Success factors in new crop commercialisation

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Abstract

Attempts to diversify New Zealand's arable agriculture through the development of new crops have been analysed and the critical factors for the successful introduction of new crops have been identified. The major common factor for successful new crop development was a sustained, clear, and positive set of market signals. Involvement in the research and development process of a committed team of marketers and/or processors, producers, and researchers was also important. The influence of risk in agricultural production and the role of research in reducing risk, are also examined.

***Additional key words**: risk, diversification, marketing, onions, durum wheat, green tea, lentils*

Introduction

It is often stated that New Zealand's agriculture needs to be diversified to reduce the risk of dependence on a narrow range of products in a limited range of markets.

For many years producers, exporters, processors and research organisations have attempted to diversify arable agriculture. Despite this effort, there have been few successes and the impact of the successful new crops has been minimal (Wynn-Williams and Logan, 1985). Crop production and export income remains restricted to six major arable species and four vegetables. This paper analyses some of the successes and failures, with the aim of defining the critical factors for success. It also examines the influence of risk, and the role of research in reducing risk.

The information is intended for resource allocators and science managers who now operate in a much more competitive funding environment. In these circumstances criteria for research project funding include scientific excellence, relevance, potential benefits and economic risk. Many previous research proposals for new crops would not have fared well if these criteria had been applied to them.

The Need for Diversification

Cropping in New Zealand is dominated by just six arable crops (wheat, barley, oats, small seeds, peas, maize) and four vegetable crops, three of which are significant in export income (asparagus, onion, and squash) and potatoes which are important on the domestic market. The need for a greater diversity of crops has been sharpened by recent developments in both domestic and international markets. Of particular concern has been the decline over the last five years of cereal commodity trading in New Zealand, due principally to massive world supply surpluses resulting from subsidised production in Europe and North America, and also to restrictive international trade barriers. Depressed world grain prices have had a severe impact on the cropping industries of small nations like New Zealand. Arable farmers in New Zealand have also faced deregulation of the domestic wheat industry, which allows millers to import quality wheat at low world prices, and have had to pay high interest rates for seasonal finance.

New Zealand wheat production has reduced by almost two thirds since 1986 and the rapidly developing barley export trade has also been severely affected with current production returning to 1981 levels due to world supply surpluses and low prices. These crops have been the backbone of the industry, and in response to the production drop, the total cropping area has declined.

Total farm numbers have declined by about 1000 since the mid-1980s and most of that decline has been in the number of arable cropping units (B. Longley, pers comm.). Gross income declined by 18% in the

same period. Total investment in agricultural service industries has also declined markedly in the past six years with the virtual dissolution of the five major stock and station/grain and seed companies.

The Role of Risk

It is accepted that farming is an inherently risky enterprise due to climatic and market variables, but some types of farming are more risky than others. Zwart and Lattimore (1990) analysed the variation in production, export price, on-farm price, and farm income for a number of export commodities. For comparison, Table 1 gives the year to year variation in production, price and farm income over the past 8 years for a range export commodities and arable crops.

While little can be done to counter production variation, which is largely weather-related, there is a wide range of options available to individual growers to influence variation from market sources. Zwart and Lattimore (loc. cit.) commented that "...especially in small or newly emerging markets the producer often faces a choice of marketing arrangements which can have a marked effect on short and medium term risks. Market information in this environment can be extremely valuable in assisting individual producers in making choices. In many cases, including arable and horticultural export industries, there is no clearly established public cash price reporting against which producers can compare alternatives."

Diversification is often recommended as a method of reducing risk, but the analysis in Table 1 suggests that the traditional activities are the most stable, and that new ventures such as lentils or onions have a high risk component. Although data are not available, experience reported by Wynn-Williams and Logan (loc. cit.) indicated that the failure of new cropping ventures could be often attributed to both commercial and agronomic factors. Reassessment of their examples, plus three more recent cases, in terms of apportioning sources or risk, is presented in Table 2.

TABLE 1: Year to year variability in farm production, commodity price, and farm income for a range of products.

Product	Coefficient of variation			
	Production	Export price	Farm price	Farm income
Major export commodities[1]				
Dairy	8.1	13.6	12.8	16.6
Beef	8.0	12.2	15.8	13.8
Lamb	11.5	10.4	18.2	25.0
Mutton	14.5	8.8	23.3	29.6
Wool	2.6	8.7	11.6	8.6
Apples	7.2	9.9	8.1	12.1
Arable crops[2]				
Wheat	7	n.a.	17	21
Barley	6	16.8	10	9
Oats	3	n.a.	6	7
Peas	18	10.4	25	17
Lentils	40	-	20	31
Onions	7	44	-	-

[1] Zwart and Lattimore, 1990
[2] Calculated from NZ Statistics Department data.

The Role of Research

Market risk

It is significant that none of the crops for which market related risks are important have established successfully. The exceptions are triticale and soybeans which are now demanded on a limited basis, due to recent alterations to the domestic market for feed grains. Fortunately, research on cultivar selection and agronomy has already established that these crops can be grown with confidence in defined areas.

The high proportion of new crops which fail due to market factors, often after the investment of consider-

TABLE 2: Principal origin of risk associated with new crop species (after Wynn-Williams and Logan, 1985).

Market risk (little demand)	Production risk (unmet demand)
triticale[1]	durum wheat
adzuki beans	lentils
buckwheat	peanuts
meadow foam	evening primrose
solanum	chickpea
faba bean	radish
rice	japanese tea
soybeans[1]	onions (Canterbury)
navy beans	coriander
amaranth	
guayule	
peppermint	
sugar beet	
sunflower	
oilseed rape	
quinoa	

[1] Recent limited demand for the feed industry.

able research, emphasises the need to improve research investment decision making.

Until the late 1970s research on new crops was often begun with little or no market information available for assessment of market prospects. Now research managers require detailed outlines of market factors at the proposal stage and need to establish stop/go decision points at critical stages in the research and development process to ensure that the investment continues to be justified as the work proceeds.

Production risk

The crops listed in this category in Table 2 include two, durum wheat and lentils, which have been successfully established. The remainder continue to attract research interest due to the sustained, relatively precise market demand signals.

Crown research in new crop development is usually justified in the 'public good' but as competition for limited public-good research funding intensifies, there will pressure for research strategies which will deliver a better 'strike rate' than in the past. Some common success can be identified in the following examples of successful new crop development.

Successful Developments

Durum wheat

The development course of durum wheat as a crop has been well documented by Wynn-Williams and Logan (loc. cit.). There was a very strong need for the processor involved to obtain a substantially improved raw material. At the same time, South Canterbury arable farmers were looking for profitable alternatives in a predominantly dryland area. These needs were recognised by a plant manager, and two scientists who collectively proceeded to investigate, develop, fine tune, and transfer the new technology to user groups. This was often carried out against the expressed wishes of their respective resource managers because of the perceived low priority of the research.

Success was achieved because a clear and sustained market signal guided the collaborative research through a logical sequence and results were quickly transferred into practice. Durum wheat was exempt from the rigid cotrols of the New Zealand Wheat Board, a major factor in allowing market signals to flow directly to producers.

Lentils

The development of lentils has been well documented (Jermyn *et al.*, 1981; Wynn-Williams and Logan, 1985) and although successfully established as an alterative arable crop, the planted area remains small (2000-3000 ha). Success was achieved for reasons similar to those given in the durum example.

Market prices for lentils remained attractive over a long period and agronomic research showed steady, encouraging results from 1972 until on-farm testing commenced in 1978/79. Some spectacularly successful on-farm results generated considerable enthusiasm with one grower and one company grain manager. The combination of processor/exporter, producer, and research staff worked well to advance development to the stage where the grain manager, in an act described as 'lunacy' by some colleagues, offered contracts for lentil production in 1982. Production varied greatly among farmers and seasons, and although the crop remains risky to grow (Table 1), continuing market demand and increased farmer experience has led to the establishment of lentils as a profitable alternative to peas for Canterbury arable farmers on light land.

Japanese tea

In 1979 the New Zealand Government announced the deregulation of the tobacco industry. This had an immediate impact on the livelihood of growers in Motueka and the surrounding districts. At a public meeting attended by more than 300 people, a steering committee was formed to investigate the establishment of an industry based on the production of black tea, *Camelia sinensis* to replace tobacco. This grower group actively pursued the project by contributing time and money, but market signals indicated that production from Eastern Bloc countries meant that the market potential was limited. In 1981, a Japanese importer approached the tea-growers co-operative to investigate the possibility of out-of-season supply of Japanese green tea (also *Camelia sinensis*). This company had a sustained need, and had investigated alternative supply areas without success.

The high level of interest of both parties was almost crushed by major quarantine obstacles. It took a great deal of effort at the highest political levels to overcome the quarantine concerns.

In 1983, DSIR staff at Riwaka commenced investigation into propagation methods with objectives of increasing plant survival and reducing unit cost to an acceptable level. This research was successful, and the close involvement of the Japanese importer and the members of the tea growers co-operative ensured that results were rapidly and effectively transferred into production. The first harvest off 20 ha is due in November 1990, and pilot scale production has

previously indicated that a profitable yield of high quality leaf is readily obtainable.

Onions

Although onions are well-established as a profitable large-scale export crop in the Pukekohe area there is further umet export demand, within certain time and quality constraints. In 1987, arable producers in Canterbury became interested in meeting this need. The data for sources of variation in relation to onions in Table 1 are dominated by production in Pukekohe which accounts for over 90% of the area and production. Variation in onion export price is the highest of all co-efficients of variation listed. However, the high level of market risk, is contrasted with low production risk among experienced producers.

The role of onion research and technology transfer in Canterbury has been to respond to information needs of growers on cultivars and agronomic practices to reduce risk associated with growing a new crop. Although the area of onions in Canterbury is still small (approximately 100 ha), experience from the past season has indicated that profitable yields which meet export quality criteria, can be grown.

Conclusion

The major common factor for successful new crop development was sustained, clear, positive market signals. In addition, the progression from idea to commercialisation involved a united trinity of marketers and/or processors, producers, and researchers.

Information from new crops research has no value in isolation from 'consumers' and producers, and the examples cited above demonstrate that all three contributors are vital to success. It is important to 'stick to the knitting' to maximise use of the best available information.

Most of the 'failures' mentioned by Wynn-Williams and Logan indicate inadequate market analysis.

Strategies to improve the success rate

1: There must be much better scrutiny of market information on new crops. Market potential can be gauged using a hierarchy of minimum data sets, e.g. Level 1 price, volume, timing, product specification; Level 2 (more precise than level 1) packaging, delivery, competitors, market segmentation; Level 3 consumer preferences, trends etc.

2: Objectives of new crop research need to be defined more accurately. Investment decisions on research on new crops are principally concerned with prediction. Nix (1980) argued that prediction of crop performance was an attainable objective but it required substantial changes in prevailing logic and method to be achieved.

Recent changes to science funding and priorities may exert sufficient pressure to move new crop research toward more sophisticated systems and simulation approaches. An outstanding example of this approach is the model of Reisling grapes developed by Hurnard *et al.*, 1982).

3: After likely new crops have been selected on the basis of market information, and excellent science has determined the most probable agro-climatic and socio-economic parameters, determined individuals will still be required to take risks, and probably fight bureaucracy, to ensure success.

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