tertiary, null:* $t(169) = 3.9196$, $p = 0.0001$.

Other differences (Organic and Certified Organic) for Primary vs other education groups are not significant (for example, Primary, Certified Organic vs Secondary, Certified Organic: $t(60) = 1.1988$, $p = 0.2353 = ns$).
Figure 4.15: Organic x Education, mean values (N=221)

Figure 4.16: Organic x Education, percentage increments. The Primary Education group does not attribute a premium to Organic or Certified Organic.
4.6.3 Organic x Purchase Organic

There is a main effect of increasing valuations on the Organic treatment variable, from null, to Organic, to Certified Organic. The interaction reported here, Organic x Purchase Organic, is due to two variations from this main effect.

Firstly, the Never Purchase Organic group, although it follows the main effect trend, the differences in its valuations across the Organic treatment variable are not significant, i.e. the Never Purchase Organic group does significantly discriminate on the Organic variable.

The second element of the Organic x Purchase Organic interaction is that the Frequently Purchase Organic group exhibits the main effect of valuing up Organic, more strongly than the Occasional Purchasers group.

For Certified Organic, Frequent Purchasers significantly value up this label, compared to Occasional Purchasers:

Certified Organic/Frequent vs Certified Organic/Occasionally: t(207) = 3.8753, p = 0.0001.

For null, and for Organic, the differences between the three groups are not significant (for example Never, null vs Occasional, null: t(135) = 1.7191, p = 0.0879 = ns). All vertical cross comparisons are not significant, other than the one reported in the previous paragraph.
Figure 4.17: Organic x Purchase Organic, mean values.

Figure 4.18: Organic x Purchase Organic, percentage increments. The Frequently Purchase Organic group values up Organic variables the most; the Never Purchase Organic group values up Organic variables the least.
4.6.4 Organic x Relationship

There is a main effect of increasing valuations on the Organic treatment variable, from null, to Organic, to Certified Organic. In the report of that effect, it is noted that for Certified Organic, the “organic” contributes approximately half of the premium, and the qualifier, “certified”, also approximately half.

For the interaction reported here, Organic x Relationship, while the main effect holds, the Related to Organics Industry group, values down Organic, and values up Certified Organic (relative to the Not Related group). Respondents related to the organic industry placed a greater premium (18.40%) on Certified Organic, compared to respondents unrelated to the organic industry (15.54% premium). The situation was reversed for Organic, where respondents related to the organic industry placed a lesser premium (3.87%) on Organic, compared to respondents unrelated to the organic industry (8.26% premium) (see Figure 4.19 & Figure 4.20).

For Certified Organic, for the Not Related group, “organic” contributes 53.2% of the premium, and the qualifier “certified” contributes 46.8% of the premium. This is in contrast to the Related group, where “organic” contributes 21.0% of the premium, and the qualifier “certified” contributes 79.0%.

The variable Relationship to the Organic industry was employed in this study primarily as a screening question, as a check that this study was a consumer survey and not an industry survey. (The word “organic” was not used in the press releases announcing the survey to the media, nor was the survey released nor promoted to the organics industry). Of the 221 respondents, 2 reported themselves as “Retailer or wholesaler of organics” and 5 reported themselves as “Grower or manufacturer of organics”. For this analysis, these third and fourth categories, “Retailer or wholesaler of organics” N=2, and “Grower or manufacturer of organics” N=5, were combined as a “Related” category N=7. The first two categories “No relationship” (N=156) and “Consumer of organics” (N=58) were combined (they are not mutually exclusive categories) as a “Not related” category (N=214).

Post hoc testing revealed a significant quadratic effect here, F(1,219) = 8.405, p = 0.004; this is reflected in Figure 4.20 and Figure 4.21 by the “Related” group dipping below “Not related” at Organic, and then recovering for Certified Organic. Post-hoc tests were not significant for Sum of
Squares F tests based on Organic levels; and t tests, comparing the two null conditions and comparing the two Certified Organic conditions were also not significant.

![Figure 4.19: Organic x Relationship, mean values.](image)

![Figure 4.20: Organic x Relationship, percentage increments.](image)

The qualifier “certified” contributes 79.0% of the Certified Organic premium for the Related group, compared to only 46.8% of the value for the Unrelated group.
4.6.5 Provenance x Age

There is a main effect of increasing valuations on the Provenance treatment variable, from China, to Australia, to Tasmania. The interaction reported here of Provenance x Age, is due to this main effect not holding for the Age ≤20 group (see Figure 4.21 & Figure 4.22).

The Age ≤20 group does not discriminate significantly based on Provenance. The other three age groups follow each other closely in attaching valuation premiums to Australia and Tasmania. The Age ≤20 group values up China, and exhibits a trend to value down Tasmania (p = ns).

For China, Age ≤20 significantly values this provenance up, compared to the other three age groups:

\[
\begin{align*}
& China, \text{ Age } \leq 20 \text{ vs China, Age } 21-40: t(101) = 6.4284, p < 0.0001 \\
& China, \text{ Age } \leq 20 \text{ vs China, Age } 41-60: t(106) = 7.0610, p < 0.0001 \\
& China, \text{ Age } \leq 20 \text{ vs China, Age } 61+: t(48) = 7.2486, p < 0.0001
\end{align*}
\]

Other vertical pairwise comparisons are not significant (for example Tasmania, Age ≤20 vs Tasmania, Age 41-60, t(106) = 1.3084, p = 0.1936 = ns).

![Figure 4.21: Provenance x Age, mean values (N=221).](chart)
Figure 4.22: Provenance x Age, percentage increments. Age $\leq 20$ attributes a lesser premium to Australia than other age groups and values Australia > Tasmania (against the Provenance main effect).
4.6.6 Provenance x Residence

There is a main effect of increasing valuations on the Provenance treatment variable, from China, to Australia, to Tasmania. The interaction reported here, Provenance x Residence, is due to two reasons.

Firstly, Overseas residents value Tasmania down (from Australia), and secondly, Australian mainland residents do not value Tasmania up (from Australia). The valuation premium for Tasmania produce over Australia produce is 9.8% for Tasmanian residents; it reduces to 1.3% for Australian residents, and is negative (-5.6%) for overseas respondents (see Figure 4.23 & Figure 4.24).

For this interaction the differences manifest at Provenance: Tasmania. For Tasmania, there is a significant difference of valuations between Tasmanian residents and Overseas residents (Provenance Tasmania, Residence:Tasmania vs Provenance:Tasmania, Residence:Overseas: t(127) = 2.5709, p = 0.0113).

For Provenance:Tasmania, the other two pairwise comparisons are significant at p< 0.1: Provenance:Tasmania, Residence:Australia vs Provenance:Tasmania, Residence:Overseas: t(99) = 1.8753, p = 0.0637.
Provenance:Tasmania, Residence:Tasmania vs Provenance:Tasmania, Residence:Australia: t(211) = 1.8189, p = 0.0704.
Figure 4.23: Provenance x Place of Residence, mean values (N=221).

Figure 4.24: Provenance x Place of Residence, percentage increments. Overseas residents value Australia > Tasmania, Mainland Australian residents value Australia = Tasmania, Tasmanian residents value Tasmania > Australia.
4.6.7 Provenance x Education

There is a main effect of increasing valuations on the Provenance treatment variable, from China, to Australia, to Tasmania. The interaction reported here is due to this main effect not holding for the Primary Education group (see Figure 4.25 and Figure 4.26).

The Primary Education group values China up, compared to two other education group’s valuations, (China, Primary vs China, Secondary: $t(60) = 3.8310, p = 0.0003$; and China, Primary vs China, Tertiary: $t(169) = 4.9460, p < 0.0001$) and values Tasmania down, relative to the two other age group’s valuations ($p = ns$). The Primary Education group, as per the other two education groups, attaches a significant premium to Australia of 12.8% over China, (China, Primary vs Australia, Primary: $t(22) = 2.4556, p = 0.0224$), although less than other education groups, 27.3% for the Secondary Education group and 27.7% for the Tertiary Education group (see Figure 4.27).

Figure 4.25: Provenance x Education, mean values (N=221).
Figure 4.26: Provenance x Education, percentage increments. The Primary Education group values Australia up 12.8%, less than half the premium that other education groups yield (27.3% for Secondary, and 27.7% for Tertiary); and the Primary Education group values Australia > Tasmania.
4.6.8 Provenance x Main Shopper

There is a main effect of increasing valuations on the Provenance treatment variable, from China, to Australia, to Tasmania. The interaction reported here of Provenance x Main Shopper, is that Not Main Shoppers moderate this effect by discriminating less. For Non Main Shoppers their valuations on China are higher (China, Main vs China, Not Main: t(219) = 3.197, p = 0.0016) and their valuations on Tasmania are lower (Tasmania, Main vs Tasmania, Not Main: t(219) = 1.8376, p = 0.0675 = marginally significant) (see Figure 4.27 & Figure 4.28).

Main Shoppers value up Australia by 27.8% compared to China, and then add an additional 6.7% premium for Tasmania. The corresponding figures for Not Main Shoppers are 19.7% and 1.9% (see figure 4.28).

![Figure 4.27: Provenance x Main Shopper, mean values (N=221).](image-url)
Figure 4.28: Provenance x Main Shopper, percentage increments. For Provenance, Main Shopper Provenance premiums are higher than Not Main Shopper premiums.
### 4.7 Demographic Effects, 3-Way

<table>
<thead>
<tr>
<th>Demographic Effects, 3 way</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic x Provenance x Age</td>
<td>F(12,648)=2.226</td>
<td>p = 0.010</td>
</tr>
<tr>
<td>Organic x Provenance x Education</td>
<td>F(8,432)=2.217</td>
<td>p = 0.025</td>
</tr>
<tr>
<td>Provenance x Gender x Main Shopper</td>
<td>F(2,216)=5.371</td>
<td>p = 0.005</td>
</tr>
<tr>
<td>Provenance x Gender x Purchase Organic</td>
<td>F(4,430)=3.227</td>
<td>p = 0.013</td>
</tr>
<tr>
<td>Provenance x Age x Income</td>
<td>F(6,426)=2.444</td>
<td>p = 0.025</td>
</tr>
<tr>
<td>Provenance x Residence x Main Shopper</td>
<td>F(4,430)=2.530</td>
<td>p = 0.040</td>
</tr>
<tr>
<td>Provenance x Income x Main Shopper</td>
<td>F(2,216)=5.924</td>
<td>p = 0.003</td>
</tr>
<tr>
<td>Provenance x Education x Main Shopper</td>
<td>F(4,430)=3.133</td>
<td>p = 0.015</td>
</tr>
<tr>
<td>Eco x Education x Main Shopper</td>
<td>F(4,430)=5.611</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Eco x Education x Purchase Organic</td>
<td>F(8,424)=2.259</td>
<td>p = 0.023</td>
</tr>
</tbody>
</table>

**Table 4.10**: 3-way demographic effects.
4.7.1 Organic x Provenance x Age

The strong visual feature here (see Figure 4.29) is the Age ≤ 20 effects, which are already established, namely that Age ≤ 20 does not discriminate on the Organic variable, and discriminates less on the Provenance variable. The interaction reported here is a Certified Organic/China x Age effect.

The Organic x Provenance x Age interaction reported here is due to two reasons. Firstly, Age 61+ values up Certified Organic/China, less compared to other age groups; Age 61+ attributes a 6.65% premium, compared to 13.81% premium for Age 41-60, and a 14.75% premium for Age 21-40. (Certified Organic, China, Age 61+ vs Certified Organic, China, Age 41-60: t(116) = 2.5248, p = 0.0129; Certified Organic, China, Age 61+ vs Certified Organic, China, Age 21-40: t(111) = 2.6953, p = 0.0081).

Secondly, Age 21-40 values Certified Organic/Australia less, compared to Age 41-60, (16.26% premium compared to 21.54% premium), (Certified Organic, Australia, Age 41-60 vs Certified Organic, Australia, Age 21-40, t(169) = 2.4289, p = 0.0162; note that for the same scenario, Age 21-40 vs Age 61+, p = ns)

![Figure 4.29: Organic x Provenance x Age, mean values (N=221). The Age 61+ group values down Certified Organic/China compared to other age groups](image-url)

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Figure 4.30: Age 61+ values Certified Organic/China (compared to China) at a low premium of 6.65%, compared to 13.81% for Age 41-60 and 14.75% for Age 21-40.

Figure 4.31: Age 41-60 values Certified Organic/Australia (compared to Australia) at a high premium of 21.54%, compared with other age groups (15.11% for Age 61+, and 16.26% for Age 21-40).
4.7.2 Organic x Provenance x Education

The strong visual feature here (Figure 4.30) is the Primary Education effects, which are already established, namely that Primary Education does not discriminate on the Organic variable, and for the Provenance variable, peaks on Australia and discriminates less on the Provenance variable than other age groups.

The Organic x Provenance x Education interaction here is due to the Tertiary Education group valuing down Australia and Tasmania, compared to the Secondary Education group, when the Organic variable is set at null, i.e. when the Provenance variables of Australia and Tasmania are decoupled from both Organic and Certified Organic,

(null, Australia, Tertiary vs null, Australia, Secondary: t(207) = 2.4974, p = 0.0133;
null, Tasmania, Tertiary vs null, Tasmania, Secondary: t(207) = 2.1259, p = 0.0347).

Figure 4.32: Organic x Provenance x Education, mean values (N=221). Tertiary Education group values down Provenances that are decoupled from Certified Organic (compared to the Secondary group).
Figure 4.33: The Tertiary Education group (compared to the Secondary Education group) values down the provenances *Australia* and *Tasmania* (when the Organic factor is null).
4.7.3 Provenance x Gender x Main Shopper

The interaction Provenance x Gender x Main Shopper is a Female/Not Main Shopper effect (see Figure 4.34).

Female /Not Main Shoppers value up China (relative to other Gender/Main Shopper groups), and do not value up Tasmania relative to Australia (as other Gender/Main Shopper groups do) (see Figure 4.35).

Female/Not Main shopper evaluation of China is significantly higher than the evaluation of China by the Female/Main Shopper group (t(164) = 4.7101, p = 0.0001), and other gender/shopper groups. This same group, Female/Not Main Shopper group values Tasmania significantly lower than the other Gender/Shopper groups.

![Figure 4.34: Provenance x Gender x Main Shopper, mean values (N=221).](image-url)

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Figure 4.35: Female/Not Main Shoppers value up China, and value down Tasmania.
4.7.4 Provenance x Gender x Purchase Organic

The interaction Provenance x Gender x Purchase Organic is an *Australia*/Male/Never Purchase Organic effect (see Figure 4.36).

The Male/Never Purchase Organic group values up *Australia*, compared to other Gender/Purchase groups, and unlike other Gender/Purchase groups, it does not value up the provenance *Tasmania*, (*Australia*, Male, Never vs *Australia*, Male, Occasional: t(36) = 2.2718, p = 0.0292) (see Figure 4.36 & Figure 4.37).

**Figure 4.36:** Provenance x Gender x Purchase Organic, mean values (N=221).
Figure 4.37: Male/Never Purchase Organic group values up Australia, and does not value up Tasmania relative to Australia.
4.7.5 Provenance x Age x Income

The interaction Provenance x Age x Income is an Age $\leq 20$ set of effects. The group Age $\leq 20$/ Below Average Income group does not discriminate on Provenance. The group Age $\leq 20$/ Above Average Income values up Australia over Tasmania (other Age/Gender groups group value Tasmania > Australia), (Australia, Age $\leq 20$, Below vs Australia, Age $\leq 20$, Above: $t$ (18) = 2.4181, $p = 0.0264$; Australia, Age $\leq 20$, Above vs Australia, Age 21-40, Below $t$(35) = 2.9931, $p = 0.0050$) (see Figure 4.38 & Figure 4.39).

Figure 4.38: Provenance x Age x Income, mean values (N=221).
Figure 4.39: Age ≤20/Below Average Income group does not discriminate on Provenance. Age ≤20/Above Average Income values up Australia over Tasmania (against the main effect).
4.7.6 Provenance x Residence x Main Shopper

This interaction of Provenance x Residence x Main Shopper is a Residence: Australian Mainland effect, where Main Shoppers and Not Main Shoppers in this category behave differently from each other. This contrasts with the Residence:Tasmania group, where Main Shoppers and Not Main Shoppers perform similarly to each other (see Figure 4.40).

There is a main effect, reported previously, of valuing Tasmania > Australia, and there is a 2-way interaction effect, also reported previously, of Provenance x Residence, with the Residence: Australian Mainland group not allocating different values to Provenance: Australia and Provenance: Tasmania.

In this interaction, for the Residence: Australian Mainland group, Not Main Shoppers value up China (China, Res:Australia, Main Shopper vs China, Res:Australia, Not Main Shopper: t(91) = 3.4623, p = 0.0008), and value down Tasmania.

It is interesting that the Main Shopper variable spreads the valuation of Tasmania, upwards for Main Shoppers, and down for Not Main Shoppers (see Figure 4.41), (Tasmania, Res:Australia, Main Shopper vs Tasmania, Res:Australia, Not Main Shopper: t(91) = 2.2487, p = 0.0269).

For mainland Australian residents who are Not Main Shoppers, there is less discrimination based on provenance. This displays as China peaking for this group (Res:Australia, Not Main) and Tasmania dipping. The effect is significant. Res:Tasmania/Not Main vs Res:Australia/Not Main for China is significant, (t(43) = 2.0942, p = 0.0422); and the dip for Tasmania is also significant, (Res:Tasmania/Not Main vs Res:Australia/Not Main: t(43) = 2.0675, p = 0.0447).

The Tasmania dip for Res:OS is not significant, (p = 0.3628, (the cell sample size is small).
Figure 4.40: Provenance x Place of Residence x Main Shopper, mean values (N=221).
Figure 4.41: For Mainland Australian Residents, Not Main Shoppers discriminate less on Provenance than Main Shoppers, valuing China up, and Tasmania down.
4.7.7 Provenance x Income x Main Shopper

The interaction Provenance x Income x Main Shopper is generated by the Income Below Average group, where the Not Main Shoppers exhibit less discrimination on Provenance than other Income/Main Shopper groups, and significantly value *China* up, and significantly value *Tasmania* down, *(China, Below, Not Main Shopper vs China, Below, Main Shopper: t(90) = 5.2793, p < 0.0001, Tasmania, Below, Not Main Shopper vs Tasmania, Below, Main Shopper: t(90) = 2.1629, p = 0.0332)* (see Figure 4.42 & Figure 4.43).

![Provenance x Income x Main Shopper](chart.png)

**Figure 4.42:** Provenance x Income x Main Shopper, mean values (N=221).
Figure 4.43: For the Below Average Income group, Not Main Shoppers discriminate less on Provenance than Main Shoppers, valuing China up and Tasmania down.
4.7.8 Provenance x Education x Main Shopper

The interaction Provenance x Education x Main Shopper is due to a fracturing of the six Education/Main Shopper groups into two response styles. One group of three values up China (relative to the other group) and values down Tasmania, to below Australia (see Figure 4.44, Figure 4.42 and Figure 4.46). The bifurcation hinges on Secondary/Not Main and Secondary/Main Shopper, where China drops significantly, and Australia and Tasmania valuations crossover (China, Secondary/Not Main vs China, Secondary/Main Shopper: $t(48) = 4.5858$, $p < 0.000$; note that for the corresponding Australia rise, $p = ns$, and the Tasmania dip, $p = ns$).

There are two response styles in this interaction, Response Style 1, values provenances Australia > Tasmania > China; this is against the main effect of provenance earlier reported. This group comprises Primary/Not Main Shopper, Primary/Main Shopper and Secondary/Not Main Shopper (see Figure 4.45).

Response Style 2 values provenances Tasmania > Australia > China; this is as per the main effect earlier reported. This group comprises Second/Main Shopper, Tertiary/Not Main and Tertiary/Main (see Figure 4.46).
Figure 4.44: Provenance x Education x Main Shopper, mean values (N=221).
Figure 4.45: Response Style 1, values Provenance: *Australia* > *Tasmania* > *China*.

Figure 4.46: Response Style 2, values Provenance: *Tasmania* > *Australia* > *China*.
4.7.9 Eco x Education x Main Shopper

The Eco x Education x Main Shopper interaction is a Primary/Main Shopper effect. This group accounts for the spike exhibited in Figure 4.44. The Primary/Main Shopper group significantly values up the absence of the eco labels, *Natural* and *Eco* (null, Primary, Main Shopper vs null, Secondary, Main Shopper: t(49) = 3.038, p = 0.0038); this is against the main Eco effect previously reported. It seems that this group has a predilection for simple, pared down labelling, perhaps even expressing an aversion to *Natural* and *Eco*?

Figure 4.47: Eco x Education x Main Shopper, mean values (N=221).
4.7.10 Eco x Education x Purchase Organic

For the Eco x Education x Purchase Organic interaction, there are nine Education x Purchase Organic groups (see figure 4.48). Five of these groups do not discriminate between Natural and Eco (see Figure 4.49) and four groups do discriminate (see Figure 4.50). Of the Eco-discriminator group, Primary/Never and Primary/ Frequently discriminate Natural > Eco. The other two groups in the Eco-discriminator group, Tertiary/Never and Tertiary/Occasionally discriminate in the other direction, Eco > Natural (see Figure 4.50).

Eco/Tertiary/Frequent lies in the Eco-non-discriminator group and Eco/Tertiary/Occasional lies in the Eco-discriminating group, and their responses to Eco are significantly different (Eco, Tertiary, Frequent vs Eco, Tertiary, Occasional: \( t(152) = 2.4516, p = 0.0154 \)).

![Figure 4.48: Eco x Education x Purchase Organic, mean values (N=221).](image)

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Figure 4.49: Eco non-discriminators, do not discriminate between Natural and Eco, (5 out of 9 Education/Purchase Organic groups).

Figure 4.50: Eco discriminators discriminate between Natural and Eco, (4 out of 9 groups).
4.8 Demographic 4 & 5 Way Interactions

Significant 4 & 5 Way interactions are reported below (see Table 4.11 and Table 4.12). These effects are reported for the sake of completeness, and as indicators of future research and analysis. These interactions indicate the complex and sophisticated multi-factorial process underlying consumer food valuations. Gender does not appear in any of these 4 & 5 Way interactions; Age and Purchase Organic each occur in almost a third of these interactions; Education occurs in almost two thirds of them (see Table 4.13). These interactions are not further analysed here for the reasons stated below.

In this study the number of demographic cells (the product of multiplying out the number of levels of each demographic variable) exceeds the number of subjects, N(demographic cells) > N(subjects); as a consequence, as n-way interactions increase there is less confidence, to draw increasingly micro conclusions, due to the diminishing small numbers, or indeed absence of subjects, in some cells. This is a limitation for further analysis of the demographic effects in this study. This consideration does not apply to the three treatment variables because the study was a repeated measures study (all 221 subjects valued all 27 food labelling scenarios).

<table>
<thead>
<tr>
<th>Demographic Effects, 4-way</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic x Provenance x Eco x Age</td>
<td>F(24,636)=1.783</td>
<td>p = 0.012</td>
</tr>
<tr>
<td>Organic x Provenance x Eco x Education</td>
<td>F(16,424)=1.817</td>
<td>p = 0.027</td>
</tr>
<tr>
<td>Organic x Eco x Education x Main Shopper</td>
<td>F(8,426)=7.666</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Organic x Eco x Education x Purchase Organic</td>
<td>F(16,848)=2.232</td>
<td>p = 0.004</td>
</tr>
<tr>
<td>Provenance x Eco x Age x Income</td>
<td>F(12,636)=2.541</td>
<td>p = 0.003</td>
</tr>
<tr>
<td>Provenance x Eco x Residence x Education</td>
<td>F(4,212)=2.596</td>
<td>p = 0.037</td>
</tr>
<tr>
<td>Provenance x Eco x Income x Education</td>
<td>F(8,426)=2.208</td>
<td>p = 0.026</td>
</tr>
<tr>
<td>Provenance x Eco x Education x Main Shopper</td>
<td>F(8,426)=3.839</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Provenance x Eco x Education x Purchase Organic</td>
<td>F(16,848)=2.299</td>
<td>p = 0.003</td>
</tr>
</tbody>
</table>

Table 4.11: Demographic Effects, 4-Way.
Table 4.12: Demographic Effects, 5-Way.

<table>
<thead>
<tr>
<th>Demographic Effects, 5-way</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic x Prov x Eco x Age x Income</td>
<td>F(24,624)=2.300</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Organic x Prov x Eco x Age x Main Shopper</td>
<td>F(24,624)=2.311</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Organic x Prov x Eco x Age x Purchase Organic</td>
<td>F(48,1242)=1.530</td>
<td>p = 0.012</td>
</tr>
<tr>
<td>Organic x Prov x Eco x Residence x Purchase Organic</td>
<td>F(24,624)=1.681</td>
<td>p = 0.023</td>
</tr>
<tr>
<td>Organic x Prov x Eco x Income x Education</td>
<td>F(16,418)=2.916</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Organic x Prov x Eco x Education x Main Shopper</td>
<td>F(16,418)=12.988</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Organic x Prov x Eco x Education x Purchase Organic</td>
<td>F(32,832)=3.399</td>
<td>p &lt; 0.001</td>
</tr>
</tbody>
</table>

Table 4.13: Frequency of Demographic variables occurrences in 4 & 5-way interactions. Gender occurs in none; Education occurs in nearly two-thirds.

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Frequency in 4 &amp; 5-way interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>nil</td>
</tr>
<tr>
<td>Age</td>
<td>5</td>
</tr>
<tr>
<td>Residence</td>
<td>2</td>
</tr>
<tr>
<td>Income</td>
<td>4</td>
</tr>
<tr>
<td>Education</td>
<td>10</td>
</tr>
<tr>
<td>Main Shopper</td>
<td>4</td>
</tr>
<tr>
<td>Purchase Organic</td>
<td>5</td>
</tr>
</tbody>
</table>
Chapter 5: Conclusions & Discussion

Halpin (2004) reported that certified organic premiums averaged 80% in Australia, and proposed that most consumers are likely to consider this figure too high. The present study confirmed Halpin’s hypothesis, finding that Australian consumers valued Certified Organic at a premium of 15.63% (Figure 4.3). This figure is consistent with “the 15% price premium that at least one of the Australian supermarket chains believes is acceptable to ordinary consumers” (Halpin, 2004, p. 71). While no further attribution information is provided by Halpin, he concludes that “the growth of organic consumption is likely to be inhibited by the existing levels of price premiums” (p.71) and the present study adds weight to that conclusion.

Firth & Lennartsson (1999) reported that “the overall costs of production are similar between conventional and organic” (p. 8), that buyers should “encourage UK growers by offering them market incentives” for organic (p.10), and that price premiums serve to compensate farmers for the costs of certification and compliance. The current level of premiums in Australia, besides limiting the growth of the market, may lead to market anomalies. Woods (2006, p. 19) reported “thousands of [certified organic] accredited livestock sold in conventional markets”, and that “despite the industry sell-off” the 77% price premium for certified organic beef carcasses has “remained firm”, and he cites a farmer declaring that “organics has been a jackpot bonanza for … producers”. The conclusion can be drawn that the industry would be well advised to reconfigure business plans on the basis of lowering current organic price premiums, towards levels consistent with the results of the present study.

The present study found that the price premiums attributed to organic produce are robust across most levels of the demographics that were measured (with the notable exceptions of the age group, 20 years and under, and those with only a primary education). This suggests that the expansion of organic offerings by Australian supermarkets, is a move consistent with the market mood, and that Australian food producers would be well advised to implement the expansion of organic production, the adoption of efficient distribution channels, and to bring Australian organic product to a wider audience. McKinna (2006) reported that the demand for organic produce exceeds supply; the alternative to increasing organic production in Australia, is that imports will meet the increasing demand.
There are many paths to the transition to organic agriculture. Some transitions are government driven, or supported, some are regionally driven (Schermer, 2002), and individual farmers, other than those who have contracted themselves to multinationals, can exercise their individual option to farm organically. As earlier referred to, China has developed a unique transition path, via its Green Food programme. Brazil aims to have 20% of its agricultural land under organic management by 2010 (IFOAM, 2005c). Indonesia under its Go Organic 2010 programme “has a target to become one of the biggest exporters of organic commodities” by 2010 (Giovannucci, 2005). At the municipal level, a city in Iowa, USA, has banned the sale of non-organic food within its precincts (Maharishi Vedic City, 2004). The Chinese town of Jiaohu is an organic town with the import of synthetic agrochemicals banned (Giovannucci, 2005). The conclusion can be drawn from the present study that it would be useful to investigate transition paths to organic agriculture that would facilitate an organic conversion for Australian farmers, to enable them to take advantage of the price premiums available and the market growth.

Tasmanian food production has been valued at AU$2,090 million (Griffiths, 2005). If the consumer price premium of 15.63% is applied to this production value, it indicates that the transition of Tasmania to organic production is worth AU$327 million to the state. At its simplest, this suggests that if the cost of conversion is less than AU$327 million per annum, then conversion is potentially a financially viable option. The analysis of a statewide conversion is beyond the scope of the present study; Igual & Izquierdo (2001) have developed a methodology that could be adapted for the purpose. Such an analysis needs to consider that elsewhere the experience is that the on-farm input costs are expected to reduce, the labour costs are expected to increase, there are additional compliance costs, and there is the expectation that during the three year conversion period yields may initially decrease, and recover thereafter. An analysis of costs and benefits would usefully also consider the value of ecological services, occupational health and safety benefits, health benefits to consumers and government, and potential collateral benefits to tourism and investment. An intrepid researcher might even be tempted to put dollar values to the societal, spiritual and wildlife benefits of a transition to an organic island. What are the karmic costs of wildlife poisonings? And is Northbourne (1940, p. 2) right when he states “there is a very real economic and biological linkage, comprehensive and of infinite complexity, between all living creatures in the world”, or was he merely being sentimental?
Dawkins (2005, p. 31) reported the absence of labelling regulations on the use of organic as a “major issue” in his survey of certified organic and in-conversion organic producers. In the present study consumers clearly distinguished between Organic and Certified Organic, with the latter valued at nearly twice the former (8.12% compared to 15.63%), a result that was robust across demographics. This result indicates that there is not a confusion in the market place between Organic and Certified Organic, and that consumers can and do clearly discriminate. With only one exception (non-certified organic milk in Victoria), the author found that Type II organic was used only by cottage-industry-type small producers, that non-certified product was not carried by major retailers, and discussions indicated it is not likely to be (it would make them targets for an ACCC action).

IFOAM embraces the diversity of organic farming, and the present study found no evidence for consumer confusion between certified and non-certified organic. Non-certified organic may be a useful path for small producers whose turnover, either temporarily or permanently, does not warrant certification costs, and yet who wish to declare their environmental solidarity. A retailer would, however, be ill-advised to on-sell non-certified organic produce, because they would surely be targeted (or at least legally joined) in any action under the Trade Practices Act, and as Dawkins (2005) points out, substantiation of an organic claim is difficult without certification.

Priestley (2005), following the Fair Dinkum Food Campaign and its call for Country of Origin Labelling, reported the absence of a study reporting the existence of a consumer willingness to pay a premium for Australian produce. The present study found that Australian consumers value Australia at a premium of 25.98%, compared to China, and Tasmania at a premium of 31.59% (Figure 4.4). Nine treatments per provenance were presented to subjects with the result that in all cases, Australia outperformed China, and the highest valued China treatment scenario (Certified Organic/China/Natural) was significantly below the lowest Australia treatment scenario (null, Australia, null) (see Figure 4.1). These results confirm the underlying premise of the Fair Dinkum Food Campaign, that Australian produced food has a premium value for Australian consumers, and confirms that the FSANZ lack of specificity in its Country of Origin Labelling rules for processed food (viz. Made from imported and local ingredients) disadvantages Australian producers.

The present study provides empirical support for the Fair Dinkum Food Campaign to persist with its push for Country of Origin Labelling (CoOL) on all food. Only with full disclosure of provenance can consumers exercise their discrimination. Australian producers are advantaged by the disclosure of provenance, and Chinese producers are disadvantaged by the disclosure. The respondent who commented “Prefer to buy Tasmanian or Australian grown and produced” is currently stymied in
exercising that preference by the FSANZ specification that allows *Made from imported and local ingredients* as an adequate disclosure. This nearly meaningless origin claim, defeats the respondent who commented “I really want to be able to choose Tasmanian/Australian products” and frustrates the respondent who commented “We need accurate information on our food labels”.

The current FSANZ rules enable the real provenance of food to be easily suppressed. For example, food grown and processed in China, can be shipped in bulk containers to Australia, and then be repackaged, with some additional processing, and then bear the imported and local ingredients designation, with the local ingredients being perhaps salt and/or water. In this way, for example, *Product of China* tomato paste is transformed into *Made in Australia* pasta sauce. This sleight-of-FSANZ-hand arbitrage, can be made transparent by re-aligning the FSANZ labelling rules that apply to fresh produce, to also apply to processed food, on an ingredient by ingredient basis. Current FSANZ rules dupe the respondent who commented “I would never buy Chinese food, as I don’t trust their labelling, whatever it may say. Or whatever it cost. I wouldn’t eat it if it was given to me”. This respondent has almost certainly been duped into purchasing and consuming what they say they would not knowingly buy or eat. Likewise, the respondent who commented that “I would not buy any food with *Made in China* on the label” has, almost certainly, had their clearly stated intent, sabotaged by the alchemy of FSANZ labelling prescriptions. While this labelling subterfuge serves Chinese producers, some food processing companies with processing facilities in Australia, and apparently the Food and Grocery Council, it disadvantages Australian producers, and deceives shoppers. Respondents commented:

> There is someone somewhere who wants to pull the wool over the consumer’s eyes! We all have the right to know where the food comes from.

> I get cross with the label ‘made from local and imported ingredients’ - how much imported? Where imported? Don’t buy if we can avoid. The sooner country of origin labelling is compulsory on packaged food the better - Woolworths ‘Home brand’ labelling is very confusing. The gov’t has to make sure that Australian farmers are batting on a level playing field.

> My biggest problem is the packaging that now states product can have Australian and imported items.

The finding that provenance attracts a significant premium undermines the WTO philosophy of the commodification (and deprovenancing) of food, and their theory of the interchangeability of produce. The WTO subscribes to the Ricardian principle of comparative advantage, restated recently...
by Vogl et al. (2005, p.15) as “no region shall produce what may be produced at other places more cheaply”. However, this study makes clear that, for example, an Australian carrot and a Chinese carrot, while perhaps indistinguishable in every other aspect, are nevertheless different products, merely by dint of their provenance. Only by the suppression of their provenance do they degrade to become, for all intents and purposes, one and the same commodity.

The suggestions of Daboh (2004), Leu (2006a) and Wong (2006) that the eco-labels, *Natural* and *Eco*, are threats to the organic industry are not borne out by this study. *Natural* attracted a premium of 2.48% and *Eco* attracted a premium of 2.84% (Figure 4.5). (This compares to *Organic* which attracted a premium of 8.12% and *Certified Organic* a premium of 15.63% (Figure 4.3)). While this result confirms Pahl’s (2004) claim that Type II eco-labels are not highly regarded in the market, this result does suggest that there are opportunities for producers to add value to their produce by the careful and judicious use of *Natural, Eco* and most probably, other labelling adjuncts beyond those explored in the present study; the development by AusVeg of the *EnviroVeg* logo (Whitman, 2006) may fall into this category. The result indicates that while the premium attributed to the two eco-labels tested, was small, it is not commercially insignificant. This indicates that there is the opportunity for further research, on (a) what might be called opportunistic eco-labels, or not clearly defined, and hence not testable, labels under the *Trade Practices Act* and (b) the development of alternative eco-labels that either carry third party certification (i.e. ISO Type I eco-labels) or ISO Type II eco-labels that have definitional and informational specificity, enabling them, for example, to be tested or challenged under the *Trade Practices Act*. Comments from respondents were consistent in wanting more, and or better, information on labels, in seeking labelling probity, and in this study none complained about the complexity of labels, nor that there was too much information on labels. Respondents commented:

*We NEED accurate information on our food labels so we can EASILY make responsible diet choices - and we need CHOICES.*

“I do spend a lot of time reading food labels.

Daboh (2004, p. 9) proposes that consumers “might pay a price premium” for food labelled with a “green food claim” such as *Natural or Eco*, and the present study supports that hypothesis. However the premium reported here for *Natural* and *Eco* is one third of the premium consumers attached to *Organic*, and one sixth of what they attributed to *Certified Organic*. This is not strong evidence for consumer confusion, and lends little weight to Daboh’s call for regulation of these terms.
The claim of Vogl et al. (2005) that there is a consumer expectation that organic produce be provenanced, is borne out by the result that there is an interaction between Organic status and Provenance (Figure 4.7), that is, these two factors act jointly, rather than independently. China suffers a 30% “trust deficit”, with respondents indicating they did not trust Chinese labelling and/or certification. This manifested in China/Certified Organic attracting a premium of 11.62% compared to Australia/Certified Organic yielding a premium of 16.48%. Tasmania/Certified Organic yielded a premium of 17.95% (Figure 4.7).

China has embraced organic agriculture because it has a pollution “crisis”, food poisoning due to pesticides has been reported, the population is rapidly increasing in affluence and education and is demanding safe food, a safe work environment for farmers is important, and with rising food production, China needs to ensure its produce is acceptable in the international market. For Chinese farmers, organics is a means to add value to their produce and alleviate poverty. This makes it more attractive for farmers to stay on the land rather than migrate to crowded cities for their economic betterment.

The present study confirms the opportunity for Chinese Certified Organic produce to attract a significant premium (11.62%) in the Australian marketplace, and suggests that China’s push into organics is well founded. The one unknown in the Chinese matrix of reasons for embracing organics is, do foreign consumers, for example, Australian consumers, attribute a premium to Chinese Certified Organic? This study finds in the affirmative. And importantly, any country or region can adopt organics for the same set of reasons as are driving the Chinese adoption: environmental, health and economics.

The German supermarket chain, Aldi, relative newcomer to Australia, has its own organic home brand “Just Organics”. In the case of their honey the label identifies in addition to organic certification, a regional attribution “produced on Kangaroo Island”. All of their organic range boldly states under the brand name: or.gan.ic/organik/ def: 1 grown as nature intended with no chemicals or additives, altogether a better way to eat. This is interesting, and worthy of emulation, since (a) there is a clear regional attribution and (b) organic is clearly and unambiguously defined, explaining the point of difference to organic-newcomers and reinforcing the message for the rest (c) the product is clearly labelled Produce of Australia and (d) the Australian certifier logo of NASSA is prominent on the label. There is however cognitive dissonance when the organic Pasta Sauce is scrutinised. On
the front it prominently bears the BFA organic bud logo, clearly stating in bold print AUSTRALIAN CERTIFIED ORGANIC, and on the reverse one reads Made in Australia from Imported and Local ingredients (sic). A grammar school education is useful for deconstructing this labelling, together with the FSANZ Standard 1.2.11, March 2006 edition. Here, the Australian is qualifying the Certified (rather than the Organic, and certainly rather than the contents of the jar), while the Certified is qualifying only the Organic (and not the Australian). According to the label, 96% of the product is tomato paste, and most of this product’s ingredients are imported (otherwise the label would state Made from local and imported ingredients); one could be excused for thinking this is deceptive and misleading conduct, and not consistent with the BFA claim to be “Your Guarantee of Integrity” (DAFF, 2004, p. 3). There is a covenant of trust between the certifier and consumers, which in this case, appears to have been breached. This provides support for the maintenance of the diversity of certifiers in Australia, currently seven (DAFF, 2004). The present study reports an interaction effect between provenance and organic status; by manufacturers suppressing provenance, as in this case, the market value of the organic produce is distorted.

Notwithstanding that this study reports many interaction effects, the major treatment variable results are very robust, across almost all treatment and demographic conditions. With only rare or no exceptions, (a) Certified Organic attracts a premium over Organic, and Organic over null, (b) Australia and Tasmania attract a premium over China, and (c) Natural and Eco attract a premium over null. The interactions reported here, with few exceptions, are ordinal (rather than disordinal); that is, where there are interactions, they mostly take the role of moderating, weakening, or strengthening an effect, rather than reversing it. Income and gender have no impact on food valuations based on Organic status or Provenance or Eco (Table 4.9). Other interactions of demographic variables presented in Chapter 4 and the Executive Summary of Results will be of interest to marketers and others, and may indicate useful avenues for future research.

Most Tasmanian vegetable production is grown under contract for North American multinationals, Simplot and McCains (DIER, 2006). Growers sign a contract that specifies in advance the pesticide regime that the farmer must follow, whether sound agricultural management practice requires it or not. The contractual schedule includes what biocides to spray, the frequency and the duration. By commodifying the produce under a multinational grower contract, the farmer relinquishes the right to micromanage the farm and crops using local knowledge, and to implement precautionary practice. The multinationals erase back-to-farm traceability, and extinguish the product’s regional provenance. By the time the frozen, (“snap-frozen” is the marketing hype), produce arrives in the
supermarket freezer, it bears the FSANZ (2006) crafted claim that it is “made from local and imported product” or the alternative “made from imported and local product”. These descriptors are convenient for Simplot and McCains, both of which currently operate food processing plants in Tasmania and China, and are expanding their operations in China (Simplot, 2006; Fangchao, 2004). In the case of Simplot, that expansion is being managed by Simplot Australia, and aims to sell into the local Chinese market as well as to export and to “take control of the entire supply chain” (Simplot, 2006). The Chinese produce can be shipped to Tasmanian processing plants, mixed with Tasmanian produce, and labelled Made in Australia from imported and local ingredients, thereby simultaneously benefiting from the Australia appellation while suppressing the China provenance. Such a strategy is likely to take advantage of the 25.98% premium for Australia (see Figure 4.4), the cheaper cost from China, and the likelihood that any substitution is likely to go unnoticed by many consumers.

There is an international trend to regionally identify food (Bashford, Carey, Rington, Meziani & Luetchford, 2001; Curtis, 2003; Minowa & Cummins, 2006). Spain has developed a program and an associated seal, Precinta de Garantia, that certifies that the produce is from a particular specified region of Spain. South Australia has developed an SA Grown logo (Redmond, 2006). The present study provides support for the notion that this approach, for example a Tasmanian Grown precinct guarantee and associated logo could be of benefit to Tasmanian producers (see Figure 4.1). This path carries a benefit only while the precinct has a positive image and associations, and it can be a handicap where the precinct has identifiable environmental or social deficiencies; in such a case, precinct identification can be used as a tool to force change. Tasmania’s practice of poisoning native animals, “1080 farming”, has attracted international condemnation, and a campaign could gain much traction were produce to be clearly labelled with a Tasmanian provenance.

The image of Australian food as “clean and green” is invoked by Australian food producers (Bovill, 2006), yet there is little or no effort to validate the veracity of that image, either as a reality, or as a market perception, and there is the counter claim that for Tasmania, “clean and green” is merely marketing hype, “an image only… to promote the island’s produce” (Felmingham, 2006, p. 19). The “clean and green” image has especially been invoked by Tasmanian producers (Vegetable Industry Taskforce, 2005). However, other than the televisual obviousness of cleanliness and greenness of the tractors on the Fair Dinkum Food Campaign’s Canberra convoy, there is little to challenge the Felmingham claim that “clean and green” is merely puffery. Neither history nor current agricultural practice bear out the brag. Most agricultural jurisdictions concentrate on biociding weeds and in-
sects; Tasmania stands perhaps alone in the world in having farming practice dependent on poisoning native mammals. Tasmania pioneered, in the 1950s, the agricultural use of the poison sodium monofluoroacetate (Rammell & Fleming, 1978), a poison developed as “Compound 1080” by the US Chemical Warfare Service during WWII (Connolly, 2004). Despite being banned in the USA for more than thirty years (Connolly, 2004), and elsewhere including China (Xie, Chen & Lei, 2002), Tasmania continues the use of this poison for killing indigenous marsupials, on the basis that it is “the most cost effective method for reducing large populations of most browsing animals” (Statham, 2001, p. 56). Continuing with this controversial and widely condemned practice has the potential to backfire on Tasmania and particularly on its primary producers, were Tasmanian Grown labelling to be adopted. The present study found that while Tasmanians attribute an additional premium of 9.8% to Tasmanian provenance, mainland Australians attribute only a 1.3% premium, and overseas residents rate Tasmania less than Australia (see Figure 4.24). While the practice of exterminating native wildlife is a part of Tasmanian farming practice, it must be considered a risk for Tasmanian farmers and/or producers in following the SA Grown lead, and the international trend towards regional labelling (Soil Association, 2005), by regionally identifying their produce. Labelling such as Produce of Tasmania will facilitate a boycott of Tasmanian produce.

The Vegetable Taskforce (2005, p. 21) has stated this somewhat more circumspectly: “the ‘clean green’ image of Tasmania is fragile and could potentially be damaged by public, verifiable claims of environmental damage or pollution”. Dawkins (2005, p. 2) reported the issue, as it pertains to Tasmanian organics, thus:

*The major competitive advantage for the Tasmanian organic industry is the state’s clean and green image however it was highlighted by most respondents that this is simply an image or perception. Publicity surrounding forestry practices, the use of chemicals and the possible contamination of water were identified by respondents as issues that can damage the image and this competitive advantage.*

It is reported that “Tasmanian products cost 30% more to produce than competing products” (Vegetable Industry Taskforce, 2005, p. 18). Moving from a clean and green *image* to a clean and green *reality* is likely to be the key for Tasmania becoming the premium label it surely ought to be, and laying claim to that 30% as a market premium (see Figure 4.4).

The age group of 20 and under, unlike other age groups, were entirely unresponsive to organic labelling. Whether this is a generational cohort effect (and that they will carry this view forward as they age) or whether it is an age-related effect (and they can be expected to “grow out of it”) cannot
be determined by the present study. The issue calls for further research since the organics industry of the future will be relying on these young consumers as customers now or in the near the future. In any event, it would be a fair and reasonable response of the organics industry to prepare and distribute educational material to students to explain the points of difference of organic food. Different approaches would need to be developed for primary, secondary and tertiary students, as well as young non-students. The author has used DVDs, travelling exhibitions (Eskesen, 2006) and Teachers Toolkit (Paull, 2006d), on a specific environmental theme, in the course of this year, to reach part of this demographic (secondary and upper primary school students) and these media proved to be three effective methods for delivering an environmental message within this age group.

The result reported here that the 20 and under age group were unresponsive to organic, is consistent with the British Heart Foundation results indicating the general disengagement of young people with food knowledge. In the BHF surveys, 36% of school children did not know the main ingredient of chips was potato, and 37% were unaware that cheese is made from milk (Homeyard, 2005), and while 99% could use a DVD player, only 58% could use a vegetable peeler and 43% could boil an egg (Slattery, 2006). The “difficulty of attracting youth to the [organics] industry” has been reported by Dawkins (2005, p. 31), and further confirms the need to develop mechanisms for exposing young people to organic food information.

Eco-labels are reported to be ineffective where there is “a low degree of environmental awareness (Jordan et al., 2003b, p.2). Reverse engineering of this claim suggests that the youth response to organic reported in this study may be a reflection of a low level of environmental awareness. On the other hand, the amount of environmental education in schools is unprecedentedly high (DESA, 2003) and 86% of Australian youth are reported to hold an “environmental belief” worldview, and have an awareness ranging from 22% to 99% of eleven tested environmental concepts (Fien, Ai, Yenken, Sykes & Treagust, 2002). Of the eleven environmental concepts tested by Fein et al., pollution, pesticides and food were not included. These findings suggest that Australian youth may lack an awareness of the connections between pesticides, food production and organics; the topic is worthy of further investigation.

This age group, 20 years and under, was also the least responsive to provenance. This suggests that this is prime age group for Chinese produce to target. This digital generation relies daily on Made in China gizmos, from laptops, mobile phones, digital cameras and game machines to digital music devices. The present study reports that this age group discriminates less than other age groups on
the basis of food provenance. This may be because this cohort has a much higher propensity to as-
associate China with high quality and reliability, than older cohorts who have the experience of earlier
Made in China knock-off products that were of poorer quality. This warrants further investigation;
the findings on provenance are favorable for China, less favorable for Australian or Tasmanian
provenances, and the prognosis will be progressively less favorable for Australian producers if this
is a cohort effect.

The original motivating question was: how would an island become an Organic Island? One path to
such a destination relies on actions, preceded by the appropriate decision/s. The present study pro-
vides some price premiums data for farmers to justify such decisions. While there are several is-
lands currently moving towards implementing the organic island option, for example, Negros Island
(Hughes, Uychiat & King, 2004), there is a second path, the do-nothing-path, to an organic future,
particularly for first world regions where there are high wage regimes (for example, in Tasmania the
average per hour remuneration is AU$33.00 per hour for rural workers compared to China at
AU$1.27 per hour (Hart & Horak, 2005)). When, in the near future, China’s vast increase in organic
hectares in 2005/2006, and the rapid increase in food production especially over the past decade,
converge, they will potentially create a massive new organic food export industry for China. The
sheer size of China’s production may give it the capacity to redefine the standard for internationally
traded food as Certified Organic. When and if this is the case, Australian, including Tasmanian
farmers, will be left producing what may soon become an anachronism, chemically-farmed food.
This may be the food equivalent of trying to sell vinyl records to an iPod world. At such a time
when Australian farmers can compete on neither price nor quality, farming jobs may be offshored,
as has happened, and is continuing to happen, to Australian manufacturing, reportedly losing 1200
jobs per week (Cameron, 2006), and likewise Australian service industries. When and if this occurs,
we can expect that local farmland, no longer in production, will revert to native vegetation, the
Pripyatization of Australian farmland. A program such as BushbankSA (Bushbank, 2006) could
perhaps facilitate this process.

Australian and Tasmanian farmers are lagging the world in conversion to organic (Figure 2.5). As
markets are increasingly able and willing to test for pesticide residues, local farmers who persist
with the status quo are at risk of becoming a case study in unplanned obsolescence. The present
study identifies Certified Organic as the best available opportunity for Australian farmers and pro-
ducers to add value to their produce.
A final comment. This study was conducted on the World Wide Web. This was the result of a confluence and a congruence of ideas, rather than a coincidence, or some unrelated additional dimension of this study. The avoidance of waste and the careful husbanding of resources is of the essence of organic farming philosophies, and has been from the outset (King, 1911; Paull, 2006a). The electronic development and presentation of the survey in the present study avoided the consumption of paper associated with printing and distributing of a hardcopy survey, the greater percentage of which are generally discarded unused, and all of which are ultimately trashed. While the University of Tasmania Ethics Committee apparently does not currently press for the avoidance of waste paper or of paper consumption, by urging the migration of research to online formats, it is the opinion and recommendation of the author that in the future, all proposed survey instruments should be evaluated on such a criterion, namely suitability for online presentation. The present study provides evidence for the efficacy of such an approach.

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“To know and not to do is really not to know at all”

Gurumayi Chidvilasananda.
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