Associations of stockpersons' personalities and attitudes with performance of dairy cattle herds

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ABSTRACT: We collected questionnaires from 128 stockpersons on 31 Czech dairy farms with the aim to examine three questions: (i) whether the stockpersons' personality profiles, their attitudes and beliefs about cows, and their age/experience were related to farm performance indicators such as milk yield per standardised lactation, culling of cows or costs of veterinary treatments; (ii) whether stockpersons' personalities and attitudes were related to their age, gender and duration of their experience with cattle; and, (iii) how the personality traits of stockpersons differed from the same traits in the general Czech population. The NEO Big Five Personality Inventory questionnaires were used to describe the personalities of the stockpersons in five dimensions: neuroticism, extroversion, openness to experience, agreeableness and conscientiousness. The attitudes towards cows were examined using a custom-made questionnaire. Attitudes towards cows, as measured by our questionnaire, were unrelated to farm performance. Farms with more neurotic stockpersons had lower milk yields per standardised lactation (r_S = –0.38, P < 0.05, n = 31) and higher veterinary costs (r_S = 0.40, P < 0.05, n = 30) and farms with more conscientious staff had lower veterinary costs (r_S = –0.37, P < 0.05, n = 30). Farms with older stockpersons had higher milk sale prices (r_S = 0.53, P < 0.01, n = 31) and lower veterinary expenses (r_S = –0.43, P < 0.05, n = 30). On the level of individual stockpersons, longer history of working with dairy cattle was related to lower neuroticism (r_S = –0.25, P < 0.01, n = 128). Female stockpersons were more neurotic (P < 0.05) and more agreeable (P < 0.01) than male stockpersons. Stockpersons were substantially less extroverted (P < 0.001), substantially less open to experience (P < 0.001), somewhat less agreeable (P < 0.05) and somewhat more conscientious (P < 0.05) than the average of the Czech population. In conclusion, this study suggests that stockpersons differ in their personalities from the general population and that their personality profiles (but not attitudes towards the animals) might affect dairy farm performance.

Keywords: dairy cows; dairy farms; human-animal relationship; personality traits; NEO Big Five; attitudes; vocational choice

Routine management practices used in the dairy industry result in a significant amount of contacts between stockpersons and cows. Some researchers suggest that the quality of the human-animal contacts may influence the productivity and health status of the herd (Breuer *et al.*, 2000; Hemsworth, 2003). Although the mechanisms of such relationship have not been fully elucidated yet, there is evidence that the presence of an aversive handler can increase the quantity of residual milk remaining in the udder, thereby reducing milk yield (Rushen *et al.*, 1999). The interaction between an aversive stockperson and an individual cow need not be limited to a single affect only but it may initiate a cascade of events throughout the herd since cows change their behaviour after observing the negative reactions of their neighbour cows (Munksgaard *et al.*, 2001). Moreover, the olfactory cues from a stressed companion can also influence the behaviour of the remaining animals in the herd (Boissy *et al.*, 1998). Exposure to human aversive behaviour has been shown to affect the future milk production

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of female calves; calves are able to discriminate between "friendly" and "aversive" stockpersons from an early age (de Passille *et al*., 1996).

Human behaviour is determined to a large extent by personality (Costa and MacRae, 1986) and attitudes (Ajzen, 1988). Consequently, a sequential causal chain has been proposed beginning with the stockpersons' personality profiles and thus attitudes influencing their behaviour towards cows which in turn will affect cow fearfulness resulting in impaired milk performance and cow health status (Waiblinger *et al*., 2002; Hemsworth, 2003). Currently there is limited evidence supporting individual parts of these hypothetical causal links. Seabrook (1972; 1980; 1984) reported effects of human personality traits on milk production; concluding that stockpersons on high producing dairy farms tended to be introverted and confident. Moreover, stockpersons with positive attitudes had a lower use of negative tactile interactions (Hemsworth *et al*., 2000), which in turn may be related to higher milk production (Breuer *et al*., 2000).

If stockperson personality does affect farm performance, it would be of interest to know whether the average personality profile of dairy farm stockpersons differed from the average of the general population in this country. To our knowledge, no rigorous study on this subject has been published.

Another interesting question for dairy farm managers is whether the age and/or duration of working experience with dairy cattle can affect the performance of the herd: specifically, are older caretakers/more experienced caretakers more careful or skilled or do attitudes towards animals change with age as it was suggested by Driscoll (1992). Some authors reported that the rate of neuroticism, extroversion and openness personality traits decreased with age, which is in contrast to agreeableness and conscientiousness whose rates were reported to increase with age (Costa *et al*., 2004).

The objectives of this study were: (1) to assess the relationship between personality traits, attitudes, age and experience of stockpersons working with a dairy herd and the productivity and health indicators of that herd; (2) to examine the relationship between individual stockperson's gender, age and experience, as well as her/his personality traits and attitudes; and 3) to compare personality traits in a sample of stockpersons on Czech dairy farms with the same traits of the general Czech population.

MATERIAL AND METHODS

Farms

Thirty-one dairy farms in Central Bohemia (within 90 km of Prague), each having 3–10 (median 4) stockpersons, were involved in this study. Herd size ranged between 80 and 688 (median 125) cows. Farms had hybrid populations of Czech Pied cattle × Holstein cattle with an average milk yield of 6 436 ± 1 481 (s.d.) kg per standardised lactation. The large between-farm variability in herd size and milk performance was representative of farms in the geographical area. One hundred and forty-one Czech stockpersons were asked to respond anonymously to two questionnaires (see below) and 31 farm managers were asked to respond to another type of questionnaire. Thirteen stockpersons failed to respond to the questionnaire properly; for example they chose the same point on the scale for all questions in the questionnaire. Hence a total of 128 stockperson responses were used in the analyses, which included 109 women (85%) with a mean age of 43.9 ± 5.3 (s.d.) years who had worked on average 18.2 ± 6.1 years with dairy cattle. Each farm manager provided a response. The data collection was accomplished during the year 2001.

Questionnaires

The first questionnaire was designed to obtain information regarding the personality characteristics of the stockpersons while the second gathered information concerning their attitudes and beliefs towards cows. The third questionnaire was directed towards the individual farm managers and was designed to made available information concerning the performance and health status of the herd.

The personality inventory

For the assessment of the personality traits, the short version of NEO Big Five Personality Inventory (PI) adapted from Costa and McCrae (1992), Hřebíčková and Urbánek (2001) elaborated the valid Czech standard used in this study. The short version NEO Big Five PI is a personality profile measured in five dimensions: "neuroticism", "extroversion", "openness to experience", "agreeableness" and "con-

scientiousness". This personality inventory is composed of 60 self-description statements, 12 for each dimension. Respondents were asked to assess individual statements using a 5-degree scale, ranging from 0 ("fully agree") to 4 ("fully disagree"). For each person, the average score from the 12 questions belonging to a dimension was taken as the quantification of that personality trait.

The attitude questionnaire

This questionnaire assessed the attitudes and beliefs of the stockpersons towards dairy cows. The questionnaire comprised 40 questions measuring five aspects of the stockperson-cow relationships: (1) stockpersons' general attitude towards dairy cows (GenAttitude), measured by questions such as "Are dairy cows intelligent?"; (2) stockpersons' emotional reactions towards dairy cows (Emotion), measured by questions such as "Are you afraid of aggressive dairy cows? "; (3) stockpersons' behaviour towards cows (HumanBehav), measured by questions such as "Do you praise the cows in voice?"; (4) dairy cows' behaviour towards stockpersons (CowBehav), measured by questions such as "Do you think that the dairy cows perceive your mood?"; and (5) the handling ease of the cows attended by the stockperson (Easiness), measured by questions such as "Are the dairy cows obedient?". Each item was rated on a 5-point scale ranging from 0 = "I do not agree at all" to 4 = "I agree entirely". The evaluation started with reversing the order of the scale for those questions that asked about negative beliefs or attitudes to the animals; thereby, attaching the highest score to the most positive (or least negative) answer. Final scores for GenAttitude, Emotion, CowBehav, HumanBehav and Easiness were then acquired by summing up the scores of all questions in each respective area.

The farm profile questionnaire

In this questionnaire we asked the farm managers for the following data (based on the performance of the farm during the last 12 months before our visit): the proportion of Holstein breed genotype in the herd, mean milk yield per standardised lactation, average price at which milk was sold (an indication of milk quality), percent of dairy cows culled per year, mean age of the herd (counted as the number of lactations), mean costs of veterinary care per dairy cow and year.

Confidentiality of project objectives

The detailed objectives of the study were not revealed to the participants until the questionnaires were completed. The second phase of the study, which involved the application of the personality tests, was completed anonymously and only on individuals who gave consent. Ethics approval was obtained for the psychological tests and the stockpersons were debriefed at the end of the study.

Statistical assessment

In order to assess the relationships between stockpersons' traits and farm performance, the personality scores, attitude scores, and age/experience variables were averaged over all stockpersons on each farm. These farm means were correlated with dairy cow mean milk yield per standardised lactation, percent of dairy cows culled per year, mean number of lactations, average milk sale price and mean costs of veterinary care per cow per year. The presence of a non-normal distribution of some of the variables required the use of Spearman correlations.

Prior to calculating the correlations two adjustments to the raw data were made. Firstly, preliminary analysis indicated that the prevailing breed type affected several of the farm characteristics, e.g. both milk yield per standard lactation and proportion of culled cows were higher on farms with the prevailing Holstein genotype. Therefore, the effect of prevailing genotype was removed from all dependant variables through a SAS GLM procedure and the residuals were taken into the correlations. Secondly, the exclusion of one outlier farm (its value lying >3 s.d. from the mean) in each of the following variables: percent of dairy cows culled per year, mean number of lactations, and mean costs of veterinary care per cow and year resulted in lowering the number of farms for some correlations to 30.

The relationship of age and experience with the personality and attitude traits were tested using Spearman correlations. In this assessment the residuals of individual stockpersons' scores were taken as data points after the influences of gender and dairy farm identity were removed through a GLM procedure.

The comparison of personality traits and attitudes between males and females in the sample of stockpersons and comparison of personality traits between males and females of the stockpersons and the general Czech population was accomplished using Student's two-sample *t*-tests. The general Czech population data were collected in the years 1999–2001 by Hřebíčková and Urbánek (2001).

Two-tailed tests with significance threshold set to $\alpha = 0.05$ were used. We did not employ Bonferroni corrections for multiple testing. Although this increased the risk of falsely rejecting null hypotheses (Type I Error), applying the corrections would unduly increase the risk of Type II Error, i.e. obscuring all possible important relationships of interest for farmers or farm managers. As in previous studies, the results of the correlation analyses should be taken with caution, as suggestions for possible relationships rather than final proofs.

RESULTS

Stockperson traits and farm performance

There were three significant correlations between stockpeople personalities and farm performance variables (Table 1). Over the 31 farms sampled, those which employed stockpersons with increasing neuroticism, exhibited decreased milk yield per standardised lactation and increased veterinary costs; and the more conscientious the people, the lower the veterinary costs.

Attitudes towards dairy cows, as measured by our questionnaire, were not related to any of the farm performance variables (Table 2).

Farms with older stockpeople were able to sell their milk at a higher price and had lower veterinary costs (Table 3). However, the duration of working experience with cattle was unrelated to farm performance.

Table 1. Spearman correlations between stockpersons' mean personality scores and performance indicators of 31 Czech dairy herds

	Personality traits				
	Neuroticism	Extroversion	Openness	Agreeableness	Conscientiousness
Milk yield per stand. lactation (n = 31)	–0.38*	0.08	–0.03	0.13	0.26
Mean sale price of milk (n = 31)	–0.17	–0.06	0.10	0.10	0.17
Percent of culled cows (n = 30)	–0.03	–0.12	0.07	–0.08	–0.05
Number of lactations (n = 31)	–0.19	0.33	0.20	0.26	0.25
Veterinary costs (n = 30)	0.40*	–0.30	–0.15	–0.25	–0.37*

*$P < 0.05$

Table 2. Spearman correlations between stockpersons' mean attitude scores and performance indicators of 31 Czech dairy herds

	Attitudes towards cows				
	GenAttitude	Emotion	HumanBehav	CowBehav	Easiness
Milk yield per stand. lactation (n = 31)	–0.09	–0.14	0.13	0.07	0.11
Mean sale price of milk (n = 31)	–0.15	–0.28	–0.09	0.02	0.05
Percent of culled cows (n = 30)	0.10	0.03	0.001	–0.09	–0.02
Number of lactations (n = 31)	–0.08	–0.02	0.14	–0.01	–0.03
Veterinary costs (n = 30)	0.17	0.18	0.15	–0.03	–0.12

Table 3. Spearman correlations of stockpersons' mean age and experience (years of work with dairy cattle) with performance indicators of 31 Czech dairy herds

	Age	Experience
Milk yield per stand. lactation (n = 31)	0.35	0.21
Mean sale price of milk (n = 31)	0.53**	0.34
Percent of culled cows (n = 30)	–0.19	0.02
Number of lactations (n = 31)	0.19	–0.01
Veterinary costs (n = 30)	–0.43*	–0.22

*P < 0.05, **P < 0.01

Stockperson traits as affected by age, experience and gender

Neuroticism was lower in people with a longer history of working with dairy cows, but no other personality or attitude traits were related to either age or experience of the stockpeople (Table 4).

In our sample of stockpeople, gender was unrelated to attitude variables (Table 5). Among the five personality dimensions, the presence of neuroticism and agreeableness were higher in female than in male employees.

Table 4. Spearman correlations of age and experience with personality traits and attitudes among 128 Czech stockpersons. Correlations are based on residual values after removing the effects of the farm identity and stockpersons' gender

	Personality traits				
	Neuroticism	Extroversion	Openness	Agreeableness	Conscientiousness
Age	–0.11	–0.06	–0.01	0.13	0.10
Experience	–0.25**	0.17	0.15	0.17	0.11
	Attitudes towards cows				
	GenAttitude	Emotion	HumanBehav	CowBehav	Easiness
Age	–0.11	–0.07	–0.07	0.10	–0.07
Experience	0.03	–0.13	–0.13	0.003	–0.07

**P < 0.01

Table 5. Comparison of personality traits and attitudes in Czech male and female stockpersons

	Males (n = 19) (mean ± s.d.)	Female (n = 108) (mean ± s.d.)	t-test
Big-Five personality traits			
Neuroticism	20.71 ± 4.73	24.10 ± 5.85	–2.39*
Extroversion	28.20 ± 6.19	26.36 ± 6.63	1.12
Openness to experience	23.98 ± 3.66	24.70 ± 5.24	–0.58
Agreeableness	26.75 ± 4.75	29.97 ± 4.87	–2.67**
Conscientiousness	31.93 ± 4.06	32.30 ± 5.29	–0.28
Attitudes towards cows			
GenAtittude	16.89 ± 5.15	17.71 ± 3.92	–0.79
Emotion	20.16 ± 3.13	19.38 ± 3.61	0.88
HumanBehav	21.27 ± 3.01	20.69 ± 3.72	0.64
CowBehav	25.77 ± 5.15	25.57 ± 4.58	0.17
Easiness	22.41 ± 3.68	22.50 ± 4.51	–0.08

P < 0.05, **P < 0.01

Table 6. Comparison of personality traits in the sample of stockpersons with the general Czech population

	Stockpersons (n = 127) (mean ± s.d.)	Czech population (n = 958) (mean ± s.d.)	t-test
Neuroticism	23.59 ± 5.81	22.04 ± 8.78	1.94
Extroversion	26.64 ± 6.59	29.66 ± 7.98	–4.09***
Openness to experience	24.59 ± 5.03	29.53 ± 6.87	–7.82***
Agreeableness	29.49 ± 4.97	30.55 ± 5.76	–1.98*
Conscientiousness	32.24 ± 5.11	30.77 ± 7.88	2.05*

*P < 0.05, ***P < 0.001

Table 7. Comparison of personality traits in the sample of male and female stockpersons with the general Czech population

	Stockperson males (n = 19) (mean ± s.d.)	Czech males (n = 430) (mean ± s.d.)	t-test
Neuroticism	20.71 ± 4.73	19.93 ± 8.50	0.39
Extroversion	28.20 ± 6.19	29.61 ± 7.78	–0.78
Openness to experience	23.98 ± 3.66	29.30 ± 6.71	–3.44**
Agreeableness	26.75 ± 4.75	28.83 ± 6.07	–1.48
Conscientiousness	31.93 ± 4.06	29.99 ± 8.27	1.02
	Stockperson females (n = 109) (mean ± s.d.)	Czech females (n = 526) (mean ± s.d.)	t-test
Neuroticism	24.10 ± 5.85	23.78 ± 8.26	0.38
Extroversion	26.36 ± 6.63	29.71 ± 8.16	–4.00***
Openness to experience	24.70 ± 5.24	29.72 ± 7.01	–7.05***
Agreeableness	29.97 ± 4.87	31.99 ± 5.08	–3.79**
Conscientiousness	32.29 ± 5.29	31.39 ± 7.50	1.19

**P < 0.01, ***P < 0.001

Personality comparison between stockpeople and the general population

Stockpersons in our sample were substantially less extroverted and less open to experience than the general Czech population (Table 6). They were also somewhat less agreeable and more conscientious than the general public. The same differences were obtained in separated comparisons of males and females (Table 7), although significance of the results was lower for the males due to lower sample size.

DISCUSSION

In this study, no evidence was found supporting the hypothesis that attitudes and beliefs of people working daily with dairy cows affect the herd's milk output, milk quality or health status. This is in contrast to all three previously published studies that examine the relationship between stockpersons' attitudes and performance (milk yield, milk quality, lameness) of dairy herds (Breuer *et al.*, 2000; Hemsworth *et al.*, 2000; Waiblinger *et al.*, 2002). Upon closer examination it is apparent that their evidence may be quite weak. For example, Hemsworth *et al.* (2000) failed to report direct correlations between attitudes and milk yield/milk quality, thus failing to indicate a straightforward causal chain between stockperson attitudes and behaviour, and between stockperson behaviour and cow performance. Furthermore, some aspects of positive attitudes were related with the number of positive interactions between the stockpersons

and cows; however, upon closer examination this number of positive interactions was negatively correlated with milk yield on the farm. Breuer *et al*. (2000) using one composite attitude score reported a high correlation of this variable with average milk yield on a farm. However, the composite score was constructed from a subset of the original questions, and this subset was selected *a posteriori* from those questions that correlated significantly with the observed behaviour of the stockperson towards the cows. Consequently, this correlation may in fact reflect the more direct causal effect of stockperson behaviour on cow milk yield. Waiblinger *et al*. (2002) calculated correlations of 15 attitudinal variables with farm-average milk yield and found two of them significant in the expected direction; however, the third highest (marginally significant) correlation was in the opposite direction.

Our failure to find at least a weak attitude-performance relationship may be explained, in part, by the fact that we subjectively grouped the individual questions into five attitudinal dimensions prior to data collection. In contrast, Hemsworth *et al*. (2000) and Waiblinger *et al*. (2002) used the principal component analysis to reduce the number of attitudinal variables. Hence, their variables represented groups of intercorrelated answers and may have been better descriptions of the inter-person and inter-farm variability in stockperson attitudes. However, this more sophisticated method has a drawback that it can be applied only after the data have been collected on a large number of farms. If attitude testing among stockpersons is to be of practical use, a brief questionnaire with a limited number of pre-defined questions will be needed. This study attempted to apply a questionnaire in this format and failed to find a relationship to farm performance and indicates that a practicable application of attitude testing for improving dairy herd performance is not yet within reach.

In terms of personality profiles of stockpersons, this study indicates that neuroticism may be negatively and conscientiousness positively related to some practically important measures of farm performance. Willock *et al*. (1999) reported similar results when they sampled a large number of Scottish farms. The farms were very diverse and therefore no direct ranking of the farms based on their actual performance was done. The authors, however, examined NEO personality dimensions using results from a questionnaire that measured (among other things) the farmers' orientation towards good production, success and achievement in farming as well as their pessimism about farming. Conscientiousness was positively correlated with orientation towards success and achievement in farming and with implementing production-oriented measures on the farm, and negatively correlated with pessimism about farming. These facts are similar to our findings indicating that conscientiousness of people working on the farm may positively affect farm performance. Furthermore, as in our study, neuroticism correlated negatively with production-oriented implementation and positively with pessimism about farming, suggesting that this personality trait may impede the farm success. Extroversion appeared to be a good trait in terms of farm prospects since extroverted farmers scored higher in those areas concerning oriented objectives and attitudes; these individuals were not pessimistic about farming either. We did not find any significant correlation between extroversion of stockpersons and farm performance, although two of the five correlations just failed to achieve significance ($r_S \geq 0.30$, $P < 0.10$) indicating that extroversion may benefit the farm performance.

To our knowledge, only two published studies directly discuss the possible relationship between dairy stockperson personality characteristics and farm performance. Seabrook (1984) reported that high yielding cowmen were characterised as highly considerate, patient, unsociable, not modest, independent minded, persevering, confident, uncooperative and suspicious of change and summarised his findings by saying that they "appeared to be introverted with a high level of confidence". Waiblinger *et al*. (2002) found no correlation between the three dimensions of stockperson personal characteristics (agreeableness, confident extroversion, and pessimism) and farm-average milk yield. Similarly like Waiblinger *et al*. (2002), we found no relationship between agreeableness and farm performance. The three previously reported studies are, however, difficult to compare due to differences in methodology used to describe the personal characteristics of stockpersons. Nevertheless, one obvious contradiction between the claims of Seabrook (1984) and our study is that our data failed to provide support for the statement that introverted people are good for farm performance; if anything, our data supports the opposite. Although the stockpersons in our sample were less extroverted than the average of the general population (see below), this did not seem to benefit the farm. Thus it is possible

that farms in the present study with good results had introverted employees, but by employing more extroverted people they may be able to improve these results.

In our sample of Czech farms, those with older stockpersons performed better, especially in terms of higher milk sale price and lower veterinary costs, but they also tended to have higher milk yields. The correlations between experience (duration of work with farm animals) and farm performance were insignificant and weaker than those between age and farm performance. Therefore the effect of stockperson's age on farm performance did not necessarily equate to those individuals having more skill due to their increased experience. Currently, we are unable to offer an explanation of how specifically older people working with the animals could improve the functioning of a dairy farm.

The female stockpersons in our sample scored higher in neuroticism and conscientiousness than their male counterparts. This gender difference parallels very closely the between-gender personality differences in the general Czech population; where the gender difference is also most pronounced in the dimensions of neuroticism and agreeableness (cf. Table 7).

The stockpersons in our study were significantly less extroverted, less open to experience, less agreeable and more conscientious than average Czechs. It is necessary to consider that the selected sample of stockpersons is older people and that age can influence the rates of NEO Big Five traits (McCrae *et al*., 2004). These results are in partial agreement with the studies by Seabrook, who found that dairy stockpersons tended to be introverted (Seabrook, 1984), that they did not dislike repetitive tasks and they did not specifically prefer variable tasks (Seabrook and Wilkinson, 2000).

The reductions in extroversion and openness to experience in our study were quite striking and could not be attributed to intentional selection by the farm managers when hiring the stockpeople. It is often difficult for managers to hire new stockpeople due to low wages, remote working locations, unpleasant working environments and monotonous work tasks. A more likely explanation is that it is the introvert and conservative persons who tend to choose and maintain these jobs. Since most tasks done by stockpeople are repetitive day after day and require more contacts with animals and machinery than with people, it is not surprising that these types of jobs are probably difficult for people who are fond of new experiences and who like to interact with other people to accept and remain in these positions.

Although people having low extroversion and low motivation for new experiences may have higher likelihood of staying in stockperson type positions, it does not mean that these traits are necessarily good for the proficiency, quality and/or efficiency of the tasks. As to openness to new experiences, this was completely unrelated to farm performance in our sample, and extroversion, if anything, tended to be positively, not negatively, related to farm results. The only NEO dimension in which the "natural selection" for a personality trait in stockpeople went in the same direction as it would be desired was conscientiousness: stockpersons were more conscientious than average Czechs and farms with more conscientious staff performed better in terms of lower veterinary costs, with some insignificant tendencies of higher milk yield and higher number of lactations.

A preliminary suggestion for dairy farm managers might be that they should encourage the natural tendency of stockpersons to do their jobs properly (conscientiousness). We also suggest that they enable and encourage more communication and socialisation among the stockpeople, e.g. through social coffee breaks where ideas and problems both related and unrelated to the tasks on the farm are discussed. This may make the job more attractive for people with somewhat higher extroversion, which, according to suggestive tendencies in our data, might be good for farm performance. Managers should be aware that the nature of the stockperson's job selects individuals that are usually quite reluctant to accept changes or take initiative.

CONCLUSIONS

Attitudes of stockpersons towards cows, as measured by our questionnaires, were unrelated to farm performance.

Increased neuroticism of stockpersons seemed to affect farm performance negatively, whereas increased conscientiousness and age of stockpersons seemed to have positive effects.

Stockpeople differed from the general population in four out of five personality dimensions; in particular, they were substantially less extroverted and less open to experience than the average Czech citizens.

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