

Social Research Working Paper

June 2004

Value Challenging Innovations in Agriculture

Geoff Kaine, Denise Bewsell and Chris Linehan

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Social Research Working Paper 06/04

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Geoff Kaine, Denise Bewsell and Chris Linehan*

* Department of Primary Industries, Victoria

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Acknowledgements

The authors wish to thank Fiona Johnson, Victorian Department of Primary Industries, and Megan Higson, AgResearch, who contributed by way of many interesting and valuable discussions.

1. Introduction

Kaine (2004) describes the use of consumer behaviour theory as a framework for analysing the adoption of innovations in agriculture. The framework has been successfully employed to explain the adoption, or lack of adoption, of a variety of innovations including irrigation systems in the horticultural, viticultural, vegetable and dairy industries in Australia, breeding practices and animal health practices in sheep and cattle in Australia and New Zealand, and pest and disease management practices in horticulture and viticulture in Australia and New Zealand.

In this paper we draw on consumer behaviour theory to consider the role that personal and social values may play in the adoption of innovations in agriculture. Our objective is to interpret our experience in the adoption of agricultural technologies and practices from the perspective of consumer behaviour literature with a view to assessing the relevance of that literature to understanding the adoption of innovations in agriculture.

In the next section we outline consumer behaviour theory in relation to product purchasing and discuss its application to the adoption of agricultural innovations. We then describe in some detail the role of social values in consumer behaviour and draw inferences for the adoption of innovations in an agricultural context. We conclude with a discussion of the implications for agricultural extension.

2. Consumer purchase behaviour

Consumers make purchase decisions in a variety of ways depending on their circumstances as illustrated in figure one. The way in which a decision to purchase is made is determined by two key factors. These are the level of consumer involvement in the product and the degree of effort the consumer is willing to invest in making a purchase decision (Assael 1998). When involvement is high consumers tend to engage in complex decision making process or brand loyalty depending on the degree of effort they invest in the purchase decision. When involvement is low consumers tend to engage in variety seeking behaviour or habit depending on the degree of effort they invest in the purchase decision.

2.1 Involvement and effort

Consumer involvement depends on the importance of the purchase to the consumer (Assael 1998, O'Cass 2000). High involvement purchases are purchases that are important to the consumer. High involvement products are generally expensive, rarely or infrequently purchased and closely tied to self-image and ego. High involvement purchases usually involve some form of risk - financial, social or psychological. Where this is the case the consumer is more likely to devote time and effort to careful consideration of alternatives before making a purchase. Typical high involvement purchases include homes, motor vehicles, white goods, clothing and perfumes (Kapferer and Laurent 1986).

Low involvement purchases are purchases that are unimportant to the consumer (Assael 1998, O'Cass 2000). These purchases are commonly inexpensive products that are routinely purchased and involve little risk. The consumer is unlikely to devote much, if any, time and effort to consideration of alternatives for low involvement purchases before making a decision. Typical low involvement purchases for many consumers are groceries, toiletries, and laundry products (Kapferer and Laurent 1986). Note that involvement has a number of dimensions such as interest, risk, symbolic value and reward or benefit (Kapferer and Laurent 1986). Hence consumers can vary both in terms of the magnitude of their involvement with a product and the basis for that involvement.

Involvement can also be categorised into situational and enduring components (Arora 1982). Enduring involvement has two major elements – experience with a product or situation and the relationship of the product or situation to centrally held social or personal values. In essence, considerable experience with an issue or product that is

strongly associated with social and personal values generates a high level of enduring involvement (Arora 1982).

Situational involvement also has two components – functional and social-psychological. Functional characteristics of the product that increase effort and risk such as complexity and novelty increase situational involvement (Arora 1982). Situational involvement also increases when the product is purchased or consumed in circumstances that increase psychological risk such as when the expectations or behaviour of others is a critical factor in product choice.

The level of effort that consumers devote to a purchase decision increases with both situational and enduring involvement. For instance, products that are costly or complex such as consumer durables evoke a greater investment of time and energy in the search for a suitable purchase (Arora 1982). In contrast, most consumers expend little effort on typical low involvement products such as groceries which involve little risk and are only distantly related to social and personal values.

Figure 1: Consumer purchase behaviour

| | <i>High involvement purchase decision</i> | <i>Low involvement purchase decision</i> |
|------------------------|---|--|
| <i>Decision making</i> | <p>Complex decision making (e.g. cars)</p> <ul style="list-style-type: none"> • High motivation to search for information • High effort into learning and discovery • Evaluation both prior to and after purchase | <p>Variety seeking (e.g. snack foods)</p> <ul style="list-style-type: none"> • Low motivation to search for information • Some effort into learning and discovery • Evaluation after purchase |
| <i>Habit</i> | <p>Brand loyalty (e.g. athletic shoes)</p> <ul style="list-style-type: none"> • Less effort into learning and discovery as consumer already has a product they are satisfied with • Evaluation based on experience with the product | <p>Inertia (e.g. laundry detergent)</p> <ul style="list-style-type: none"> • No motivation to search for information • No effort put into learning and discovery • Evaluation after purchase |

The level of effort expended on a purchase also depends on the individual's familiarity with the product and their perception of differences in the performance of different brands. As a general rule, consumers devote less effort to making purchase decisions for products which they are thoroughly familiar with compared to products that they are not familiar with. Also, consumers will expend less energy on making decisions between brands of a product when they do not perceive any difference among brands in product performance (Assael, Reed and Patton 1995).

By definition the adoption of an agricultural innovation involves consideration of the novel and unfamiliar. Usually the adoption of a new agricultural practice or technique has significant consequences for the future financial performance of the farm enterprise. The new technology or practice must be integrated into the existing mix of technologies, practices and resources that exist on the farm (Crouch 1981; Kaine and Lees 1994).

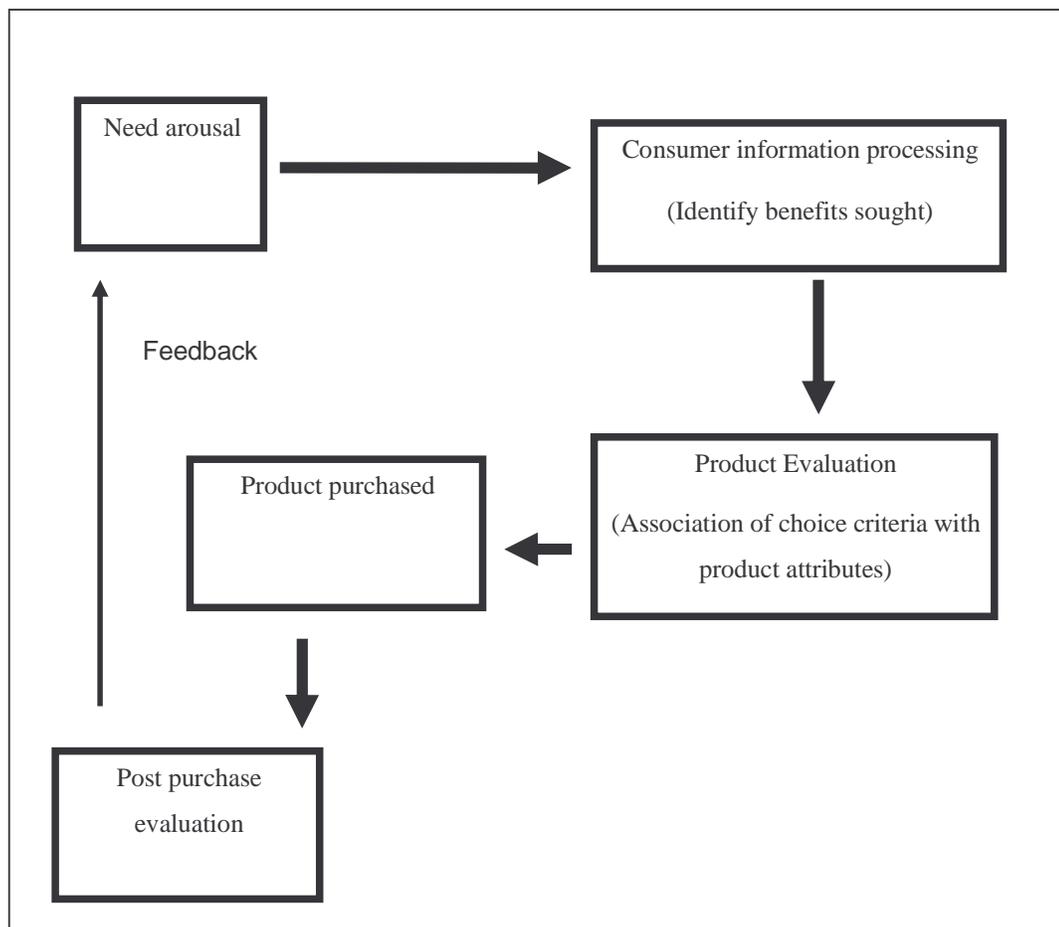
This means, generally speaking, the likely outcomes of adopting a particular technology or practice are difficult to predict as the compatibility of the technology or practice with the existing farm system, and the resulting benefits, depends on a range of contextual factors that are specific to the circumstances of each farm enterprise. Consequently, the decision to adopt an agricultural innovation is often financially risky. As such they entail social risks and psychological risks for the individual as the outcomes affect the wellbeing of family members and can influence producers' feelings of achievement and self-fulfilment. The adoption of most agricultural innovations can be characterised then, as a form of high involvement purchase for primary producers that has enduring and situational components that are likely to encourage an extensive search for information before a decision is made.

2.2 Complex decision making

Consumer behaviour theory suggests that consumers follow either a complex decision-making process or exhibit brand loyalty with high involvement purchases (Assael 1998). Complex decision-making is a systematic, often iterative process in which the consumer learns about the attributes of products and develops a set of purchase criteria for choosing the most suitable product (see figure two). In complex decision making the consumer is portrayed as attempting to make the best product or brand choice.

The first step in complex decision making, need arousal, is the recognition of a need for a product or brand. The recognition of a need can be triggered by many causes including experiences, an immediate cue, new information, or a change in circumstances or the environment (Assael, Reed and Patton 1995). The next step, information processing, is the process of noticing relevant stimuli, understanding and interpreting them, and retaining the stimuli in memory. This step captures the searching for, screening and gathering of information about products that the consumer perceives as relating to satisfying their need. The next step, product evaluation and purchase, encompasses the association of product characteristics with the benefits the consumer seeks, the selection and purchase of a product.

Figure 2: Stages in complex decision making



Adapted from Assael (1998)

In the final stage following purchase, post-purchase evaluation, the consumer evaluates the performance of the product. Satisfaction is likely to result in repurchase and eventually brand loyalty. If the expectations of the consumer are not met then the consumer will be dissatisfied and unlikely to purchase the product again. The stages in complex decision making are not intended to be mutually exclusive, nor strictly sequential.

Given need arousal, the key to understanding the purchase decisions of consumers is to understand the key benefits consumers are seeking and how those benefits translate into a set of criteria that consumers use to make their decisions. Generally speaking, consumers' purchase criteria reflect their usage situation. In the case of consumer goods the usage situation is often a function of the consumer's past experiences, their lifestyle and their personality (Assael, Reed and Patton 1995). Having settled on a set of

purchase criteria for deciding between products, the consumer then evaluates the products against the criteria and makes a choice.

Consumers can be grouped into market segments, in this case benefit segments, on the basis of similarities and differences in the key purchase criteria that they use to evaluate a product (Assael, Reed and Patton 1995). Knowledge of the key purchase criteria that will be used by consumers in a segment can be employed to tailor products to meet the specific needs of consumers in that segment and promote products accordingly.

In the case of agriculture the purchase criteria producers use to evaluate new technologies should reflect the key benefits the technology offers given producers' usage situations. The mix factors that define the usage situation for an innovation will vary across innovations and among producers. In many instances the usage situation is likely to be a function of the farm context into which a new technology must be integrated. Generally speaking, the farm context is the mix of practices and techniques used on the farm, the skill base of the producer and the biophysical and financial resources available to the farm business that influence the benefits and costs of adopting an innovation (Crouch 1981; Kaine and Lees 1994). The usage situation for an innovation describes the aspects of the farming system that are functionally related to the innovation (Rogers 1983).

However, for some innovations the producers' perceptions of relevant risks and the management strategies that have been implemented to ameliorate those risks may be the relevant contextual variables that define the usage situation. Hence, the notion of farm context can at times encompass the producers' perception of relevant risks and associated management strategies. Similarities and differences among farm contexts for an agricultural innovation will translate into similarities and differences in the key purchase criteria that producers will use to evaluate that innovation.

Given that the usage situation for agricultural innovations is defined by farm contexts, differences in farm contexts will result in different market segments for an innovation. Logically, the market for an innovation (i.e. the population of potential adopters) will be defined by the set of farm contexts for which the innovation generates a net benefit (see Kaine and Bewsell 2002a; Kaine and Bewsell 2003a; Kaine, Court and Niall 2002 and Kaine and Niall 2001b for examples).

As is the case with consumer products, knowledge of similarities and differences in the key purchase criteria that will be used by producers to evaluate an innovation can be used to classify producers into segments, to tailor the innovation to meet the specific needs of producers in a segment, and to promote the innovation accordingly.

Through the application of convergent interviewing and laddering techniques, which are described in detail in Kaine (2004), we have identified segments for innovations such as irrigation systems in the horticultural, viticultural, vegetable and dairy industries in Australia, breeding practices and animal health practices in sheep and cattle in Australia and New Zealand, and pest and disease management practises in horticulture and viticulture in Australia and New Zealand among others (see Kaine and Bewsell 2002b; Burrows et al 2002; Bewsell and Kaine 2002; Kaine and Bewsell 2000; Kaine and Niall 2001a; Kaine, Tarbotton and Bewsell 2003; Kaine and Bewsell 2003a and Bewsell and Kaine 2003 respectively).

In most of these studies the purchase criteria that were identified as constituting the farm context relevant to a particular innovation included biophysical elements of the farm environment that are often used to classify enterprises into farming systems – topography, soil type, climate, type of enterprise, scarcity of natural resources such as water. However, in most studies at least some of the criteria were more socio-economic in nature. Such criteria included the length of time needed to irrigate a property, the period of time taken to spray an orchard, the availability of labour, and the layout of channels on a property. Often we found relatively subtle interactions between an innovation and these criteria. For example, the impact of property layout can have a critical impact on the benefits of automatic irrigation (Kaine and Bewsell 2000) or the choice of spray irrigation technology (Kaine and Bewsell 2002d). Property layout, as well as topography, also influences the effectiveness of pheromone mating disruption in controlling orchard pests (Kaine and Bewsell 2003b).

In some studies perceptions of risk and the strategies used to ameliorate risk were key purchase criteria. Producers' perceptions of price and business risk and the business strategy they used to mitigate these risks appear to influence producers' propensities to adopt financial management aids (Kaine, Lees and Sandall 1994). Perceptions of risk in regard to predictions of pest infestations relative to the capability of fruit growers to respond quickly to an infestation are a key factor influencing the adoption of integrated pest management techniques (Kaine and Bewsell 2003b).

2.3 Brand loyalty

When repeated purchasing of a chosen product consistently generates a high degree of satisfaction then, over time, complex decision making may be replaced by brand loyalty. Brand loyalty is the second approach to purchasing high involvement products. Brand loyalty is more than just habitual purchasing of a brand. It represents a personal commitment to repeatedly purchase a brand on the basis of favourable attitudes towards the brand (Assael 1998). In situations where the purchase of a product entails a high

level of risk, then brand loyalty may be an effective strategy for reducing risk. Brand loyalty does not equate with habit (Assael 1998).

Brand loyal consumers may change brands for three reasons. First, because they experience a change in their needs and the original product does not satisfy or match these new needs. Second, brand loyal consumers may be forced to change brands because of dissatisfaction with the favoured product due to continually poor performance of the product over a period of time. Finally, brand loyal consumers may be induced to change brands because they learn of an alternative which is demonstrably superior.

In the case of agricultural innovations, brand loyal behaviour translates into a personal commitment to the use of an agricultural technology or practice that has been proven through experience to be successful, especially in situations where failure can have serious consequences. This means that producers are likely to be particularly unwilling to change technologies in situations where the failure of a technology can have serious consequences for the farm enterprise and existing technologies and practices have proved to be reliable. In such situations the rate of adoption and diffusion of alternative technologies is likely to be exceedingly low unless a change in circumstances leads to the failure of the traditional technology. The loyalty of producers to traditional technologies and practices in this type of situation is a structured, strategic response to risk.

We found evidence of behaviour resembling brand loyalty with regard to wool producers' choice of sheep stud (Kaine and Niall 2001a) and fruit growers adoption of integrated pest management techniques (Kaine and Bewsell 2003b).

3. Personal values in consumer behaviour

Consumers are constantly exposed to a range of marketing stimuli designed to influence purchase behaviour. For high involvement purchases, consumers' reactions to those stimuli depend on the interaction of three sets of factors. The first set of factors is the consumers' psychological set which is the general state of mind of the consumer toward an object (Assael, Reed and Patton 1995). The psychological set will determine whether a consumer's reaction to a product or brand is positive or negative. The psychological set is composed of the needs, perceptions and attitudes of the consumer. The second set of factors that influence purchase decisions includes the personal characteristics of the consumer such as demographics, lifestyle and personality. The third set of factors are broader environmental influences on the consumer such as culture, social class, family and reference groups (Assael, Reed and Patton 1995).

With regard to the psychological set, consumers are characterised as possessing needs that they seek to satisfy ranging from physiological needs for food and shelter through to ego and self-actualisation needs for prestige, success and self-fulfilment. The manner in which they choose to satisfy those needs depends on their motivations which are an outcome of their demographics, personality, lifestyle and socialisation through the influence of cultural, class, family and peer factors (Ahuvia and Wong 2002; Assael, Reed and Patton 1995). For example, characteristics such as income, family size and lifestyle shape needs in terms of home size and functionality while factors such as personality, and motivations such status and self-fulfilment may influence home location, design and decoration.

Hence, consumers' attitudes towards high involvement products are based on their beliefs about the attributes of product and their evaluations as to whether these attributes are positive or negative given their needs and motivations (Assael, Reed and Patton 1995). Consequently, consumers' personal values, resulting from socialisation through cultural, class family and peer pressures and life experiences, will influence the purchase of high involvement products when they form part of the basis for forming preferences about the relevance and attributes of products (Ahuvia and Wong 2002; Schwartz 1994). That is, when the evaluative component of consumers' attitudes towards a product depends on their personal values.

A personal value is a belief about what is a desirable state or mode of behaviour that transcends a particular situation and is used to guide the selection or evaluation of behaviour, people and events (Inglehart 1990; Rokeach 1973; Schwartz 1994). Hence, personal values are the fundamental criteria we employ as individuals to form judgements, favourable or unfavourable, about the world around us and to guide behaviour.

Personal values can be ordered, more or less, by their importance relative to other values. This ordering results in a more or less hierarchical topology of value types representing fundamentally different judgements about desirable ways to meet the needs of individuals as organisms, for coordinating social interaction and for ensuring the functioning of groups (Shwartz 1994).

Clearly, the strength of the link between personal values and consumer purchase behaviour depends on the degree of involvement of the consumer in the purchase. With low involvement purchases the link between values and attitudes towards product or brand is likely to be minimal, sometimes almost nonexistent. On the other hand, many high involvement purchases are involving precisely because they are value expressive (Arora 1982). Such products are important to the consumer because they symbolise a particular suite of personal values and so serve as a signal to others (Richins 1994; Shavitt 1990).

For instance, the purchase of designer furniture, fashion and jewellery could signify a personal emphasis on values associated with achievement and wealth at the expense of social justice and equality. On the other hand, the purchase of organic, hand made and natural products could signify an emphasis on values associated with self-direction, creativity and environmentalism at the expense of conformity and tradition. See Schultz and Zelezny (1998) for example in relation to environmentally friendly behaviours.

Products that are value expressive will appeal to consumers whose personal values include those with which the product is associated. Conversely, such products will not appeal to consumers whose personal values conflict with those with which the product is associated. For example, Thorgersen and Olander (2001) found evidence that Danish consumers who attached a relatively high importance to universalism (Schwartz 1994) as a personal value were more likely than other consumers to engage in a range of environmentally friendly behaviours such as recycling, buying organic food and using alternative means of transport.

On the other hand, consumers who did not exhibit strong personal norms in relation to being environmentally friendly were not only less likely to engage in environmental behaviours, they were also more likely to substitute more convenient behaviours for behaviours requiring more effort (Thorgersen and Olander 2001).

Previously we suggested that consumers' values play little if any explicit role in the purchase of low involvement decisions. However, low involvement products can become highly involving for consumers if they become associated with the expression of personal values. For example, many consumers in Europe may have regarded red meat as a relatively low involvement product in the past. European consumers are now more likely to treat red meat as a high involvement purchase due to health concerns over food safety, and ethical concerns about the environment and the treatment of animals (Bernues, Olaizola and Corcoran 2003; Verbeke and Vackier 2004). In this case consumers are using their personal values to make evaluative judgements about the desirability of the methods and behaviours used in the manufacture of the product. These judgements then influence consumers' evaluation of the product itself. This is especially the case with genetically modified products (Small *et al* 2002, Verdurme and Viaene 2003, Bredahl 1999)

Relatedly, when there is a lack of familiarity with a product, attitudes towards the product can be strongly influenced by attitudes towards the product category and behaviours associated with the creation, acquisition or use of the product (Bobbitt and Dabholkar 2001). In this case, consumers' personal values may directly influence their attitude toward the product if their values play a central role in the formation of their attitudes towards the product category or behaviours associated with the product. See Bech-Larsen, Poulsen and Grunert (1999) and Small *et al* (2002) for examples in relation to biotechnology.

The personal values consumers associate with a high involvement product can change in response to marketing and other influences. Bredahl (1999) illustrates how the hypothetical use of genetically modified starter culture in yoghurt creates a change in consumer preferences. The original full milk product was viewed by consumers as wholesome and natural and contributed to a long, healthy and happy life. The modified product was viewed as unwholesome and artificial, untrustworthy and even immoral (Bredahl 1999). Hence, the introduction of a different method of manufacture dramatically changed the personal values consumers' associated with the product and, as a result, their attitude toward the product.

In conclusion, personal values play an important role in many of the high involvement purchase decisions of consumers. Many consumer products are highly involving for consumers because they are perceived by consumers as symbolising their identity and values. The personal values associated with products can change in response to marketing and other influences such as changes in production methods. Furthermore, low involvement products can become highly involving if they become strongly associated in the minds of consumers with the expression of their personal values.

4. Value challenging innovations in agriculture

We have characterised the adoption of innovations in agriculture as high involvement purchases for primary producers. The preceding discussion on the contribution of personal values to high involvement purchases by consumers implies that the personal values of primary producers can potentially play a pivotal role in their decision to adopt some innovations. Logically, primary producers will be more likely to adopt innovations that appear consistent with their personal values and less likely to adopt innovations that appear inconsistent with, or challenge, their personal values.

Generally speaking, primary producers place a priority on tradition, conformity, self-direction and achievement (Cary and Holmes 1982; Frost 2000; Gasson 1973; Holmes and Day 1995; Kerridge 1978; Sandall, Kaine and Cooksey 2001). Consequently, agricultural innovations that are designed to improve the business performance of agricultural enterprises are consistent with the personal values of most primary producers. In other words, primary producers will evaluate innovations that contribute to better farm performance in a positive light because they believe that the accumulation of wealth by individual effort is fundamentally desirable. Hence, the failure of primary producers to adopt innovations that are designed to improve farm performance is most likely to occur when producers are not persuaded that they will realise the benefits claimed for the innovation. That is, when producers are not convinced that the innovation will satisfy their farming needs given their farm context. This is consistent with Rogers (1983) conceptualisation of economic advantage as a key factor influencing innovation diffusion with the observations of Lindner (1987) that self-interest is the key motivation influencing the adoption of innovations in agriculture.

Commercial agricultural innovations, unlike many consumer products, cannot be regarded as value expressive in the usual sense that consumer products can be. Basically, agricultural innovations are intended to contribute functionally to improving farm performance. To the degree that primary producers place a high priority on conformity, self-direction and achievement the adoption of innovations designed to improve farm performance simply signals competence to other producers rather than self-identity. There are, however, some opportunities for primary producers to express their personality and values and signal identity to other producers through participation in groups such as Landcare (Curtis and De Lacy 1996).

Given the lack of understanding of farming among other groups in the community, the adoption of most agricultural innovations lacks any capacity to meaningfully convey information about producers' personal values to others in the community beyond that

signalled by being a primary producer in any case. Consequently, primary producers, like other consumers, tend to express their personal values and signal their identity through their choice of career and lifestyle and through the purchase of consumer products such as clothing, cars and leisure activities.

As most primary producers place a higher priority on conformity, self-direction and achievement than on universalism and self-transcendence they are unlikely to find innovations that are designed to enhance the environment intrinsically appealing, especially if the adoption of those innovations is likely to lower business performance. Such innovations could be regarded as 'value challenging' in the sense that the adoption of these innovations purely for the environmental benefits they create is inconsistent with the personal values of many producers.

Primary producers tend to exhibit an individual good social orientation (Sandall, Kaine and Cooksey 2001). People whose social values are orientated towards individual good tend to place a high priority individual self-reliance, physical and economic security hard work and individual freedom (Inglehart 1990; Schwartz 1994). This social orientation is grounded in three key beliefs about the relationship between individuals and the societies in which they live. The first is that it is the individual members of society that create wealth. The second is that the wealth of society as a whole is equal to the sum of the wealth generated by each individual member of society. The third belief is that the wealth of society as a whole can be maximised in circumstances where individuals are free to create wealth with minimal interference from government (Sandall, Kaine and Cooksey 2001).

People with an individual good social orientation believe that each person is responsible for their own actions and should be rewarded for their own efforts (Mill 1975). They also believe they should be free to use the wealth that they have created to meet their own wants and needs as they see fit and they should be free to develop their personal capabilities to the fullest (Dworkin 1996; Mill 1975). These beliefs imply that people with an individual good value orientation are likely to feel a social responsibility to develop their personal capabilities to the fullest and to make the most productive use of the resources available to them (Sandall, Kaine and Cooksey 2001).

The individual good value orientation is associated with two key beliefs about the natural environment. The first is that the interests of humans should take priority over the interests of the natural environment (Stern and Dietz 1994). The second is that the natural environment is a source of resources and commodities which individuals have a moral obligation to manage efficiently and productively (Merchant 1990). Thus, people with an individual good value orientation are likely to favour solutions to environmental

issues that provide individuals with appropriate and enforceable rights to the resource in question (Merchant 1990).

These beliefs also suggest that people with an individual good value orientation are most likely to support environmental protection when they are personally affected by environmental degradation and the personal benefits to them from ameliorating this degradation outweigh the personal costs (Stern and Dietz 1994; Stern, Dietz, Kalof and Guagnano 1995).

This has a number of implications for the adoption of innovative practices in natural resource management. First, few primary producers are likely to be motivated to adopt innovations designed to benefit the environment simply to enhance the environment (Kaine and Bewsell 2003a). Furthermore, efforts to encourage producers to adopt such innovations by promoting their environmental benefits are likely to meet with limited success because producers are unlikely to be persuaded that such benefits intrinsically appealing (Bewsell and Kaine 2003, Kaine and Bewsell 2003b).

Second, primary producers are likely to be motivated to adopt innovations that benefit the environment when they perceive those innovations as contributing to improving the performance of their farm businesses. For example, the development of resistance and the level of pest infestation are key factors influencing the adoption of integrated pest management techniques by fruit growers in Australia and grape growers in New Zealand (Kaine and Bewsell 2003a, Bewsell and Kaine 2004 respectively). The development of resistance to pesticides and the banning of pesticides have been identified as the critical factors motivating the adoption of integrated pest management techniques in Asia (Jeger 2000; Kogan 1998). The need to reduce the labour involved in irrigation and changes in planting layout have motivated adoption of water saving micro-irrigation technologies by fruit growers in northern Victoria (Kaine and Bewsell 2002b). The adoption of organic food production methods by kiwi fruit producers in New Zealand was found to be motivated mainly by commercial rather than philosophical or environmental considerations (Campbell, Fairweather and Steven 1997). Similarly, the adoption of quality assurance programs, integrated production programs and environmental management systems is largely motivated by commercial concerns with regard to obtaining market access and demonstrating duty of care (Bewsell and Kaine 2003; Hopkins *et al* 2003; Kaine and Bewsell 2003b). The adoption of technologies, practices and programs in these instances was motivated primarily by commercial gain rather than environmental or social benefit.

Third, if primary producers do adopt an innovation for commercial reasons that results in environmental benefit then they may be less likely to adopt other innovations that

generate environmental benefits. As discussed earlier, consumers who did not exhibit strong personal norms in relation to being environmentally friendly were less likely to engage in environmentally friendly behaviours and they were also more likely to substitute more convenient behaviours for behaviours requiring more effort (Thorgersen and Olander 2001). Where producers have adopted an innovation for commercial gain that generates an environmental benefit they may use their adoption of this innovation to justify the rejection of other innovations that benefit the environment on the grounds that they are already engaging in environmentally friendly behaviour. This effect may also occur where producers have adopted an innovation that has little commercial impact on the farm business but signals environmentally friendly behaviour to others (such as planting of trees around the margins of their property).

Fourth, where producers have adopted an innovation for commercial gain that generates an environmental benefit they are likely to implement the innovation in a manner that maximises the commercial gain. This may not be consistent with implementing the innovation in a way that maximises the benefit to the environment. The management of reuse dams in flood irrigation systems provides an example (Kaine and Bewsell 2000).

In the case of flood irrigation reuse dams are intended to act as a mechanism for trapping excess water in the event a bay is over-watered. The reuse dam is intended to prevent the uncontrolled release of water off-farm and consequently, should be empty when irrigation commences. However, farmers realised that reuse dams could be used to exert greater control over the timing of irrigations. By ordering irrigation water in advance and storing the water in their reuse dam, farmers could time their irrigations more precisely. This means commencing irrigations with the reuse dam full of water rather than empty. Hence, farmers manage reuse dams in the opposite way to the way they were intended to be managed.

The fifth implication concerns primary producers' beliefs with respect to use of resources. To the degree that the personal values of primary producers differ from those of other groups in the community, the criteria they use to make judgements about how desirable a behaviour is will differ from the criteria used by others in the community. For example, Sandall, Kaine and Cooksey (2001) found that primary producers' judgements about the appropriate use of different landscapes differed from those of conservationists and policy makers, and that the differences were attributable to differences in values. They found, furthermore, that differences in personal values even extended to differences in the way landscapes were perceived.

This means that disagreements between primary producers and other groups in the community over the proper use of natural resources are more than struggles over shares in economic wealth. They are disputes about how to judge what is desirable. Such disputes are usually characterised by protracted and passionate disagreements as the parties involved hold fundamentally different beliefs about what is a desirable state or mode of behaviour. Such disagreements often cannot be resolved by negotiation or consensus.

Relatedly, primary producers may interpret concepts such as stewardship and sense of community differently to others. For example, those in society who place a priority on social justice, cooperation, universalism and self-transcendence and so have a social good or environmental good value orientation are likely to have a much broader interpretation of 'community' than those such as primary producers who place a priority on conformity, tradition and self-achievement (Sandall, Kaine and Cooksey 2001; Stern and Dietz 1994). The latter may be likely to interpret community as a more localised and exclusive concept. This means producers are less likely to view the broader community as having a legitimate right to intervene in the management of farm enterprises (see Frost 2000). They are also likely to believe that the costs of actions they are compelled to take for the benefit of the community should be spread among the community.

Similarly, those in society who have a social or environmental good value orientation are likely to have a different interpretation of 'stewardship' than those such as primary producers who place a priority on conformity, tradition and self-achievement (Sandall, Kaine and Cooksey 2001; Stern and Dietz 1994; Suzuki 2000). The latter may be more likely to interpret stewardship in terms of retaining the farm as a productive asset within the family and to discount the off-farm consequences of their actions (see Frost 2000).

This means efforts to persuade or compel producers to adopt innovations that are thought to create benefits for the wider community by appealing to values such as stewardship or sense of community can be counter-productive. First, such efforts may be interpreted by producers as threatening their independence and challenging the principle of self-direction. Second, such efforts may have unintended results because primary producers may interpret stewardship and sense of community differently from others in society. As noted earlier, primary producers may have a more exclusive interpretation of community and a more economic interpretation of stewardship than others in society.

Third, efforts to persuade or compel producers to adopt innovations by appealing to values such as stewardship or sense of community could easily be counterproductive if those efforts can be interpreted as suggesting that primary producers are engaging in

behaviours that are not consistent with these values. In equating certain behaviours with these values there is an implicit accusation that producers who behave otherwise are acting against the interests of their local community and are failing in their family responsibilities to retain the farm as a productive asset. Such accusations are unlikely to elicit a cooperative response from producers.

Fourth, the concept of sense of community may be associated with values such as justice, fairness and equity. If this is so, the association of these values provides a moral foundation for the argument that it is unfair to expect producers to bear the entire cost of actions that they may be forced to take that will benefit the community as a whole. The association of these values provides a moral justification for the argument that the community as a whole should bear the cost of such actions and it is unfair to penalise producers for their actions if other sections of the community are also contributing to the environmental problem.

As most primary producers place a higher priority on self-direction and achievement than on universalism and self-transcendence they may be likely to discount arguments that innovations involving genetic modification should be proscribed because they pose a risk to the environment. However, some primary producers may find innovations involving genetic modification to be value challenging because they believe genetic modification contravenes the ideas and customs of traditional culture and religion (Small, Wilson and Parminter 2002). Hence, while innovations using genetic modification may appeal to producers because their use can create a commercial benefit which is consistent with placing a priority on achievement they may not adopt such innovations because their method of manufacture is inconsistent with some of their most fundamental personal values.

On the other hand, some producers who place a particular priority on tradition could, however, believe genetic modification is entirely consistent with the traditional view that nature was created to serve humanity (Small, Wilson and Parminter 2002). Producers with this belief may wholeheartedly endorse the development and use of innovations involving genetic modification. Note that the importance of personal values in the adoption of value challenging agricultural innovations, such as genetic modification, becomes problematic if producers believe such innovations are beyond consideration because they are unacceptable to consumers (Small 2001).

Finally, given the priority producers place on self-direction and independence they are unlikely to accept that others in society have a legitimate influence on the management of agricultural enterprises unless they can prove direct self-interest (such as food safety). Producers' distrust of intervention by those outside of agriculture is exacerbated

by the limited understanding of farm systems outside agriculture and the lack of appreciation of diversity in farming systems. Hence, efforts to influence farm management practices that are perceived by producers as lacking legitimacy or credibility are likely to meet with little success. This has been the case to some degree with, for example, the implementation of quality assurance programs and farm safety initiatives (Sandall *et al* 1999).

5. Conclusion

In this paper we have drawn on the literature describing the role of personal values in consumer behaviour to consider and interpret the role of personal values in the adoption of agricultural innovations by primary producers as managers of agricultural enterprises.

Commercial agricultural innovations, unlike many consumer products, cannot be regarded as value expressive in the usual sense that consumer products can be. To the degree that most primary producers place a high priority on conformity, self-direction and achievement the adoption of innovations designed to improve farm performance simply signals competence to other producers rather than self-identity. Given the lack of understanding of farming among other groups in the community, the adoption of most agricultural innovations also lacks any capacity to meaningfully convey information about producers' personal values to others in the community beyond that signalled by being a primary producer in any case.

Like consumers, primary producers tend to express their personal values and signal their identity through their choice of career and lifestyle and the purchase of consumer products such as clothing, cars and leisure activities. There are, though, some opportunities for producers to express their personality and values and signal identity to other producers through participation in groups such as Landcare.

As most primary producers place a higher priority on self-direction and achievement than on universalism and self-transcendence they are unlikely to find innovations that are designed to enhance the environment intrinsically appealing, especially if the adoption of those innovations is likely to lower business performance. Such innovations could be regarded as 'value challenging' in the sense that the adoption of these innovations purely for the environmental benefits they create is inconsistent with the personal values of many producers.

We have found that widespread adoption by producers of innovations such as integrated pest management and programs such as quality assurance and integrated production systems is primarily motivated by commercial considerations rather than environmental concerns.

Furthermore, we have found that when producers adopt an innovation for commercial gain that generates an environmental benefit they are likely to implement the innovation in a manner that maximises the commercial gain. This may not be consistent with maximising the benefit to the environment.

Most, if not all, primary producers are concerned for environment. However, producers view the landscape differently to others in society and may interpret ideas such as stewardship and sense of community differently to others. This means differences in opinion between primary producers and others in society about the most suitable use of landscapes are more than arguments about economic opportunity. They are conflicts between groups with fundamentally different views about what is a desirable way to live.

We believe there are grounds for thinking that efforts to persuade or compel producers to adopt innovations that are thought to create benefits for the wider community by appealing to values such as stewardship or sense of community can be counter-productive. Such efforts may be interpreted both as threatening producers' independence and accusing producers of acting against the interests of their local community and failing in their family responsibilities. Both interpretations are likely to elicit defensive and hostile responses from producers.

Finally, some primary producers, like some consumers, may find innovations involving genetic modification to be value challenging because they believe genetic modification contravenes the ideas and customs of traditional culture and religion. Hence they may not consider adopting innovations that involve genetic modification because their method of manufacture is inconsistent with some of their most fundamental personal values.

6. References

- Ahuvia A C and Wong N Y (2002) Personality and values based materialism: their relationship and origins, *Journal of Consumer Psychology*, 12(4): 389–402
- Arora R (1982) Validation of an S-O-R Model for situation, enduring, and response components of involvement, *Journal of Marketing Research* 19 (November): 505 - 516
- Assael H (1998) *Consumer Behaviour and Marketing Action*, South Western College Publishing, Cincinnati, Ohio
- Assael H, Reed, P and M Patton (1995) *Marketing: Principles and Strategy, Australian Edition*, Harcourt Brace, Sydney
- Bech-Larsen T, Poulsen A and Grunert K (1999) Acceptance of functional foods in Denmark, Finland and the US – a cross-cultural study of consumer values and preferences, Seventh Cross-Cultural Research Conference, Cancun, Mexico, Brigham Young University, Provo, Utah.
- Bernues´ A, Olaizola A and Corcoran K (2003) Extrinsic attributes of red meat as indicators of quality in Europe: an application for market segmentation, *Food Quality and Preference*, 14:265–276.
- Bewsell D and G Kaine (2004) Understanding the impact of context: a new approach for understanding the adoption of improved pest and disease management practices, *Proceedings of the 20th Annual Conference of the Association of International Agriculture and Extension Education*, Dublin, Ireland, 24-27 May
- Bewsell D and G Kaine (2003) *Adoption of Sustainable Practices in The Wine Grape Industry*, Client Report to New Zealand Winegrowers, AgResearch, Hamilton, New Zealand
- Bewsell D and G Kaine (2002) *Soil Monitoring, Irrigation Scheduling and Vegetable Production*, Report to New South Wales Agriculture, School of Marketing and Management, UNE, Armidale
- Bobbitt L M and Dabholkar P A (2001) Integrating attitudinal theories to understand and predict use of technology-based self-service: the Internet as an illustration, *International Journal of Service Industry Management*, 12 (5):423-450.
- Bredahl L (1999) Consumers' cognitions with regard to genetically modified foods: results of a qualitative study in four countries, *Appetite*, 33: 343-360.

- Burrows D, Boland A, Bewsell D and G Kaine (2002) Increased adoption of irrigation best management practices for vines, *Irrigation Australia 2002 Conference*, Sydney, New South Wales, May
- Campbell H, Fairweather J and Steven D (1997) Recent developments in organic food production in New Zealand: part 2, kiwifruit in the Bay of Plenty, Department of Anthropology, University of Otago, Studies in Rural Sustainability, Research Report No. 2.
- Cary J and Holmes W (1982) Relationship among farmers' goals and farm adjustment strategies: some empirics of a multidimensional approach, *Australian Journal of Agricultural Economics*, 26: 112–30.
- Crouch B (1981) Innovation and farm development: a multi-dimensional model. In: S Chamala (ed) *Extension Education and Rural Development*, Wiley and Sons, Brisbane.
- Curtis A and De Lacy T (1996) Landcare in Australia: does it make a difference? *Journal of Environmental Management*, 46(2): 119-137.
- Dworkin R (1996) Do liberty and equality conflict? In: Barker P (ed) *Living as Equals*, New York, Oxford.
- Frost F (2000) Value orientations: impact and implications in the extension of complex farming systems, *Australian Journal of Experimental Agriculture*, 40: 511-517.
- Gasson R (1973) Goals and values of farmers, *Journal of Agricultural Economics*, 24: 521.
- Holmes J and Day I (1995) Identity, lifestyle and survival: value orientations of South Australian pastoralists, *Rangeland Journal*, 17:193–212.
- Hopkins W, Ashcroft B, Johnson F and Kaine G. (2003) Environmental Management Systems in horticulture: pathways to adoption and achievement of natural resource management outcomes, Paper presented to the *3rd National Conference on Environmental Management Systems in Agriculture*, Tanunda, South Australia, November.
- Inglehart R (1990) *Culture Shift in Advanced Industrial Society*, Princeton University Press, Princeton.
- Jeger M J (2000) Bottlenecks in Integrated Pest Management, *Crop Protection*, 19: 787-792.

- Kaine G (2004) Consumer behaviour as a theory of innovation adoption in agriculture, *Social Research Working Paper 01/04*, AgResearch, Hamilton, New Zealand.
- Kaine G and Bewsell D (2000) *Irrigation Systems, Irrigation Management and Dairy Farming*, Report to the Victorian Department of Natural Resources and Environment, School of Marketing and Management, UNE, Armidale.
- Kaine G and Bewsell D (2002a) Are market research and extension complementary? *Proceedings of the 18th Annual Conference of the Association of International Agriculture and Extension Education*, Durban, South Africa, May.
- Kaine G and Bewsell D (2002b) *Soil Monitoring, Irrigation Scheduling and Fruit Production*, Report to the Victorian Department of Natural Resources and Environment, School of Marketing and Management, UNE, Armidale.
- Kaine G and Bewsell D (2002c) *Managing Irrigation for Grapevines*, Cooperative Research Centre for Viticulture, Urrbrae, South Australia.
- Kaine G and Bewsell D (2002d) *Managing Irrigation and Fertiliser in Dairy Farming*, Report to the Victorian Department of Natural Resources and Environment, School of Marketing and Management, UNE, Armidale.
- Kaine G and Bewsell D (2003a) The adoption of pest and disease management practices by grape growers in New Zealand, *Contributed paper to the 10th Annual Conference of the New Zealand Agricultural and Resource Economics Society*, Blenheim, New Zealand, July.
- Kaine G and Bewsell D (2003b) *Adoption of Integrated Fruit Production: A Qualitative Study*, Client Report to the Victorian Department of Primary Industries, AgResearch, Hamilton, New Zealand.
- Kaine G, Court J and Niall E (2002) Implications of customer perceptions and decision-making for genetic gain in the wool industry, *Wool Technology and Sheep Breeding*, 50 (3): 423-430.
- Kaine G and Lees J, (1994) *Patterns in Innovation: An Analysis of the Adoption of Practices in Beef Cattle Breeding*. TRDC Publication No. 190, UNE, Armidale.
- Kaine G, Lees J and Sandall J (1994) *Planning and Performance: An Exploration of Farm Business Strategy and Perceptions of Control*, TRDC Publication 192, UNE, Armidale.
- Kaine G and Niall E (2001a) *Sheep Breeding: Complex Decision-Making and Brand Loyalty*, Report to the Victorian Department of Natural Resources and Environment, School of Marketing and Management, UNE, Armidale.

- Kaine G and Niall E (2001b) The adoption of sub-surface drainage and on-off grazing by Victorian dairy farmers, *Proceedings of the 10th Australian Agronomy Conference*, Hobart, January.
- Kaine G, Tarbotton I and Bewsell D (2003) *Factors Influencing Choice of Health Products for Livestock*, Client Report to Celentis, AgResearch, Hamilton, New Zealand.
- Kaine G, Sandall J and Bewsell D (2003) Personality, strategy and innovation in agriculture, *Proceedings of the 16th European Seminar on Extension Education*, Eger, Hungary, September.
- Kaine G, Sandall J and Bewsell D (2004) Personality and strategy in agriculture, *Proceedings of the 20th Annual Conference of the Association of International Agriculture and Extension Education*, Dublin, Ireland, 24-27 May.
- Kapferer J, Laurent G (1986) Consumer involvement profiles: a new practical approach to consumer involvement, *Journal of Advertising Research*, 25: 48-56.
- Kerridge K (1978) Value orientations and farmer behaviour — an exploratory study, *Quarterly Review of Agricultural Economics*, 31: 61–72.
- Kogan M (1998) Integrated Pest Management: Historical perspectives and contemporary developments. *Annual Review of Entomology*, 43: 243-270
- Lindner R (1987) Adoption and diffusion of technology: an overview, In: Champ B, Highly E and J Remenyi (eds), *Technological Change in Postharvest handling and Transportation of Grains in the Humid Tropics*, Australian Centre for International Agricultural Research, No 19: 141-151
- Merchant C (1990) Environmental ethics and political conflict: a view from California, *Journal of Environmental Ethics*, 12: 45-68.
- Mill J S (1975) *On Liberty*, Norton, New York.
- O'Cass A (2000) An assessment of consumers' product, purchase decision, advertising and consumption involvement in fashion clothing, *Journal of Economic Psychology* 21: 545 – 576.
- Richins M L (1994) Special possessions and the expression of material values, *Journal of Consumer Research*, 21 (December): 522–533
- Rogers E (1983) *Diffusion of Innovations*, 3rd Edition, Macmillan, New York.
- Rokeach M (1973) *The Nature of Human Values*, Free Press, New York.

- Sandall J, Cooksey R, Reeve I and Kaine G (1999) Australian farmers' perceptions of farm health and safety hazards, *Australian and New Zealand Journal of Occupational Health and Safety*, 15(5): 449-464.
- Sandall J, Kaine G and Cooksey R (2001) More than a matter of taste: Social Values and the appeal of native vegetation in agricultural landscapes. In: Graham J, Reeve I and Brunckhorst D (eds) *Landscape Futures: Social and Institutional Dimensions, Proceedings of the 2nd International Conference on Landscape Futures*, 4-6 December, Armidale. Institute for Rural Futures, University of New England, Armidale.
- Schultz P W and Zelezny L (1998) Values and pro-environmental behaviour: a five country survey, *Journal of Cross-Cultural Psychology*, 29 (4):540–559.
- Schwartz S H (1994) Are there universal aspects in the structure of human values?, *Journal of Social Issues*, 50: 19-45.
- Shavitt S (1990) The role of attitude objects in attitude functions, *Journal of Experimental Social Psychology*, 26 (March): 124-148.
- Small B (2001) Factors Influencing Retailers' Decisions to Stock GMOs, Client report for HortResearch, AgResearch, Hamilton, New Zealand.
- Small B, Wilson J and Parminter T (2002) *New Zealanders' Beliefs and Attitudes towards Genetic Engineering: Final Report and Interpretation*, Client Report for AgResearch Reproductive Technologies Platform, AgResearch, Hamilton, New Zealand.
- Small B , Wilson J , Pedersen J and Parminter T (2002) Genetic engineering and the public: attitudes, beliefs, ethics and cows, New Zealand Society of Animal Production Conference, Massey University, Palmerston North, New Zealand.
- Stern P C and Dietz T (1994) The value basis of environmental concern, *Journal of Social Issues*, 50: 65-84.
- Stern P C, Dietz T, Kalof L and Guagnano G A (1995) Values, beliefs, and pro-environmental action: attitude formation toward emergent attitude objects, *Journal of Applied Social Psychology*, 25: 1611-1636.
- Suzuki D (2000) Suzuki says put water first, retrieved March 4 2002 from <http://www.abc.net.au/landline/stories/s103202.htm>.
- Thøgersen J and Ölander F (2001) Spillover of environment-friendly consumer behaviour, 5th Nordic Environmental Research Conference, 14-16 June, Aarhus.

Verbeke W and Vackier I (2004) Profile and effects of consumer involvement in fresh meat, *Meat Science*, 67: 159–168

Verdurme A and Viaene J (2003) Exploring and modelling consumer attitudes towards genetically modified food, *Qualitative market Research: An International Journal*, 6(2): 95–110