

The adoption of sub-surface drainage and on-off grazing by Victorian dairy farmers

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ABSTRACT

Waterlogging on Victorian dairy farms results in pugging damage to soils and reduced pasture growth and utilisation. There has been concern at the low rate of adoption of practices for managing waterlogged pastures (sub-surface drainage or on-off grazing using feed pads). Market segmentation research was used to help develop extension strategies to promote the adoption of these practices by Victorian dairy farmers. Interviews were conducted with dairy farmers to identify the key factors influencing the adoption of strategies for managing waterlogging and a mail survey was distributed to 3000 dairy farmers to quantify the relative importance of these key factors. Dairy farmers reporting problems with waterlogging were classified into six segments based on the nature and severity of the problem. Two research and extension strategies were developed to meet the needs of farmers in the six segments.

KEY WORDS

Adoption, dairy farming, waterlogging, drainage, grazing, survey.

INTRODUCTION

Waterlogging occurs on dryland dairy farms across southeast Australia resulting in a range of problems including pugging damage to soils, reduced pasture growth and utilisation, reduced milk production and reduced farm income. Waterlogging can be managed by installing sub-surface drainage or by using on-off grazing in conjunction with stand off areas such as feed pads (1). There has been concern among policy makers, researchers and extension professionals that the rate of adoption of these management options is too low (2).

In this study a well-known market research technique, segmentation analysis, was used as a framework to identify the contextual factors influencing the adoption of sub-surface drainage and on-off grazing by dairy farmers. By contextual factors we mean the biophysical characteristics of farms and the mix of technologies and management practices used on them.

Market segmentation is undertaken to provide a systematic basis for developing promotion strategies and positioning products. Consumers purchase products to satisfy needs. Since the needs of consumers vary, one product usually will not meet the needs of all consumers. Consequently, products with different characteristics are required to satisfy the needs of different consumers. One objective in market segmentation is to classify consumers into groups or segments based on differences in their needs. Knowledge of such segments can be employed to:

- identify the characteristics that differentiate consumers in one segment from another;
- infer the attributes of products that will best meet the needs of consumers in a particular segment; and
- formulate a strategy for marketing a product to a particular segment.

Differences in consumers' needs arise for a variety of reasons, one of the most important being the usage situation or context in which the product is consumed (3). For example, the uses for paper towels have been classified into heavy duty (cleaning ovens, washing windows and cars), light duty (wiping hands, counters and dishes) and decorative (placemats, napkins). Clearly, paper towels with different characteristics are needed for each of these situations. Consequently, consumers will employ different criteria to choose between brands of towels depending on the usage situation they are purchasing for.

When the usage situation is the critical determinant of consumers' needs, then market segmentation should be undertaken using those variables that define key differences in usage situations. The role that segmentation can play in guiding the development of extension programs becomes clear when it is recognised that the relative advantage and compatibility of agricultural innovations are largely determined by the usage situation.

Five factors influence the rate of adoption of innovations (4). These are:

- Relative advantage, which is the degree to which a new product is perceived to be superior to existing substitutes.
- Compatibility, which is the degree to which a new product is consistent with needs, attitudes, past experience and practice.
- Simplicity, which is the ease with which a new product can be understood and used.
- Observability, which is the ease with which a new product can be seen.
- Trialability, which is the degree to which a new product can be tested or sampled before adoption.

In terms of the adoption of agricultural innovations, relative advantage and compatibility are usually strongly related. This is because the benefits of adopting a new practice or technique depend heavily on the ease with which it can be integrated into the existing mix of practices and techniques used in the farm enterprise. In effect, the resources and mix of practices and techniques used in a farm enterprise describe the usage situation (or production context). Consequently, different market segments can be described for an agricultural innovation by identifying key differences in usage situations (ie. production contexts).

Having identified different market segments and characterised the usage situations peculiar to each it should be possible to:

- assess the goodness of fit between the needs of a segment and the characteristics of the innovation and use this information to forecast the rate of adoption across segments and to formulate priorities with respect to targeting segments;
- draw inferences regarding modifications and adaptations to the innovation to better meet the needs of segments;
- formulate extension programs that 'position' the innovation appropriately in terms of promotion themes/messages and, possibly, communication channels.

In this study we identified different usage situations that described different market segments with respect to the adoption of sub-surface drainage and on-off grazing by dairy farmers.

METHODS

Personal interviews were conducted with approximately fifty farmers to identify the key contextual factors influencing the adoption of sub-surface drainage and on-off grazing. A mail survey based on these interviews was distributed to nearly 3000 dairy farmers to quantify the relative importance within the dairy farming population of these key contextual factors and to identify market segments. The response rate to the survey was 35 per cent. Validation interviews were conducted with 30 farmers to confirm that the extension strategies that were developed on the basis of segment characteristics were relevant to the needs of the farmers in each segment. Quantitative analyses were conducted using CLUSTAN (5) and SPSS (6).

RESULTS

We found from the interviews that waterlogging has a dramatic impact on the income and lifestyle of many farmers. We also found that farmers who experience problems with waterlogging are likely to have devoted quite considerable time and effort to actively formulating strategies for managing waterlogging on their farms. Approximately two thirds of the farmers who responded to the survey indicated that waterlogging was a problem on their farm.

The two thirds of dairy farmers who experience problems with waterlogging were classified into six segments based on the severity of their waterlogging problem (see figure 1). Note that the 88 farmers who had installed sub-surface drainage were excluded from this stage of the analysis. The severity of waterlogging was measured by the degree to which waterlogged pastures could be grazed when wet and whether waterlogging was limiting spring pasture growth and utilisation.

Farmers in segments one, two and three (40 per cent of farmers with wet soil problems) generally experience severe waterlogging throughout winter and much of spring. Often more than half of the farm is waterlogged for weeks or months at a time (see figure 2). As a result, they cannot fully utilise pastures in winter or in the spring growth period. Farmers from these segments experience substantial economic

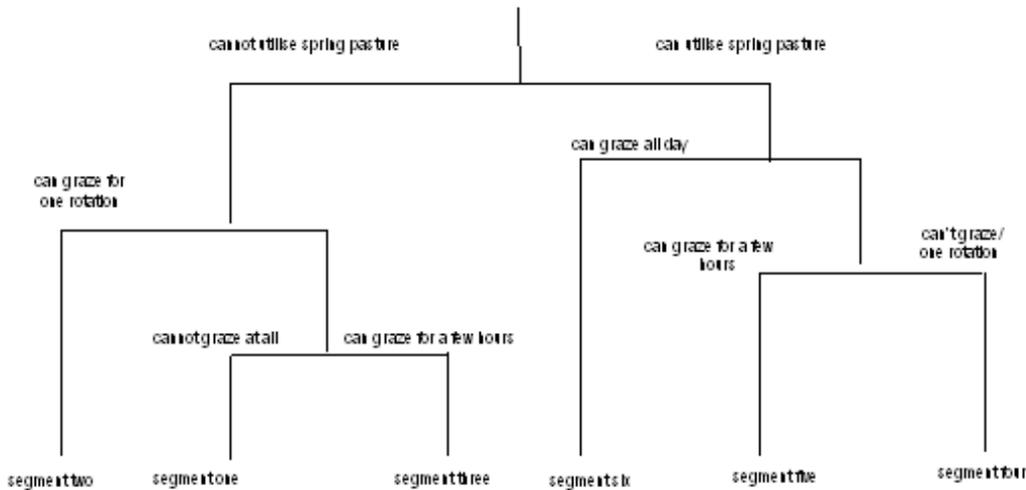


Figure 1. Context segments for sub-surface drainage and on-off grazing.

and lifestyle losses from waterlogging and spend a considerable amount of time and effort trying to manage the effects of waterlogging.

These losses would justify the installation of sub-surface drainage on many farms in segments one and two. The feasibility and viability of such an investment on any particular farm will depend on the soils and topography of the farm, the state of the farm infrastructure, and the availability of labour and capital resources to the farm business. In many instances, farmers may not have been able to establish whether their soils are suited to sub-surface drainage.

Farmers in segments four and five (27 per cent of farmers with wet soil problems) generally experience waterlogging throughout winter but not in spring. Usually less than half of the farm is waterlogged and then for only a few days or a couple of weeks at a time. As a result, although they cannot fully utilise pastures in winter they can fully utilise pastures during the spring growth period. Sub-surface drainage is generally not justified on farms in segments four and five because farmers in these segments can fully utilise spring pastures. These farmers can manage waterlogging through on-off grazing in conjunction with stand off areas. Many farmers in these segments require more information on designs for temporary stand off areas and on the management of on-off grazing and stand off systems.

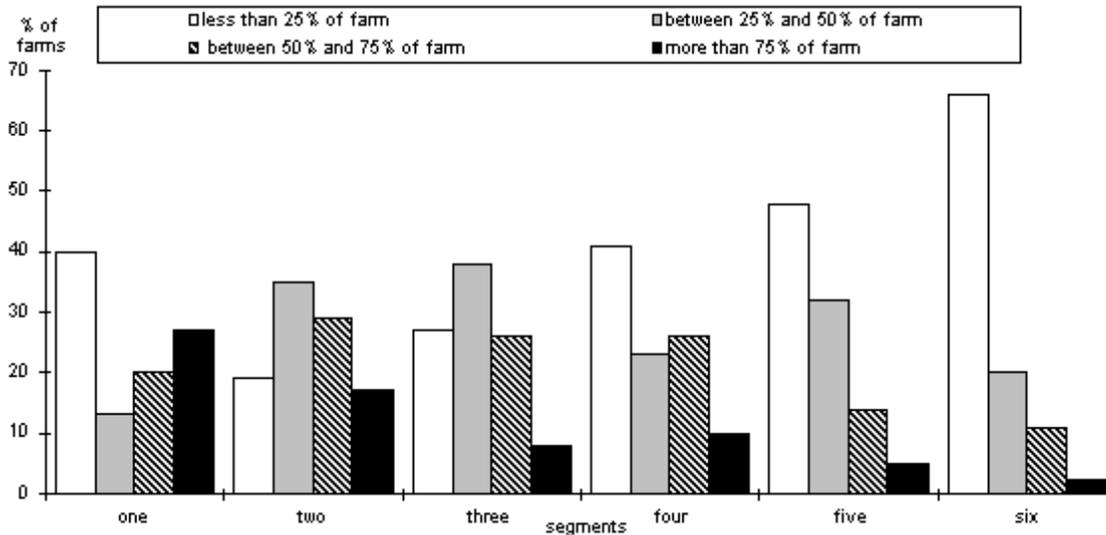


Figure 2. Area of farm subject to waterlogging.

Farmers in segment six (33 percent of farmers with wet soil problems) experience some waterlogging in winter but they can graze waterlogged pastures unless conditions are exceptionally severe.

The segmentation analysis was undertaken using data from respondents who had not installed sub-surface drainage. To test the validity of the segmentation results we allocated the 88 respondents who had installed sub-surface drainage into the segments based on the severity of waterlogging they reported prior to installation of the drainage (see table 1). As expected, a significantly higher proportion of these respondents were classified into segments one, two and three ($\chi^2=17.7$, $p=0.00$).

The most common forms of sub-surface drainage are tile drains (46%), mole drains (38%) and mole drains over tile pipe collectors (27%). No significant differences were detected across the segments in terms of the type of drainage installed. There was no significant variation across the segments in the proportion of farmers who believed their soils were suited to sub-surface drainage.

Table 1 Proportion of segment installing sub-surface drainage.

Segment	1	2	3	4	5	6
Proportion with sub-surface drainage (%):	25.6	20.0	17.0	12.7	10.9	6.1

Two extension strategies have been proposed in order to meet the needs of farmers in the six segments. One strategy will focus on promoting the adoption of sub-surface and surface drainage to neutralise or alleviate severe waterlogging on farms in segments one and two and, to a lesser degree, farms in segment three. The other strategy will focus on promoting the adoption of on-off grazing management practices to alleviate the symptoms of waterlogging on farms in segments four and five, and to some extent, farms in segment three.

Validation interviews were conducted with 30 farmers and confirmed that the extension strategies were relevant to the needs of the farmers in each segment.

CONCLUSIONS

Market segmentation research was used in this study to help develop extension strategies for promoting the adoption of sub-surface drainage and on-off grazing using feed-pads by dairy farmers. This study has shown that the adoption of these techniques is strongly related to contextual factors such as the severity of waterlogging over winter and spring and that farmers can be classified into segments on the basis of these factors. Extension strategies targeting these segments were developed and are being implemented.

The success of this study suggests that market research techniques can be fruitfully adapted to assist in the development of research and extension strategies.

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