UNDERSTANDING MANAGERIAL ABILITY CRITICAL FACTORS AND THEIR IMPROVEMENT

Peter L Nuthall

Lincoln University

Most farm managers primarily use intuition when making decisions with only a few managers formally analysing choices with extensive calculations. Furthermore, an assessment of national survey data shows there is a wide range of profit success and consequently managerial ability providing a rich source of information to assess the reasons for the differences in intuition. The real question is of course determining the conditions and factors which give rise to the development of successful managers with their valuable intuition. It then becomes possible to consider ways of improving ability. Any improvement is beneficial to both the nation and the individuals leading to increased efficiency with much the same resource input. Farmer training programmes are the most likely outcome, but the question is over the form they should take.

The research reported in this paper determines these skill factors for a large sample of NZ farmers. The survey sought information on the farmers' early life right through to their experiences as managers. It also gathered data on their personality, objectives, education and training, experiences as well as other demographic information and both financial and physical output.

The information collected was used to develop a structural equation model of managerial ability providing information on the factors creating ability, and their degree of importance. Surprisingly farmers who had a strong desire to 'enjoy farming as a way of life' tended to have high ability. The results also showed inherent intelligence was not as important as might be expected contributing some 8% of ability, whereas, in stark contrast, 'experience' contributed some 67%. Other important factors included 'management style', an expression of a farmer's personality in his approach to management, which explained 16% of ability, and interestingly enough, 9% of ability was apportioned to early parental influences.

The survey also estimated farmer's 'locus of control' being a measure of how much influence a farmer believed he had over outcomes relative to chance factors. This factor was correlated with some of the management style factors and also bore some relation to managerial skill.

All these conclusions lead to the methods of improving a farmer's ability. Clearly enhancing the lessons from experience will be important as they lead to a farmer creating successful intuition. The discussion in the paper explores how both intuition and the influence of the other factors can be improved. As part of this process the attributes of the most successful 30% of the 700 farmer sample were isolated and comparisons made. This data will also be presented.

Key Words: Managerial ability, explaining ability, factors in ability, improving ability, core skills

1 Introduction

By far the majority of farm managers make decisions, and implement them, on the basis of their intuition. Seldom do they carry out a quantitative analysis before acting preferring to rely on their inherent feelings about the correct action. Their intuition, or tacit knowledge, is probably the result of years of experience including observation of the outcomes of past decisions, both their own and those of colleagues and neighbours. Early family influences may also play a part.

March2011 - ISBN 978-92-990056-6-8 www.ifmaonline.org - Congress Proceedings

Surveys (for example Beef + Lamb NZ (2010)) giving the distribution of profit levels per hectare in a similar environment show there is a wide variation between farms. No doubt some of this is due to the farmers having different objectives, but much of the variation is probably due to a range of levels of managerial skill, or different levels of intuitive success. This variation provides information allowing an analysis of the differences between farmers and consequently suggestions on the origins of the differences. The research reported in this paper has resulted in conclusions on these origins for at least the sample of farmers used. This sample was a large one from across all farming types and regions in New Zealand.

The sections that follow summarise the results obtained from several surveys designed to capture farmer attributes and outcomes with a view to explaining managerial ability. The final survey was constructed using information from earlier surveys the analysis of which suggested the factors likely to be important. Logic also provides some ideas which are listed in the next section. The initial surveys were designed to get both farmers' and consultants' views on the important attributes to successful management. Selected results from both surveys are presented and discussed. The paper concludes with ideas on methods of improving a farmer's ability. In the discussion a farmer will be referred to as a male, but in reality there are many female managers so 'his', and its derivatives, should be taken to mean both male and female.

2 Factors Defining Managerial Skill

An obvious factor to consider is intelligence with the idea that the higher the level of intelligence the more likely a farmer will be a successful manager. While most people have been exposed to intelligence tests at some stage in their life, the important question is whether such tests relate to the aspects of intelligence important in management. Nuthall (2010) developed what was called an aptitude test which had various sections (for example memory, shape analysis, calculational skills...) but found the results were not particularly well related to ability. Further work is clearly required in this area.

Education and training is another factor likely to impact on ability. There is considerable research on the value of education (for example Dhungana et al (2004) showed education was strongly related to farming efficiency). The type of education might also be important and, for example, a classical education may not provide an appropriate set of skills.

How a person behaves when exposed to various stimuli is largely dependent on two broad areas. The first is their intelligence, and the second their personality. Consequently a farmer's personality will influence the appropriateness of decisions. Intelligence and personality are both formed from environmental and genetic factors. Intelligence tests need to be designed with the culture in mind as what is suitable for one background will bear little semblance to intelligence if used in a different culture and situation. There is very good evidence that personality is very much a product of a person's genetic makeup and the early enviroment experienced particularly with respect to parental influences (Matthews & Deary, 1998). Modern theory suggests personality is made up of five core factors referred to as openness, conscientiousness, extroversion, agreeableness, and neuroticism. To explore personality in a management context Nuthall (2006) surveyed a large number of farmers and, using factor analysis, came up with a set of attributes making up a farmer's management style. These factors were labelled 'concern for correctness' (equivalent to neuroticism), 'conscientous planning', 'thoughtful creativity', 'community spirit' (similar to extroversion), 'consultative logician', and 'benign management'. The similarities with the five personality factors are clear.

March2011 - ISBN 978-92-990056-6-8 www.ifmaonline.org - Congress Proceedings

Another factor likely to influence 'ability' is the set of objectives a farmer holds, or a set relevent to a farm family situation. In the first instance, the objectives will drive decision making towards outcomes required to satisfy the objectives. In many cases, of course, sustainable profit may not feature as a dominant objective, though there will always be profit aspects important to a comfortable living. The relevant objectives will also influence most other aspects of a farmer's operations. For example, in seeking out training the type and frequency will be influenced by the objectives.

While perhaps related to personality, two other factors are worth mentioning. These are a farmer's attitude to risk, and their belief in how much control they have over outcomes. Some farmers work hard to reduce risk using insurance, avoiding risky products, and the like. Furthemore, the concept of a farmer's 'locus of control' may influence success. A person's locus of control (Kaine et al, 2004) reflects his view of how important the decisions made are to the success of outcomes. At one extreme a farmer may believe uncontrollable factors will have the major force on outcomes no matter what he does . Thus, for example, the weather, disease incidence, and markets will be the important factors in contrast to his decisions. At the other extreme a farmer may believe he is the master of the situation.

Finally, a farmer's level and type of experience is very likely to relate to managerial ability. Age could also be a factor (Dhununga, 2004, found this for efficiency). While simple logic suggests experience is important, there is also good evidence to suggest it should be included (Sumner & Lieby, 1987). It might also be surmised that a range of other factors could be important. For example, job satisfaction might influence keeness and ability, and in a negative way, the stress experienced might be important (Deary et al, 1997). The support from family will also be important, and, of course, technical knowledge and practical ability will both influence outcome success.

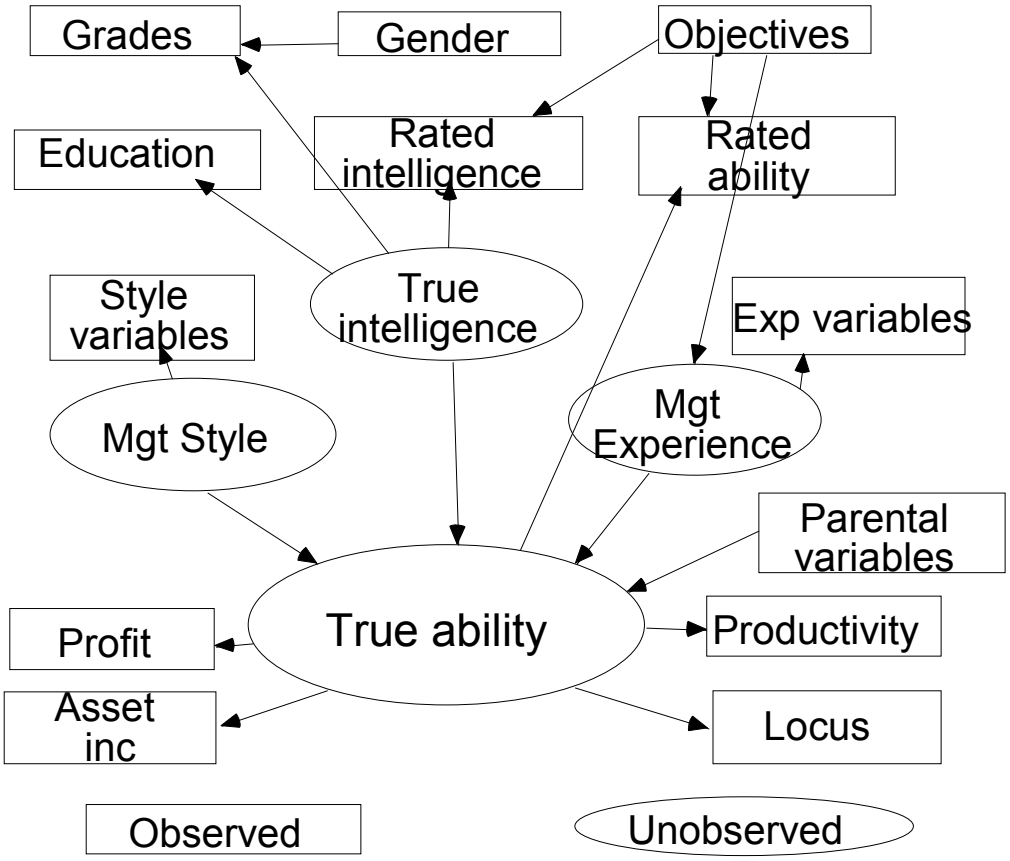
3 Quantifying the Importance of Each Factor

A postal survey of 2300 farmers was conducted to obtain information on all the factors thought to be important. The questionaire contained sections on each farmer's demographics, experience both as a youngster and a farmer, managerial style, goals and aims, forebears, views on magerial approaches (locus of control), profitability, asset value changes, and productivity levels. The question set covered eight pages. The response rate was 43% which is considered good.

To assess all the information a theoretical model was constructed. This had the general form shown in Figure 1.

March2011 - ISBN 978-92-990056-6-8 www.ifmaonline.org - Congress Proceedings

FIGURE 1 Model of managerial ability



This represents what is known as a structural equation model. Each box represents an item of data with the arrows indicating the direction of influence of each item upon another. Furthermore, some items (variables) are not actually observed and must be calculated from the actual observations held. Thus, for example, 'True managerial ability' is not actually observed whereas the outcomes from using the ability are observed. Thus 'Profit' is an outcome of ability, as is the 'Asset value increase', and the level of physical 'productivity'. Similarly, a farmer's 'locus of control' is a result of ability.

Further variables not actually observed include the farmer's true intelligence, management style, and the level and quality of his experience. Thus, these variables are in an ellipse. To estimate their value observable variables resulting from them, such as the farmer's level of education and the grades obtained, are used. For experience a whole host of variables can be obtained such as, for example, the years before becoming a manager, years as a manager, and the farmer's belief in how much he learnt as a teenager living on a farm and so on. For parental influences information such as how often farm financial matters were discussed in family meetings, the types of technical training offered as a youngster, and many others can be gathered. In addition the farmer's view on his own intelligence and

March2011 - ISBN 978-92-990056-6-8 www.ifmaonline.org - Congress Proceedings

managerial ability can be collected ... while these variables need to be taken with some scepticism, if treated correctly they can improve the conclusions. The relationship between them and the farmer's objectives also helps put them into perspective.

Finally, the inherent style a farmer brings to his management can be assessed through the management style tests included in the questionnaire (a set of 25 questions fashioned on the five factor personality model).

The questionnaire also contained question sets to assess a farmer's locus of control (19 question set) and objectives (20 question set). A factor analysis (a statistical method to isolate the core variables behind the locus of control and objectives) showed for the locus of control the core farmer approaches could be called:

'people and luck negativity', 'conservative traditionalist', 'determined despite bad luck', 'careful and determined planner', 'flexible achiever', 'gene based traditionalist'.

For farmer objectives the factor analysis showed the base components were:

'balanced', 'profiteer', 'way of life', 'family supporter', 'risk remover', and 'reluctant farmer'.

Any one farmer will have a mix of these factors some being less important than others. All these factors were measured and built into the structural equation model, as were the style factors mentioned earlier. Full details of the survey, the questionnaire and the data obtained are given in Nuthall (2009).
Using a computer package called AMOS (1999) it is possible to work out the importance of each arrow in the structural equation model and assess each variables' contribution to its successors. Table 1 contains the more important results for what are called the standardised linear regression coefficients. This form removes the impact of variations in the scales used so they can be compared. Effectively the figures give a percentage impact figure for each variables' impact on the target variable as indicated by the arrows in the variable pair definition. The last column of the table indicates whether an increase or decrease in the variable improves the outcome. This column is added as the variable value sign can be confusing due to the scales used. Note that only variables with a coefficient greater than 0.2 (20%) are presented provided their level of significance probability was less than 0.1(10% level of significance). The Obj 1/2/3/4/5/6 variables refer to the objective factors listed above. The variables preceded by 'rated' refer to the farmers' own assessment.

March2011 - ISBN 978-92-990056-6-8 www.ifmaonline.org - Congress Proceedings

Table 1 Model Parameters (coeff >0.2 & sig <= 0.1)

Variable pair and relationship direction	Standardised regression coefficient	Direction for ability improvement
Intelligence -> True ability	0.109	Greater
Style -> True ability	0.232	Greater
Experience -> True ability	0.971	Greater
Obj 1 (balanced) -> Experience	-.202	Greater
Obj 3 (way of life)->Experience	-.541	Greater
Obj 5 (risk r'mver)->Experience	0.656	Lesser
Obj 6 (reluctant …)->Experience	0.470	Lesser
Style -> style 2(conscientiousness)	-.217	Greater
True intelligence -> Grades	0.351	Higher
True intelligence -> Education	0.683	Higher
Age -> Rated intelligence	0.270	Higher
True intelligence -> Rated intelligence	-1.179	Lower
Obj 3 -> Rated intelligence	0.250	Greater
Obj 1 -> Rated ability	0.571	Less
Obj 2 -> Rated ability	-.557	Greater
Obj 3 -> Rated ability	1.593	Less
Obj 5 -> Rated ability	-2.075	Greater
Obj 6 -> Rated ability	-1.460	Greater
True ability -> Rated ability	3.275	Higher
True ability -> Locus	0.434	Higher
Obj 3 -> Profit increase	0.289	Less
Obj 5 -> Profit increase	-.393	Greater
Obj 6 -> Profit increase	-.232	Greater
True skill -> Profit increase	0.609	Greater
True skill -> Productivity	0.250	Greater

The major values to note are the impact of the core variables Management Style, True Intelligence and Experience on true managerial ability. If the coefficients are summed and then each expressed as a percentage of the total coefficient it is discovered that intelligence contributes 8% to ability, management style 16%, early parental influences 9%, and the major factor 'experience' contributes 67% to managerial ability. These results are somewhat surprising, though not altogether unexpected. They clearly point out the critical importance of experience. This does not simply mean having years of practice is important, but rather making careful note of all experiences and learning appropriately from them. This successful use of experience leads to successful intuition for which many experts find difficulty in explaining. All they know is their decisions work successfully.

While not presented here, the significance tests applied to the model showed it was a good representation of the situation and that the results can be taken as being robust. Full details are given in Nuthall (2009 a).

March2011 - ISBN 978-92-990056-6-8 www.ifmaonline.org - Congress Proceedings

Other variables of note include the objective factor 'risk remover' which is negatively related to managerial ability. Effectively if a farmer is a strong risk averter this tends to negate against managerial success. Furthermore, this variable is related to the 'concern for correctness' management style variable (which is in turn highly correlated with the 'neuroticism' variable in the five factor personality model). In contrast a high level of the management style variable 'conscientiousness' is valuable to high ability.
It will also be noted that the 'locus of control' factor is quite highly related to managerial ability. This variable was expressed as a percentage so that a high percentage meant a strong belief in control, and vice versa. The average value for several samples was 67%. For a full assessment of the 'locus of control' concept see Nuthall (2010 a).

4 Further Assessment of the Results

To provide a clear conclusion from the results all the replying farmers were split into two groups after converting the measure of each farmer's 'True Ability' into a percentage score. Farmers with a score of 70% or greater had all their statistics compared with the remainder of the farmers. The mean ability score was 61.3% and the top group with a score of 70% or greater comprised some 25% of the sample. The results of this analysis are presented in Table 2. This shows all variables where the average value for each group was 100% or greater and the level of probability significance was better than 20%. Thus, for example, the average true intelligence for the top group was 104% greater and the last column indicates it is better to have a higher intelligence. The percentage difference figures are given as the scales used for each variable differ somewhat.

As noted earlier the 'concern for correctness' management style variable is very different between the two groups. Also very significant are the objective factors. Clearly to show high managerial ability a farmer must want to achieve at high levels and consequently put the time and energy into learning both from the lessons from experience and all other offerings such as field days, articles in appropriate journals, and the like.

For the types of experience, all categories are significantly important. Details of each type are listed in the table and come from a factor analysis of all the experience variables gathered for each farmer. Of particular note are the first three experience variables which record the influence of a farmer's parents in his early upbringing. It seems it is the lucky farmer that was born into the right family with supportive and helpful parents. Of course, for any farmer the parental influences are history and any future training can only attempt to improve on these early influences. For all the other variables not shown here the full details are given in Nuthall (2009 a).

March2011 - ISBN 978-92-990056-6-8 www.ifmaonline.org - Congress Proceedings

Table 2 Attributes associated with high managerial ability.
Comparison between farmers with 70% or greater ability rating relative to the remainder (> 100% diff & sig >= 0.2)

Variable group	Variable	Percentage difference	Desirability
Latent	Intelligence	104	Greater
Latent	Experience	154	Greater
Style factor	Concern for correctness	374	Lower
Style factor	Conscientious planner	134	Higher
Style factor	Community spirit	129	Higher
Style factor	Consultative logician	129	Higher
Style factor	Benign manager	135	Lower
Objective factor	Balanced	384	Desirable
Objective factor	Profiteer	214	Not desirable
Objective factor	Way of life	503	Desirable
Objective factor	Family supporter	407	Desirable
Objective factor	Risk removal	490	Not desirable
Objective factor	Reluctant farmer (leave)	574	Not desirable
Exp'nce .. parental	Early management exp.	425	Desirable
Exp'nce .. parental	Early practical exp'nce & knowledge	426	Desirable
Exp'nce .. parental	Imagination, observation & people skills help	426	Desirable
Exp'nce .. learning	L'ning from recent past	344	Desirable
Exp'nce .. learning	L'ning from early exp's	413	Desirable
Exp'nce .. learning	Experiencing assistance from colleagues	507	Desirable
Exp'nce .. learning	Speed at learning mgmt	309	High speed beneficial

5 Details of Experience

The results clearly point to the importance of experience, and this is probably reflected by the many farm consultants who will tell you that some of their best farmers do not appear to have high intelligence. They somehow have the knack of making the right decision at the right time. This begs the question over what aspects of decision making is it important to have had useful experiences. A definitive answer will probably require careful observation strategies that take note of the experiences farmers' have and what lessons they learn from each. Very intensive repeat interviews will be necessary over long periods of time.

In the meantime, however, it is possible to consider the results of work obtaining from farmers, and consultants, what skill areas they consider are important. The survey reported above also makes it clear that parents have a useful part to play in developing the next generation of farmers, as do colleagues in providing a sounding board in mulling over past situations (and probably family also).

Nuthall (2006) reports on the list of skills considered important by a large sample of all types of farmers across all regions in New Zealand. Table 3 contains a summary of the core factors considered important.

March2011 - ISBN 978-92-990056-6-8 www.ifmaonline.org - Congress Proceedings

Three were isolated with the constituents listed in Table 3 for the more important items. The figures give the importance percentage of each item to each factor. Thus, 'planning for short and long terms' had a 50% importance.

Table 3 Factor analysis of competencies from all farmer groups (only factor loadings of 0.5 or greater are displayed)

Competency (paraphrase)	Factor One	Factor Two	Factor Three
Observing current state of farm		0.6	
Planning for short and long terms	0.5		
Obtaining planning information	0.6		
Intuitively noting early signs	0.6		
Acting on time	0.6		
Negotiation skills	0.6		
Looking ahead and anticipating	0.7		
Good risk management	0.7		
Early observation of impt. f'tors		0.7	
Keeping a cool head		0.7	
Confidence to conclude and act		0.6	
Learning from experience		0.6	
Developing a good character			0.6
Understanding interrelationships		0.6	
Getting coop of 'ployees/contr'ors			0.6
Successful judge of personality			0.8
Resolving conflicts			0.8
Good relationships off the farm			0.6

It will be noted the skills can be broadly categorised into 'observation', 'anticipation' and 'risk management', and also perhaps, 'human relationships' as well as personal qualities like 'keeping a cool head'. Most consultants would argue that these core skills are all important. It is also clear that management style factors already mentioned feature.

Any farmer would benefit from developing all the skills mentioned. Nuthall(2010) covers the details of all these core skills and provides methods of making improvements. Details of skills like 'active listening', reading, negotiating, imagination, budgeting, deciding relevance, record keeping, visualisation, and many more, are covered. Essentially, the three broad areas of observation, anticipation and risk management are explained through their constituents.

6 Conclusion and Action Points

The structural equation modelling and survey data analysis make the factors contributing to high managerial ability very clear. For any farmer, however, his current level of ability is a product of history. If he is interested in increasing ability attempts at improving, particularly, the lessons of experience, and formal training, must be undertaken. Also of relevance is a farmers current 'management style'.

In the latter case there is good evidence that personality can be changed (Roberts.1997). Such change requires various forms of counselling right from the casual interactions with a consultant on, for example, being more adventuresome and overcoming worries about decisions, through to help from a professional counsellor.

March2011 - ISBN 978-92-990056-6-8 www.ifmaonline.org - Congress Proceedings

For the core skills, training and books are available ... as noted for many farmers the core skills have been acquired simply through taking in the lessons of life. A formal course, can however, improve the skill levels where the basics have not been well absorbed. Furthermore, often short courses are available from community groups on such items as 'active listening'. How often is a farmer accused of 'you are not listening to me'? Clearly, picking up the true messages is absolutely essential for good management.

But probably most importantly, is improving the lessons of experience. In that every farmer has many experiences every day there is an opportunity to learn from this 'university of hard knocks'. This means a farmer should at the very least use his family to review all daily activities and outcomes and, together, come to a conclusion on the lessons learnt. These might relate to practical issues such as sprayer setting, right through to, say, methods of assessing future prices.

Above all, however, reviewing major experiences and decisions with a group of peers and, if at all possible, a consultant, is critical to progress. Perhaps a monthly meeting of trusted colleagues can be organised in which full details are discussed enabling the farmer to review and conclude for future use. This approach will improve a farmer's intuition, that, according to research (Kerr, 1995), is very much a learned attribute. In past eras farm discussion groups played an important role in many areas, particularly in dairying. These need to be reinstated, but at a small group level with trusted colleagues, so they can carefully conduct this decision and experience review task.
Also relevant is the recognition of a farmer's biases. Any decision that is consistently less than perfect means the farmer has one or more decision biases. Typical biases are (full details are given in Nuthall, 2009b, and similarly for many other factors associated with the manager as a human decision maker):

- observational biases,
- forecasting biases,
- decision process biases,
- implementation biases, and
- general biases that might impact on several areas.
- people dealing bias.

Other farmers, and family, can often help a farmer recognise a bias and, having worked this out, the process of correction can start with the help of colleagues and family.

Improving managerial ability is likely to have major benefits. If a farmer can improve productivity and returns by as little as, say, 5% the change will be welcomed by many. The cost is time and, perhaps, the charges associated with short courses and books. But if management improves the benefits will last a lifetime.

March2011 - ISBN 978-92-990056-6-8 www.ifmaonline.org - Congress Proceedings

References

AMOS (Arbuckle, J.L. & Wothke, W.)(1999). User's guide (version 4). Small Waters Corporation, Chicago.

Beef + Lamb NZ (2010) New Zealand farm facts. Publication number P10013. Beef + lamb NZ, Wellington.

Deary, I.J., Willock, J. & McGregor, M.(1997) Stress in farming. Stress Medicine 13(2):131-136

Dhungana, B.R., Nuthall, P.L. & Nartea, G.V. (2004) Measuring the economic efficiency of Nepalese rice farmers using data envelope analysis. The Australian Journal of Agricultural and Resource Economics 489(1):347-369

Kaine, G., Sandall, J., & Beswell, D. (2004) Personality and strategy in agriculture. Proceedings of the 20th Annual Conference, Association for International Agricultural and Extension Education. Dublin, Ireland, pp 790 – 801

Kerr, M.R. (1995) Tacit knowledge as a predictor of managerial success: a field study. Canadian Journal of Behavioural Science 27:1-13

Matthews, G. & Deary, I.J. (1998) Personality Traits. Cambridge University Press, Cambridge, England

Nuthall,P.(2006), Determining the important management skill competencies: The case of family farm business in New Zealand. Agricultural Systems 88(2-3):429-450

Nuthall, P.L. (2009) Managerial factors in primary production: data from a sample of New Zealand farmers with an emphasis on experience as a factor in success. AERU Research Report No. 315, Lincoln University, Canterbury.

Nuthall, P. (2009 a) Modelling the origins of managerial ability in agricultural production. Australian Journal of Agricultural and Resource Economics, 53:413-436

Nuthall, P. (2009 b) Farm Business Management – The Human Factor. CABI, Wallingford, England

Nuthall P.L. (2010) Farm Business Management – The Core Skills. CABI, Wallingford, England

Nuthall, P.L. (2010 a) Should farmer's locus of control be used in extension? The Journal of Agricultural Education and Extension. 16(3):281-296

Roberts, B.W. (1997) Plaster or plasticity: are adult experiences associated with work experience in women? Journal of Personality 65(2):205-232

Sumner, D.A., & Lieby, J.D. (1987) An econometric analysis of the effect of human capital on size and growth of dairy farms. American Journal of Agricultural Economics 69:465-470

March2011 - ISBN 978-92-990056-6-8 www.ifmaonline.org - Congress Proceedings