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## Goals and management strategies of dairy farmers

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### ABSTRACT

In a study of dairy farm owners from a small geographical region and exposed to similar environmental conditions, management decisions were found to be better described by long-term goals than the commonly assumed goals of productivity and profitability. The assessment was made after analysing physical and managerial data from a two year period that included a period of drought. Farmers were interviewed to establish their long-term goals and the rationale of various farm strategies. Cognitive maps, where important concepts are mapped and linked to illustrate the line of argument, were used to represent visually, farmers goals and rationale.

The long term goals of the 32 case farmers indicated that for 14 of them expansion and development was important; nine were interested in stabilising and economising; nine were looking for ways of reducing their involvement.

These findings are relevant to advisers, who wish to help their client, to industries, whose goals may differ from those of the farmer, and to resource managers, who may wish to see environmental and ethical standards adopted by farmers.

**Keywords:** Farmers' goals, Cognitive mapping, Case study.

### INTRODUCTION

Reading the research and extension literature in New Zealand one would be forgiven for assuming that all farmers are trying to increase production, or, in some instances, profitability. Research on resource usage is conducted at rates that either maximise production, ie levels that are non limiting, or at optimum rates where further input of a resource does not produce an adequate response to cover that input. Similarly agricultural Decision Support Systems assume that profit maximisation is a logical goal. A lot of effort is concentrated on a small part of the production spectrum. However in the few studies of farmers goals that have been carried out, maximum production or profitability does not rank highly.

The obvious approach is to ascertain the purpose of farming systems directly and there is a literature on the goals expressed by agricultural managers. Gasson (1973) in Britain, Smith and Capstick (1976) and Harper and Eastman (1990) in the USA, Cary and Holmes (1982) in Australia all surveyed the goals of farmers. Gasson found that 'independence' and 'country life' rated highly as personal goals and 'producing good crops/livestock' 'leaving land better than before' were important professional goals. Queensland graziers ranked 'safeguarding income for the future' higher than 'maximising income' (Cary & Holmes 1982) while New Mexico small farmers ranked 'quality of life' above 'income' (Harper & Eastman, 1980).

These sorts of surveys are valuable in demonstrating that, as Human Activity Systems, farmers have many and varied goals but as a technique to establish the purpose of a system, as expressed by goals, they have a failing. Being reductionist in their design, these surveys can only prove or disprove the choices offered in the survey. They do not allow for farmers to express their own goals set in their own view of

the world. Limitations of surveying techniques are well known and there are techniques being developed to improve the relevance of the data collected. One of these, cognitive mapping (Eden, Jones & Sims 1983), shows particular promise for small farm systems.

This study made no assumptions about the goals of farmers other than they were purposeful systems. The main objective was to explain their behaviour in rational terms. A secondary objective was to test cognitive mapping as a technique for overcoming observer bias.

### METHOD

The approach taken was to study a group of farmers who experienced a similar physical and social environment. This reduced the number of assumptions made when analysing and comparing farms. A group of owner/operator factory supply dairy farmers was chosen from an area west of Dannevirke. Their income from milk was similar and stable, the soils in the area were similar. There was an average rainfall gradient across the district but again this could be allowed for. The study used the drought of late summer/autumn 1989 as a focus for decisions made on the farm and data were collected for both the 88/89 and 89/90 seasons.

An initial interview was carried out to gather physical, operational and performance data from 32 farmers. Of the thirty-two, twenty-nine made available two years' farm accounts relating to the 1988/89 and 1989/90 years. MAFTech, Dannevirke conducted a financial analysis on the farm accounts. The data included the information on farm resources like land, including farm area, soil type and ownership. Stock numbers and breeds, stocking rates, and information about milking herd size and characteristics, replacement stock, bull beef and sheep production were collected. Also recorded were

farm operations and management practices relating to land and soil, including numbers of milking paddocks, soil testing, fertiliser use, and measuring rainfall, practices relating to livestock and pasture, including changing livestock policies, herd testing, culling, mating and calving, supplementary feeding and off-farm grazing were also recorded.

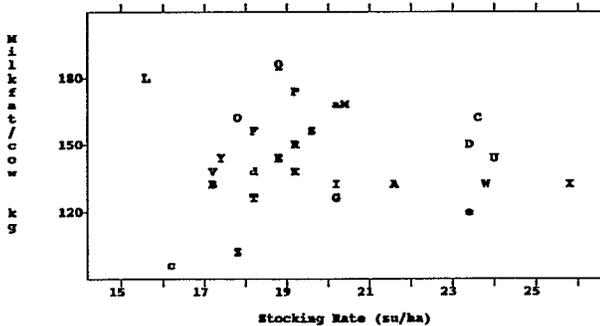
At the second interview each farmer/family was visited for an interview from which cognitive maps were used to generate a goal statement and rationale for management decisions. Cognitive maps, where concepts were mapped and linked to reflect the rationale of the argument, were created for each interview. The technique also uses an opposite or pole for each concept which helps with the interpretation of the maps and avoids the interviewer imposing his/her world view on the events being described.

The two visits provided contrasting interviews. The first being structured around a questionnaire while the second was largely an unstructured conversation about the management of the farm.

**RESULTS**

Production figures showed that the surveyed farms covered a wide range in performance. Milkfat per cow in 1989, a year that became very dry in late Summer and Autumn, varied from a high of 182 kg/cow to a low of 97 kg/cow (Figure 1)

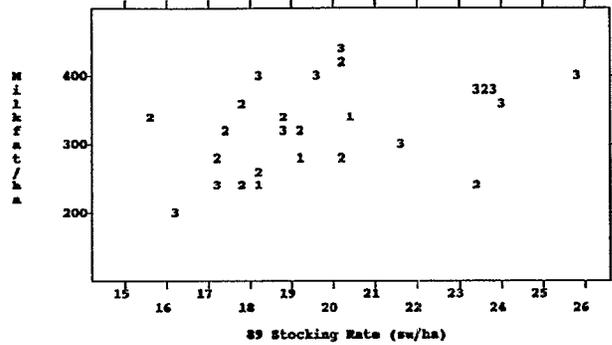
**FIGURE 1:** Milkfat per cow against stocking rate for each farm.



A principal component analysis could not find a combination of management strategies that accounted for either Milkfat Production or Economic Farm Surplus. Neither was there a strong relationship between Milkfat Production and Economic Farm Surplus (EFS). Figure 2 shows milkfat production per hectare plotted against stocking rate for each farm ranked by EFS. The groupings for EFS were: 1 - >\$500, 2 - \$500 to \$1000 and 3 - >\$1000 EFS per hectare. As with production, the EFS showed a wide variation and it was not obviously related to production per hectare.

The second interviews produced statements of how the farmers saw their farm and how it operated. It was possible to recognise long term goals and strategies to achieve those goals, information that was not available from collecting the physical data which represented the allocation of resources and the operational activities of the farm. Of the 32 case farmers interviewed 14 indicated that development of the farm through expansion and improvements as well as contin-

**FIGURE 2:** Milkfat per hectare against stocking rate. The farms are ranked by Economic Farm Surplus where 1 = <\$500, 2 = \$500 to \$1000 and 3 = >\$1000 per Ha.



ued learning and challenges were important. Nine were interested in stabilising and economising and nine were looking for ways to reduce the intensity of their involvement through strategies such as bring on a sharemilker, passing on to family or selling. We made some subjective assessment and ranked these stages of farmers goals and style of operating as follows:

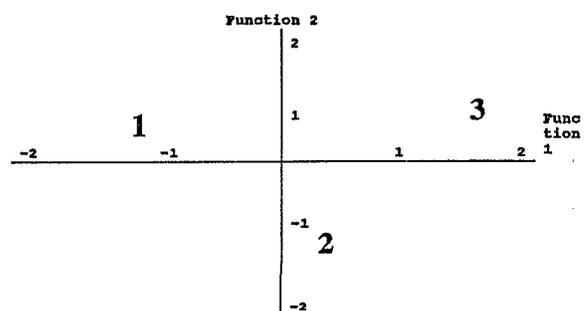
- Stage 1 Period of establishment/expansion
- 2 Period of goal stability/consolidation
- 3 Preparing to relinquish control
- Goals 1 Well formulated and expressed goals...
- to
- 5 Goals not well formulated or expressed
- Measure 1 Objective measurement of on-farm parameters
- 2 Some objective measurements
- 3 Mainly subjective measurements

When these variables were included in a discriminant analysis where 'stage' was used as the grouping variable, a pattern emerged. The two functions could be summarised as:

Function 1: selected variables that reflected older farmers that had been in financial control longer, tended to have higher production per cow (but not per hectare) and made objective measurements of their farms performance.

Function 2: combined variables that featured the availability of a runoff area and the grazing of young and dry stock off farm, tended to have considerable feed reserves and had well formed goals.

**FIGURE 3:** The Canonical Discriminant Functions of the expanding (1), stable (2) and declining (3) involvement by farmers as indicated by goals statements.



The relationship of these functions to 'stage' are given in Figure 3. Not surprisingly those preparing to relinquish control were older and had been longer in financial control. They also had adopted the strategy of grazing stock off farm. Similarly those farmers developing their farm tended to be younger, aim for a higher production per hectare (but not per cow) and have an intuitive style of management. The 'stage' 2 farmers, who were in a steady state situation, were intermediate for function 1 but were negative for function 2. That is they tended to keep the young and dry cows at home, did not conserve large quantities of fodder and had poorly formed goals.

### DISCUSSION

Finding little or no relationship between the physical data collected and the emergent properties of the system, like productivity and profitability, was not unexpected. Wilson (1984) described this phenomena as the 'What/How' problem. It is very easy to observe and measure 'How' a farmer is managing resources, selecting stock policy options etc. but it is much more difficult to deduce 'What' are the reasons for these decisions. For every 'How' there are several 'Whats'. For example a farmer may conserve fodder to increase production, reduce risk or diversify. It is not possible to deduce, with any certainty, the nature of any 'What' from the observed 'How'. The data gathered in the first survey was largely the quantifiable 'Hows' of dairy farming. The qualitative information gathered in the unstructured interview

provided the reasons farmers have for their activities, emphasising that parameters like milk production and profit are means to some end and not an end in themselves.

### CONCLUSIONS

While these results appear rational and do not surprise, there are some important conclusions to be drawn from them. If farmers do have a higher level purpose to farming that may change over time then the interactions that farmers have with their physical and socio-economic environment may be expected to change. Attitudes to advice, technology adoption and peer pressure will change just as will responses to social and financial incentives.

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