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Are farmer personality traits associated with farm profitability? Results from a survey of dairy farmers in England and Wales

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ABSTRACT

Although the personality of the manager has been shown to predict performance in many fields, in agriculture, this relationship has not been studied in detail. In the study presented here, 59 dairy farm managers in England and Wales completed psychological assessments; on 40 of 53 measures, farmers were found to be distinct from the general working population norm. Significant correlations to farm profitability for four of the 53 measures were found. Almost 40% of the variation in farm profitability was predicted by a simple linear model with just three of these personality measures: 'Detail Conscious' and 'Leadership' measures positively and, 'Relaxed', negatively, predicted farm profitability. Though observational, and not demonstrating cause and effect, the associations are strong. These three measures are, thus, candidate variables for personality measures that drive farmer and farm manager performance. Longitudinal, or intervention studies, may demonstrate causality in the future. In the interim, being cognisant of these attributes during the hiring and training of farm staff, particularly those with management roles, may well result in improvements in farm profitability.

KEYWORDS: farm profitability; farmer personality; management; talent; performance; psychology

1. Introduction

That more than 40% of the variation in job performance can be predicted by personality and intelligence has been established in numerous meta-analyses and reviews (e.g. Hunter and Hunter, 1984; Schmidt and Hunter, 2004; O'Boyle *et al.*, 2010; Schmitt, 2014). Assessing human attributes has, thus, become a focus in Industrial and Organisational Psychology with General Cognitive Ability (GCA) consistently found to predict more variation in job performance than any other attribute (Reeve and Hakel, 2002). GCA, IQ, 'g' or intelligence is generally described as consisting of two components: fluid and crystallised intelligence (Nuthall, 2001). Fluid (non-verbal) intelligence is thought to be largely genetic, relating to the capacity to solve problems in novel situations. Crystallised (verbal) intelligence relates to learned and cultural intelligence and familiarity with the situation at hand (numerical, verbal and social ability).

Personality has also been found to be generally independent of GCA and to have incremental predictive ability over GCA for job performance (Schmitt, 2014).

Personality, in particular measures from the Five-Factor Model (FFM) of individual personality, has been shown in these reviews of studies from a range of sectors (though not including agriculture) to predict up to 25% of the variation in job performance. This indicates personality is a major predictor of job performance, although coming somewhat behind that of GCA (40%) (Schmitt, 2014).

The Five-Factor Model (FFM)/Big 5 is the predominant personality model in psychology and has surpassed other theories, such as the Myers Briggs Type Indicator, in research contexts. The main components within the FFM are agreeableness, conscientiousness, neuroticism (emotional stability), extraversion, and openness (McCrae & Costa, 1985). Of these, conscientious and emotional stability have been found to be predictors of capability in a wide range of sectors. The remaining three can be important to a lesser extent depending on the context. Openness and agreeableness are advantageous during training for example (Poropat, 2009).

Nuthall (2009) adapted FFM theory to create 25 questions to assess 40 New Zealand farmers' 'management style'.

Original submitted March 2018; revision received October 2018; accepted October 2018.

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Is farmer personality associated with farm profitability?

Following factor analysis, six 'style factors' were identified, two of which aligned somewhat with two of the FFM factors, while four factors did not. Two variables predicted financial performance and are related to conscientiousness. 'Thoughtful creator' was positively associated with profitability and 'concern for correctness' was negatively associated with profitability with an effect size of about 0.1 each.

From an agricultural and farm economics perspective, there is a relatively extensive literature looking at farm characteristics such as size and enterprise mix as predictors of farm financial performance and sustainability. In general, a clear picture emerges that only a proportion of the variation can be explained by these variables, and that the main drivers of this variation are scale, efficiency and market prices (Tey and Brindal, 2015). All three have a relatively well developed associated literature with efficiency, in particular, being a prominent area of discussion (Wilson *et al.*, 1998; Alvarez and Arias, 2004; Barnes, 2006; Johansson and Öhlmer, 2007; Wilson and Harper, 2011). The proportion of variation explained by these variables is surprisingly small, considering the considerable research effort these topics have had, and continue to garner. As Tey and Brindal (2015) showed in a review of studies on the topic of farm financial performance being predicted by farm characteristics alone, statistical significance is not consistently found for most variables and, even then, the direction of the association is not even consistent. Beyond the token inclusion of age and education, a full investigation of the role of farmer attributes as drivers and correlates with farm business profitability is missing from the literature. Conversely, there is a significant core of literature that looks at farmer attitudes, perceptions and motivations which does not include consideration of financial information (e.g. Sutherland and Burton, 2011; Gasson, 1973; Burton, 2004). Given the relative paucity of agricultural research linking GCA, and personality in particular, to farm profitability to date, and the established importance of these attributes in the field of occupational psychology, more research on these topics is likely to be fruitful and to add significantly to our knowledge of the drivers of farm business performance.

Research on these topics in agriculture to date has been curiously modest with a few notable exceptions (McGregor *et al.*, 1996; Austin *et al.*, 2001; Hansson, 2008; Nuthall, 2010). There has been some research on the related topic of attitudes and beliefs (Gasson, 1973; Edwards-Jones, 2006; Mäkinen, 2013; O'Leary *et al.*, 2018). However, this focus on attitudes and beliefs is closer in scope to the well-developed theme of understanding and influencing specific farmer behaviours such as individual practice adoption (Mattison and Norris, 2007; Garforth, 2010; Schroeder, 2012; Jones *et al.*, 2016). The focus of agricultural economists and rural sociologists to date has thus been assessing the data that is readily available in datasets such as those in the European Union's Farm Accountancy Data Network and those farmer attributes assessed when trying to influence farmer behaviour. One set of studies, the Edinburgh Study of Decision Making on Farms, did assess the personality and GCA of farmers in Scotland but did not assess associations between these measures and farm profitability in detail (McGregor *et al.*, 1996; Willock *et al.*, 1999; Austin *et al.*, 2001). McGregor *et al.* (1996) did have a table that indicated that lower GCA farmers were less profitable,

though this was not discussed in detail or followed up in the subsequent publications coming out of the project.

Assessing the personality of managers and staff on farm, and using this information during selection and training may, therefore, be a way to improve farm profitability that is currently not part of the farm management research paradigm. Farm-specific research confirming such findings in general occupational studies would aid the application of these insights in agriculture, and so are likely to improve farm profitability.

This paper, which is inter-disciplinary in nature, drawing on aspects of farm economics, rural sociology and occupational psychology aims to address the paucity of research to date of how farmer personality is associated with farm business performance. A sample of British dairy farmers completed the Occupational Personality Questionnaire (OPQ) (Saville *et al.*, 1996; British Psychological Society, 2016) and the associations between 53 OPQ psychometric measures and farm profitability are reported here using both correlation analysis and linear models. The findings, and their implications for farm management and farm management research, are then discussed.

2. Materials and Methods

Introduction

The objective of the study presented here was to assess the relationship between personality and farm profitability. A sample of dairy farmers in England and Wales had their personality assessed in conjunction with the financial performance of their farm businesses in 2015. In this section, the participants' characteristics, the profitability measure, the personality assessment, and the analysis methods used are introduced and described.

Sample characteristics

Over 180 dairy farm managers and farmers in England and Wales were asked to take part in our study; most were clients of Promar International, and a minority were contacted by DairyCo (now called AHDB Dairy). As such, the sample can be classed as a convenience sample; 59 dairy farm managers and farmers completed a personality assessment resulting in a response rate of 33%. Farmer workload was cited as the most common reason for not participating. Financial data was not forthcoming from three participants, so personality and financial data was only available for 56 of the 59 project participants.

Of the 59 respondents, 40 had independently created farm management accounts carried out by Promar International which provided the financial data for this study. Looking at this sub-sample of 40, it is not especially representative of England and Wales for farm size and system with smaller herds under-represented in particular (Table 1).

Whilst 16 farm managers completed spreadsheets by themselves to calculate their own 'comparable profit', this farmer calculated data was found to be less accurate than the independently calculated data as stronger statistical relationships emerged when using only the independently calculated profitability measures. For this reason, these farm businesses were not included in the profitability analysis resulting in a final sample of 40 for

Table 1: Participant farm businesses’ summary descriptive statistics (N=40)

	Mean	Standard deviation	National average (2015)
Herd size	210	108	141 ¹
CFP ³ /litre	5.3p	5p	4.35p ²
CFP ³ /cow	£390	£353	N/A
Litres per cow	7,362	1,620	7,944 ¹

¹ Herd size, England and Wales, litres per cow, UK (AHDB, 2016a)

² Mostly English reference sample (Vickery *et al.*, 2015)

³ Comparable Farm Profit

Table 2: Example OPQr forced choice question block

	Most like me	Least like me
I like helping people I enjoy competitive activities I view things positively	X	X

the correlation and linear model analysis. For our comparisons between farm managers and the UK population norm, all 59 completed personality assessments were used.

Comparable Farm Profit (CFP) is a measure of profitability used in benchmarking by the levy body that all UK dairy farms are required to belong to, AHDB Dairy. Here it focused solely on the dairy enterprise and involved calculating total profit for the dairy enterprise per litre, per cow and per hectare. In this study, only profit per litre and cow was available to the authors. CFP is derived as follows. From dairy income, variable costs and fixed costs are subtracted plus the profit/loss on any sale of assets to produce what is widely called Farm Business Income. When the value of family or unpaid manual and managerial labour is subtracted, CFP results - in some circles this is called Farm Corporate Income. Rent, whether real or imputed, and finance charges are not deducted to get this measure.

The Occupational Personality Questionnaire

The Occupational Personality Questionnaire TM (OPQ) is a personality inventory designed for use in occupational contexts for selection and training. The themes assessed include relationships with people, thinking style and feelings and emotions. It is based on prominent models from psychology and management (Saville *et al.*, 1996). The OPQ has received an endorsement from the British Psychological Society having been tested for validity and reliability (Smith and Banerji, 2007). OPQ’s incremental validity for predicting performance beyond ability measures has also been established (Bartram, 2013; Furnham *et al.*, 2014). The OPQr was, thus, deemed a suitable tool for the study summarised here where farmer personality was the topic of interest.

Table 2 shows an example OPQr question block. In each block, three statements were presented. Participants then selected the statement most like them and the statement least like them - a forced choice format. This forced choice format helps counteract social desirability bias and is relatively efficient (Brown and Bartram, 2009). The OPQr version employed in this study was the latest version of the OPQ available at the time and takes 25 to 40 minutes to complete. It has a short, forced choice format, with normative properties (British Psychological Society, 2016). The OPQi (ipsative) is similar

but with a forced choice between four options (rather than three) and the OPQn is a normative version. As they are mostly self-explanatory, for space reasons, and the fact that the OPQr instrument is proprietary, descriptions and definitions of every variable assessed are not included in this paper. Much information regarding the OPQ is, however, available from SHL/CEB publications on their website of published literature e.g. Saville *et al.*, 1996; Brown and Bartram, 2009; Bartram, 2013.

The norm population

To calculate scores on these personality measures for the participant farmers, their responses were compared by SHL to a norm population that was a representative of the general working population of the UK’s Commonwealth English speaking countries; this includes people from India and Australia (for example SHL Group Limited, 2011). People from all socio-economic, educational and occupational backgrounds were included in this norm population as detailed below:

‘The OPQ32r international ‘general population norm’ is a work population norm, drawn from country-specific (or regional) work population norms (CEB, 2011-2012) that include people actively seeking employment and those in employment; it is therefore a generic norm of people who can be employed, including people not currently in employment, students, and graduates (with varying employment length and all education levels).’ (SHL Group Limited, 2015)

The characteristics of the norm population are detailed in the technical manuals available online from the SHL/CEB website (SHL Group Limited, 2015). The main population norm characteristics of note that contrast with average dairy farmers in England and Wales are as follows:

- A gender ratio of 61:39 male to female; farmers in England and Wales are 95% male (Wilson *et al.*, 2013);
- 37% of the norm population were 29 or younger and only 6.7% of the norm group were over the age of 50; the average age of dairy farmers in England is 51 (Farm Business Survey Team, 2012);

Table 3: Likelihood of having a particular competence by STEN score

STEN score	1	2	3	4	5	6	7	8	9	10
Competence likelihood	Unlikely		Less likely		Average		Quite likely		Very likely	

- 32.6% of the norm population had postgraduate degrees; this is much higher than farmers in England and Wales at about 3% (Wilson *et al.*, 2013); and
- only 40% of the norm population had managerial responsibilities; this can be compared to all the participants of this study having such responsibilities.

Though this may not be the most ideal comparison, it functions well as a reference. In addition, other population norm comparisons were not available for the study reported here. For example, a comparison with managers or sole proprietors would also have been informative.

A total of 53 psychological variables were extracted from the individual farm managers' assessments. These measures were calculated by SHL against the norm population and presented as STEN (standardised ten) 'scores' in reports for each of the participants (Table 3). Each score indicates how likely the respondent has a particular competence/trait compared with the norm population. Mean STEN scores for the norm population are, by definition, 5.5 and have a standard deviation of 2 for the norm population (Macnab *et al.*, 2005). These STEN scores were extracted from the individual participants' reports and comprise the independent variables used in the study reported here.

Analysis methods used

To compare the participants' scores with the population norm mean of 5.5, one-sample t-tests were performed using R function 't-test' specifying 'two-sided' and mu of 5.5 (R Core Team, 2013). To assess the relationship between personality measures and profitability, a Spearman's rank correlation analysis was performed. To assess the relative importance of variables correlated with profitability, linear regression was also carried out. The 'cor' and 'lm' functions in R statistical software were used for this (R Core Team, 2013).

3. Results

Introduction

In this section, the results of three types of analysis are presented. First, the scores of the study farmers and farm managers are compared with the reference norm sample using one-sample t-tests. Second, correlation analyses between personality measure STEN scores with litres of milk produced and profitability measures are reported. Finally, two linear models predicting profitability are presented.

Comparison with norm population

As the OPQ reports measure participants as STEN scores, for comparison purposes, the mean of the norm population described above for each measure is, by definition, 5.5. Table 4 reports the contrasting mean scores for farm managers, the standard deviation of the farm manager sample, and the p-value indicating if farmers' scores were statistically distinct from the norm

population (UK English speaking general working population). For 40 of the 53 measures, the farm managers' scores differed significantly ($p < 0.05$); 33 of 53 differed at the stricter threshold of < 0.01 and 23 at < 0.001 .

For example, farm managers scored lower on Conscientiousness and Detail Conscious measures but higher on Modest and Independently Minded compared with the norm sample.

Correlations with profitability

Four personality variables had large and significant correlations with both profit of the dairy farm business per cow and profit per litre. As shown in Table 5, these were Detail Conscious, Leadership, Relaxed and Conscientiousness measures.

Profitability linear models

This study reported here set out to identify variables predictive of CFP per cow and per litre. To this end, linear models to predict variation in these two variables were developed using the personality measures most correlated to these profitability measures.

An initial model was created with these nine variables most correlated to profitability shown in Table 5. The least significant variable was then removed and the model re-run. This procedure was iterated until all the remaining variables were statistically significant, similar to the stepwise procedure used by Vandermersch and Mathijis (2004). Models with an adjusted R^2 of 0.41 for profit per litre of milk and 0.38 for profit per cow resulted. The same three variables emerged in predicting both outcomes: Detail Conscious; Leadership; and Relaxed (see Table 6 and Table 7).

A high scorer for Detail Conscious 'focuses on detail, likes being methodical, organised and systematic'. A low scorer can be described as 'unlikely to become preoccupied with detail, less organised and systematic, dislikes tasks involving detail'. High scorers were much more profitable. Scoring one STEN score higher on this measure (half a standard deviation) was associated with £72 per cow or 1p per litre of milk greater CFP per year.

A similar change in Leadership score was found from the modelling to result in a £55 per cow, or 0.8p per litre of milk, change in profit per year. Leadership is described as 'Inspiring and guiding individuals and the group. Leading by example and arousing enthusiasm for a shared vision'. Finally, Relaxed was negatively associated with profit with each STEN score increase associated with a negative change in profit of £49 per cow and 0.6p per litre of milk. A high scorer on this is likely to be described as: 'finds it easy to relax, rarely feels tense, is generally calm and untroubled'. A low scorer 'tends to feel tense, finds it difficult to relax, can find it hard to unwind after work'.

Only the personality measures derived from the OPQ were included in this analysis of financial performance, as that was the focus of the study.

Table 4: Comparison of farm managers with the population norm on personality scores¹, ordered by farm manager mean upwards (N=59)

	Farm managers mean	Farm managers Std Dev	p-value
Conscientiousness	3.4	2	<0.001
Detail Conscious	3.6	1.9	<0.001
Conscientious	3.6	2.1	<0.001
Service Orientation	3.8	1.8	<0.001
Building Bonds	4	2.1	<0.001
Achieving	4	1.8	<0.001
Rule Following	4.1	1.9	<0.001
Behavioural	4.2	1.9	<0.001
Understanding Others	4.3	2.1	<0.001
Persuasive	4.3	1.6	<0.001
Caring	4.3	2.1	<0.001
Emotional Awareness	4.4	2.1	<0.001
Communication	4.4	2.1	<0.001
Innovative	4.4	1.8	<0.001
Accurate Self Assessment	4.5	1.8	<0.001
Achievement Drive	4.5	1.8	<0.001
Organisational Awareness	4.5	2.1	0.001
Persistence	4.6	2.2	0.003
Influence	4.6	1.9	0.001
Change Catalyst	4.6	2.1	0.002
Developing Others	4.6	2	0.001
Teamwork and Collaboration	4.6	1.9	<0.001
Leadership	4.7	2.1	0.005
Affiliative	4.7	2.1	0.003
Socially Confident	4.7	2	0.003
Democratic	4.7	2.5	0.015
Evaluative	4.7	1.9	0.002
Conceptual	4.7	2.2	0.011
Variety Seeking	4.7	2.1	0.006
Adaptable	4.7	1.7	0.001
Initiative	4.8	2	0.009
Outspoken	4.8	2.1	0.017
Self Confidence	5	1.9	0.045
Data Rational	5	2	0.049
Conflict Management	5.1	1.7	0.083
Controlling	5.1	1.9	0.148
Outgoing	5.2	2.1	0.34
Optimistic	5.3	2.1	0.55
Decisive	5.3	2.1	0.41
Adaptability	5.4	2	0.675
Relaxed	5.4	2.5	0.732
Competitive	5.5	2	0.869
Forward Thinking	5.6	1.8	0.694
Tough Minded	5.7	2.3	0.515
Trusting	5.7	2	0.423
Vigorous	5.8	1.8	0.265
Conventional	5.9	2	0.105
Worrying	6	1.9	0.059
Self Control	6.1	2.1	0.024
Consistency	6.2	1.4	<0.001
Modest	6.5	1.9	<0.001
Emotionally Controlled	7	2.2	<0.001
Independent Minded	7.2	1.7	<0.001

¹ One sample t test, two tails, n=59; being STEN scores, the reference population has a mean of 5.5. Ordered by mean STEN score upwards

4. Discussion

Introduction

Farmers were found to be distinct psychologically from the population norm of people available to work in UK English speaking countries with 23 out of 53 variables being significantly different at the <0.001p-value threshold (see Table 4). This could well have been expected as farmers and farm managers are quite different in many regards from the general working population of UK English speaking countries used as the comparative

population norm. Of note, however, is that participants, in general, scored lower than the comparative population norm used.

Farm managers scored a standard deviation lower on the Detail Conscious personality variable (mean =3.6) compared with the norm population (5.5). This indicates farmers and farm managers are much less likely to focus on detail, be methodical, organised and systematic compared with the population norm described in the Method section above and relative to many of the other measures assessed. Farmers are generally their own ‘bosses’, perhaps

Table 5: Profit of dairy farm businesses and farm manager personality correlation (n=40)

	Rho	p-value	Rho	p-value
	profit/litre		profit/cow	
Detail Conscious	0.48	0.00	0.45	0.00
Leadership	0.46	0.00	0.43	0.01
Relaxed	-0.35	0.03	-0.37	0.02
Conscientiousness	0.35	0.03	0.33	0.04
Controlling	0.30	0.06	0.29	0.07
Democratic	0.29	0.07	0.26	0.11
Social Skills	0.29	0.07	0.24	0.14
Conscientious	0.26	0.10	0.26	0.10
Self-Control	-0.21	0.19	-0.29	0.07

Table 6: Profit per litre on survey farms predicted by personality variables (N=40)

	β	Estimate	Standard error	t-value	p-value
(Intercept)		1.03p	2.16p	0.47	0.638
Detail Conscious	0.40	1.00p	0.31p	3.22	0.003
Leadership	0.34	0.79p	0.29p	2.72	0.001
Relaxed	-0.31	-0.61p	0.24p	-2.49	0.017

$R^2=0.48$, Adj $R^2=0.41$

Table 7: Profit per cow on survey farms predicted by personality variables (N=40)

	β	Estimate	Standard Error	t-value	p-value
(Intercept)		£137.66	0.477	-1.554	0.129
Detail Conscious	0.38	£71.84	0.069	2.994	0.005
Leadership	0.31	£54.67	0.064	2.449	0.019
Relaxed	-0.32	£-48.72	0.054	-2.596	0.014

$R^2=0.43$, Adj $R^2=0.38$

explaining this difference from the reference population who are generally, employees. A comparison with managers in other sectors would have been insightful in this regard. Leadership was the other positively related variable and those studied had a mean of 4.7, just less than half a standard deviation lower than the norm population.

Farmers and farm managers were found to have a similar mean score for Relaxed to the norm population (5.4), and this measure was negatively associated with profitability. High scorers on Relaxed are likely to be less proactive in preventing problems as they probably can tolerate problems when they arise. The more anxious and worried manager, scoring lower in the Self-Control and Relaxed personality variable, goes out of their way to prevent such occurrences.

The remainder of this section discusses these findings in more detail. First, each of the three variables included in the profitability models are discussed and interpreted in more detail. Observations regarding the data sources, possible future research and some weaknesses of the study described here are then discussed.

Detail conscious

The Detail Conscious measure relates positively to profitability. A high scorer 'focuses on detail, likes being methodical, organised and systematic'. A low scorer is 'unlikely to become preoccupied with detail, less organised and systematic, dislikes tasks involving detail'. However, the sample of dairy farmers assessed had relatively low scores compared to the other competences assessed and the comparative norm population used in this study.

Half of the farmers and farm managers had STEN scores of three or below. The median dairy farmer in the sample was, thus, at least a standard deviation less Detail Conscious than the norm population.

Potential explanations include that many farmers may only have worked for family members before becoming managers themselves, and that family owned and managed farms provide a job security that is likely to reduce incentives for the Detail Conscious behaviour expected in other contexts. Further research, both quantitative and qualitative, may thus be required to understand this finding fully. However, farming does not preclude Detail Conscious behaviour as several high scorers were observed in this study. These farmers tended to have much more profitable farm businesses.

The correlation of $\rho=0.48$ indicates that the Detail Conscious measure of farmers and farm managers covaries with approximately 24% of the variation in profit. This is the largest correlation found in the study reported here. The regression model indicates that a change in STEN score of just one (half a standard deviation in the norm population) predicts a change in profit per cow of £71. Assuming a 150 cow herd, the UK average (Ashbridge, 2014), this implies over £10,000 profit differential a year for a single STEN point change in managers' scores. As a result, the relationship between Detail Conscious behaviour and profitability should be communicated to farmers and farm managers along with the finding that it is far from the norm found in the industry.

Starting from a low base of 3.7, and with the largest single correlation observed in the study, this offers the

greatest potential return for achieving farm financial performance improvements. If farmers and farm managers could become more Detail Conscious, large improvements in performance may follow. The models suggest that effecting a two or three point change in this score could have large benefits. As a consequence, expending effort to achieve this is likely to represent a good return on investment for farmers and farm managers.

Conscientiousness and related measures

Here we outline the differences between Conscientiousness, Conscientious and Detail Conscientious measures discussed in this study. Conscientiousness is one of the five factors constituting the Five Factor Model (McCrae and Costa, 1985), also known as the Big Five or NEO five. The scores Conscientious and Detail Conscious exist within the 'Conscientiousness' factorial space (Brown and Bartram, 2009). Conscientious and Detail Conscious, therefore, measure specific aspects of 'Conscientiousness'.

The broader measure, Conscientiousness, is described as 'Taking responsibility for personal performance. Meeting commitments and adopting an organised approach to one's work'. Possessing this measure correlated with profit per litre, and per cow, significantly (0.35 and 0.33). In contrast, a high scorer for Conscientious, an aspect of Conscientiousness, is described as someone who 'focuses on getting things finished, persists until the job is done' and a low scorer as someone who 'sees deadlines as flexible, prepared to leave some tasks unfinished'. Conscientious correlated (0.26) to both profit measures but was not statistically significant ($p=0.10$). Having compared these three measures (Detail Conscientious, Conscientious and Conscientiousness) it appears that it is the attention to detail aspect, rather than completing and finishing that is most associated with profitability.

Leadership

Leadership is described as: 'Inspiring and guiding individuals and a group. Leading by example and arousing enthusiasm for a shared vision'. The important role of Leadership in farm profitability is, for the first time, supported empirically among farmers and farm managers by our findings. The regression models predict that, if two farmers only differed in their Leadership measure by one STEN score, half a standard deviation, the one that scored higher would achieve £55 more profit per cow or just under £8,000 more per year for a 150 cow herd.

Relaxed

The variable Relaxed had a large negative correlation with profitability, and was included in the final models. A high scorer on the Relaxed measure 'finds it easy to relax, rarely feels tense, is generally calm and untroubled' and a low scorer 'tends to feel tense, finds it difficult to relax, can find it hard to unwind after work'. A constant drive to succeed manifests as tenseness and an always-on approach appears beneficial in dairy farming, financially at least. This finding was somewhat contradictory to expectations. Relaxed exists in the factorial space of Emotional Stability (Bartram, 2013), which is thought to be an important positive predictor of performance, in general, while these results indicate that some aspects of

Is farmer personality associated with farm profitability? emotional stability are not beneficial from a farm financial perspective.

Data quality and future research

Future research in this area should include the OPQr, or alternative psychological inventory, a reputable GCA measure and quality financial data with a larger fully representative sample and with varying populations of farmers. Controlling for business size may also be advisable. The OPQr instrument has been proven to be effective for use with farmers and farm managers. However, non-proprietary alternatives should be considered. The OPQs' opaqueness, due to its proprietary nature, is a significant impediment from a research perspective and it would be relatively expensive for farmers and farm managers to use the tool themselves. This is likely to reduce potential benefits from the application of the findings in practical contexts.

5. Conclusions

Three personality measures predicted around 40% of the variation in farm financial performance in a relatively small sample of 40 dairy farmers and farm managers in England and Wales over 2015. A wide range of scores on these variables existed among the farmers and farm managers, and the mean scores of some key attributes are distinct from the national norm population used for comparison in the study summarised here. Hiring and training of farm managers, and other farm staff, is likely to be improved by increased assessment of such personality measures in the process. Training providers, farm consultants and farm managers should also consider how to achieve this.

Increasing Detail Conscious behaviour is the most exciting opportunity arising, as there appears to be a need to increase this beneficial trait from a low base among dairy farmers and managers in England and Wales. The effectiveness of training at targeting Detail Conscious behaviour, and Leadership, at improving farm business financial performance also requires more investigation. Further research, with larger, more representative and diverse samples of farmers and managers from sectors other than dairying focusing on Detail Conscious, Leadership and Relaxed measures is required to verify the very promising, and rather innovative, findings of the study presented here.

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Acknowledgement

The data used in this paper were originally collected for a project by Promar International for AHDB Dairy, focusing on the Emotional Social Intelligence of farmers. The role of Neil Adams of Promar International and James Hanbury of Exeter Leadership in the original project, made this paper possible, and is acknowledged with much gratitude by the authors. Whilst the original project was in progress, the lead author was employed on a parallel project which received support from the Knowledge Transfer Partnership's programme, overseen by Innovate UK (Swindon), the UK's innovation agency which is supported by 16 other public sector funding organisations.

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