



# FUTURE AGRICULTURISTS: CZECH AND U.S. AGRICULTURAL STUDENTS' ATTITUDES TOWARDS AGRICULTURE

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The future of agriculture in the EU is endangered by a constantly diminishing number of young skilled agricultural workers starting their career in agribusiness. The problem of not pursuing in the agricultural career after the university graduation forced us to compare different attitudes of students from the USA (Ohio State University) and the Czech Republic (Czech University of Life Sciences Prague). The article deals with the attitudes towards agriculture in two groups of agriculture university students ( $n = 201$ ). The data were collected with the use of a standardized Questionnaire on Measuring the Affective and Cognitive Properties of Attitudes. The results of Man-Whitney test indicate that both groups of students show significantly more the affective than the cognitive base of their attitude. Furthermore, U.S. students display more positive attitudes towards the agriculture workers than Czech students. Authors bring forward the issue of attitudes in an attempt to find a way to influence the decision making of skilled agri-graduates to prefer the field of agribusiness over other careers and propose to focus on a change in attitudes, for example by the increase of the level of practical experience with agribusiness in school farm estates.

attitudes, Czech students, employment, farming, reflexion, skilled agricultural workers, U.S. students



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## INTRODUCTION

The present authors have frequently come across the issue of pursuing in the agricultural career after university graduation. Students frequently leave the agricultural sector, which they mainly do not find attractive enough. The department of psychology at Faculty of Economics and Management, Czech University of Life Sciences Prague has a deeply rooted cooperation with the American university partners. During a recent internship at the Ohio State University we have been confronted with the same problem there.

Agriculture is losing its importance as a source of livelihood for a substantial part of the economically active population. According to the Czech Statistical Office (2017), in 2016 there were less than 70 000 skilled agricultural, forestry and fishery workers. The number of agricultural workers in the USA in 2012 was 3.2 million people in

2.11 million farms, while in 1988 it was 2.2% of the U.S. population (Peasley, Henderson, 1992). During the last five years the total number of farms decreased by 50 000, of which 1000 were from Ohio (USDA, National Agricultural Statistics Service, 2017a, b).

Currently, there exists high demand for skilled workers from the agribusiness practice. However, even the salary of agronomist around 80–100 thousand CZK is not motivational enough to attract the graduates from agricultural universities. Even though the mechanization in the sector is increasing, and its further development leading to lower demand for manual workers can be expected, the demand for specialists, skilled workers in the sector, will not cease. Therefore, we should be concerned with the issue of the decline of skilled workers in this sector.

In both countries, there are substantially more men engaged in agriculture business than women.

In the last published Census in the USA it was 86% men to 14% women from 2.1 million principal farm operators (USDA, 2014), whereas in the CR 47.3 thousand men to 22.5 thousand women were engaged as skilled agricultural, forestry and fishery workers (Czech Statistical Office, 2016). According to the statement of the International Labour Organization a similar problem has been detected in Developed Economies and European Union countries, Latin America and the Caribbean (International Labour Organization, 2014). The same issue is mentioned in studies from other parts of the world as well, e.g. from Africa (Ibitoye, 2011; Ilenloh et al., 2012). The gender differences in job preferences for agriculture between male and female youths were found statistically significant in the research of Ibitoye (2011).

Demographic ageing is a global phenomenon (e.g. Stockdale, 2011). In accordance with this situation, the age structure of the agricultural workers has an increasing tendency both in the CR and the USA. In the CR there are 71 thousand agricultural workers older than 45 years (more than 54%) (Czech Statistical Office, 2016); in the USA this number is even higher – more than 80% of the workers are older than 45 years (2.5 million) (USDA, National Agricultural Statistics Service, 2017a). This trend was also discussed by Majerova et al. (2010), Ibitoye (2011) or Ilenloh et al. (2012).

Furthermore, this effect is magnified by the migration of young adults out of the European rural areas (Stockdale, 2004). Argent et al. (2014) argue that this situation is influenced by rapid economic development associated with industrialization, agrarian change, mobility and altered conception of rural and urban life. The same phenomenon was described also in other parts of the world, e.g. in Western Asia (Alibaygi, Karamidehkordi, 2009).

The above-stated findings clearly show that the problematic issue of the lack of young adults in agriculture and the rural sector deserves multidisciplinary treatment. Next to the current EU policies and rural development programmes the matter should be approached also from the point of view of psychology and education. One of the conceivable ways to resolve the problem is the analysis of the attitudes and forming the opinion about farmers and agriculture at students from agrarian universities.

The influence of attitudes and their crucial role in actual behaviour is incorporated in many psychological theories. They reflect person's tendency to think, feel or behave in a certain way towards a certain aspect of his environment (Ajzen, 2001). Attitudes are considered to be an important component of behaviour, together with intentions and social pressure, for example in the theory of reasoned action (Ajzen, Fishbein, 2000) which was later on modified into the theory of planned behaviour – TPB (Arnold et

al., 2005). TPB has received considerable attention in the literature; Armitage, Conner (2010) concluded their meta-analysis that TPB accounted for 27% and 39% of the variance in behaviour and intention, respectively.

Korkeaoja (2001) points out the necessity to rebuild the image of farmers to enhance the young people's chances in rural sector. Ibitoye (2011) stressed out the crucial role of attitudes towards agriculture at youth in order to attract them to the agricultural profession and the importance of forming these attitudes during the university education of agricultural students. The importance of the attitudes in forming the farmers' behaviour with special concern to the EU Common Agricultural Policy in Portugal was described by Dos Santos et al. (2010).

The consistency of attitudes and respective behaviour is affected by nature of attitudes and their components, among which we place an affective and a cognitive base (Fabrigar, Petty, 1999; Fabrigar et al., 2006; Taut, Baban, 2012). The affective component of an attitude is reflected in a person's physiological response or what he feels about the object of the attitude, whereas the cognitive component of an attitude refers to a perception of the object of the attitude, or what the person believes about the object (Arnold et al., 2005). However, attitudes can vary with the context in which they are expressed (Ajzen, Fishbein, 2000).

The objective of education at agriculture universities should be to address not only the students' intellectual aspect but also support the personal growth and loyalty to the field of study so as they continue in the field after the graduation. The young agribusiness workers are the link between present and future of agriculture.

The aim of the study is to analyse and compare the attitudes towards agriculture and farming at groups of students from two different agrarian universities – namely the Czech University of Life Sciences Prague and the Ohio State University, in order to explore the current state of the matter in the respective countries with the focus on the Czech Republic. Furthermore, the authors intend to ascertain the potential ways of influencing the willingness of the students to stay in their field of the study after graduation.

## MATERIAL AND METHODS

The data were collected during the years 2012–2016 at the Ohio State University and the Czech University of Life Sciences Prague. The group of respondents consisted of 201 undergraduate students, 99 students from the USA and 102 students from the CR, with the mean age of 21.1 years. More detailed descriptive characteristics of the sample are shown in Table 1.

The subjects volunteered to participate in the survey, at the beginning were informed about the goal

Table 1. Descriptive characteristics of respondents

		<i>n</i>	Percentage/mean
Nationality	USA	99	49.3
	CR	102	50.7
	valid <i>n</i>	201	100
Gender	male	75	37.3
	female	126	62.7
	valid <i>n</i>	201	100
Age	valid <i>n</i>	201	21.1

of the research and gave us verbal informed consent with the use of their data. They received no benefits for their cooperation.

The Questionnaire of Measuring the Affective and Cognitive Properties of Attitudes by *Crites et al.* (1994) was administered, to U.S. students in its original version devised at the Ohio State University, to Czech students in the validated translation into their native language. The Questionnaire consists of two semantic differentials (for affective and cognitive components of attitude) with bipolar scales of adjectives, which were proven to be of high internal consistency on both scales, with Cronbach alphas ranging from 0.91 to 0.95. The affective component of the attitudes refers to the feelings and emotions, the cognitive component of the attitude to the knowledge and information. The affective and cognitive semantic differential scales are applicable to multiple attitude objects and have stable psychometric properties.

As for the statistical analysis of the gathered data, next to the descriptive statistics the inferential statistical methods were administered, in order to determine whether there exist any differences between the two groups of students. For the detection of the possible means of exerting the effect to the attitudes, the bases of the attitudes were analysed.

For this purpose, the following hypotheses were formulated:

H1: The overall attitudes towards agriculture are the same across the two categories of nationality; H2: The distribution of the score of the Affective component of attitude scale is the same across the two categories of nationality; H3: The distribution of the score of the Cognitive component of the attitude scale is the same across the two categories of nationality; H4: The distribution of the score of the Affective component of attitude scale is the same across the categories of gender; H5: The distribution of the score of the Cognitive component of the attitude scale is the same across the categories of gender.

The normality of the distribution of the above-mentioned variables was tested by the general Kolmogorov-Smirnov test and also by more powerful Shapiro-Wilk test of normality. The results are displayed in Table 2.

With respect to these results, we had to reject the null hypothesis of the data distribution normality of the Cognitive component of attitude towards agriculture. For the further statistical analysis Man-Whitney non-parametric test was therefore used. The distributions of the Affective component of attitude scale as well as the overall attitudes towards agriculture were proven to be normal and so the *t*-tests of two independent samples were calculated.

Table 2. Tests of normality

	Nationality/gender	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		statistics	df	<i>P</i> -value	statistics	df	<i>P</i> -value
ACAsumq1	USA	0.08	99	0.09	0.98	99	0.07
	CR	0.09	101	0.06	0.99	101	0.32
ACAsumq2	USA	0.10	99	0.01	0.96	99	0.01
	CR	0.07	101	0.20*	0.98	101	0.08
ACAglobal	USA	0.06	99	0.20*	0.99	99	0.33
	CR	0.09	101	0.07	0.99	101	0.90
ACAsumq1	male	0.07	75	0.20*	0.98	75	0.40
	female	0.09	125	0.01	0.98	125	0.09
ACAsumq2	male	0.11	75	0.02	0.97	75	0.08
	female	0.10	125	0.00	0.96	125	0.00

\*lower limit of true significance

<sup>a</sup>Lilliefors significance correction

Table 3. Testing of hypotheses (H) – *t*-tests

			Levene's test		<i>t</i> -Test for equality of means						
			<i>F</i>	<i>P</i> -value	<i>t</i>	df	2-tailed <i>P</i> -value	mean difference	SE difference	95% confidence interval of difference	
										lower	upper
H1	ACAglobal	EVA	0.78	0.38	6.91	198	0.00	10.67	1.55	7.63	13.72
		EVNA			6.90	195.6	0.00	10.67	1.55	7.62	13.72
H2	ACAsumq1	EVA	1.10	0.30	7.05	198	0.00	6.72	0.95	4.84	8.60
		EVNA			7.05	196.7	0.00	6.72	0.95	4.84	8.60
H4	ACAsumq1	EVA	1.64	0.20	1.95	198	0.053	2.13	1.09	-0.03	4.27
		EVNA			1.91	146.5	0.06	2.12	1.11	-0.08	4.32

SE = standard error, EVA = equal variances assumed, EVNA = equal variances not assumed

The statistical software IBM SPSS, Version 21 was used for the data analysis and all the statistical tests.

## RESULTS

The details of the samples and the inferential statistics were described in the previous section.

In the first phase of the data analysis the nature of the base of the attitudes was examined, so the affective versus cognitive character of the persons' attitudes was stated. The results show that a majority of the subjects (148 out of 201) have their attitude formed primarily on the affective basis. This suggests that students in general, approach the assessment of agriculture and agriculture workers on the basis of feelings and emotions in contrast to the suppressed influence of facts and evidence from the field, even though they are supposed to be educated intellectuals in agribusiness. In the case that the attitude is mainly affective, the persuasion aiming at its change is more effective when focused at feelings and emotions. Therefore, educators should consider this component of attitude as well.

The hypothesis H1 is focused at the general attitudes towards agriculture and possible differences between the two nationalities, Czech and American. In case of the different general attitudes we may try to analyse the base of the attitudes and to support the change of the negative trend of young people leaving

the agriculture field. The present authors strive to find a way how to work with them through the attitudes change in order to develop a deeper level of loyalty towards the field of agriculture.

The group statistics for the H1 (Table 3) show a great difference between the mean values of the two groups. The mean of the general attitude of U.S. students is 22.91, whereas the mean of the same variable at the group of Czech students is only 12.24. This visible difference was confirmed by the independent samples *t*-test, which revealed the statistical significance of this difference to be at the 0.01 level. The H1 of the equality of the two means was rejected.

From the testing of the H1 it is clear that there exists a substantial difference in the attitude towards agriculture between Czech and U.S. students of agriculture universities, where U.S. students have more positive attitude. We may probably expect the work on the stay within the agriculture field to be easier with young people in the USA. Even though the overall value for Czech students' attitudes is substantially lower than that for the U.S. students attitudes, from the nature of the questionnaire (the scale range is from -3 to +3) it may be said that the general attitude of Czechs still falls into the positive rank of attitudes. However, as the level of positivity is so close to neutral, the work on the change with these students could be expected to be widely harder, though not completely impossible. The general output for Czechs is not fully pessimistic

Table 4. Hypothesis testing – Mann-Whitney *U* tests (asymptotic significances are displayed, *P* = 0.05)

Null hypothesis	Test	<i>P</i> -value	Decision
H3 – The distribution of ACAsumq2 is the same across nationalities	independent samples Mann-Whitney <i>U</i> test	0.00	reject the null hypothesis
H5 – The distribution of ACAsumq2 is the same across gender		0.641	retain the null hypothesis

from the view of the further exert of influence towards the higher loyalty to the field.

The following data analysis is focused on the closer look at the two fundamental properties of the overall attitude, the affective and cognitive components. The division is important for the targeted work with the attitude change. Details on testing the hypotheses H2–H5 are displayed in Tables 3 and 4.

As for the equality of means of the affective component of the attitudes at the two studied samples (H2), the group statistics again reveals a visible difference (as in the case of the H1) – U.S. students: 10.45 vs Czech students: 3.73. The hypothesis was tested via the *t*-test, which brought the output of the significant difference between the two groups, at the 0.01 level. The hypothesis of the equality of means was therefore rejected. We may conclude that Czechs find the stimuli expressing emotions connected with agriculture significantly less positive than their American counterparts.

Even though the mean values at respective variables for the hypothesis H3 are different (8.50 and/or 12.45); this disparity is not as dramatic as it was in the previous case. This refers to certain similarities in the choice of the bipolar adjective from the bipolar scales. As presented above (Table 2), the parametric tests for testing the hypothesis H3 were inapplicable, we therefore chose the nonparametric test independent samples Mann-Whitney *U* test of equality of the distribution across categories of nationality. The results of the test show the difference in the two samples of Czech and U.S. students in cognitive components of attitudes at  $P = 0.01$  level, so we reject the null hypothesis H3. We may conclude that U.S. students rely more heavily on information and knowledge than Czechs. This may indicate another possible way of approaching the specific work targeted on intended loyalty towards the field reinforcement.

The gender differences in job preferences for agriculture between young males and females have already been mentioned in the introductory section. Hypothesis H4 focuses on gender differences in affective components of the attitudes. The mean value of the affective component is 8.39 and/or 6.26. The test of normality of the respective variable distribution allowed us to use the parametric test of equality of means; independent samples *t*-test was computed. According to its output, the null hypothesis was retained ( $P = 0.053$ ); even though the disparity was not proven to be significant, a certain decrease of this value could be expected at a larger sample.

The last hypothesis H5 tests cognitive components in relation to gender. The mean values of the cognitive components of the attitudes were 10.08 and/or 10.69, so it can be seen that the difference is inconsiderable. We had to use the non-parametric test (Independent samples Mann-Whitney *U* test) to test the H5, the result of the same distribution of the variable across the category gender indicated to retain the null hypothesis.

The rational part of the assessment on agriculture and agricultural workers did not differ between male and female, in contrast to the affective component, where the null hypothesis was retained on the basis of the significance value just slightly above the level of rejection. This leads us to the supposition of possible approach to change of the attitude of females towards agriculture, in a sense of increasing the number of women in agribusiness through exerting the influence up the emotions and feelings.

## DISCUSSION

The results indicate more positive attitudes of the U.S. group compare to the Czech students, whose attitudes balance around the neutral level. Nevertheless, the situation in Europe (K o r k e a o j a , 2001) and the USA (F r a z e et al., 2011) is still better than in Africa. The studies of I b i t o y e (2011) and also of I l e n l o h et al. (2012) generally revealed a negative attitude of the young towards agriculture as a future profession area in Nigeria.

In contrast to Africa, where the global economic situation dramatically differs from that in developed countries, the esteem of Czech students towards the work in agriculture is still higher. On the other hand, not even the relatively similar levels of the CR and U.S. development do form the base for the comparable level of respect to agribusiness.

The idea to study the differences in attitudes towards agriculture studies between Czech and U.S. students emerged primarily during discussions at summer school in Prague with American students and teachers, mainly from the Ohio State University, which has a long-time established agricultural tradition. Czech Republic and the United States are in many ways culturally close; however, the education system is rather different and therefore the interest in the differences arose. Should there exist, supported by the research data, an evidence, that U.S. students continue after the graduation in the agricultural field more frequently, we would be able to learn from that example and propose application of the proven-useful steps and tools. Similarly, the Faculty of Economics and Management is presently working on incorporating a new model for changes in education of the economy sector. The model is from the Finish Team Academy – Tiimiakatemia (P a r t a n e n , 2016) and has gained excellent results through employment of practical business experiences to enhance business competencies of students. This particular model could be used in agribusiness sector as well. As a result of verification of agribusiness skills in practice, the increase of interest in pursuing the career in respective sector could be expected. Valuable is also the experience of a close work relationship with other students of the same field.

A study by Osborne, Dyer (2000) revealed an overall positive attitude towards agriculture at a group of agricultural students in the USA. As was mentioned in the introductory part, the real situation in agribusiness in both countries is quite similar, with a declining tendency. We may conceive that the less positive attitude of the Czech students may have its roots in cultural differences between the two nations and different systems of education.

Even though agriculture may be viewed differently in different countries, some issues are similar across at least three continents (the decrease of employees in agriculture in CR, the USA and Nigeria – International Labour Organization, 2018). The agriculture practices in CR and the USA are comparable as well as the level of income (Bureau of Labor Statistics, 2018; European Commission, 2018). The executive director of the American Museum of Agriculture (Frazee et al., 2011) stressed the same problem as we have addressed in CR – of attracting and retaining quality students in agricultural education.

One of the biggest differences for U.S. and Czech students is that U.S. students have to pay for their education, whereas in Czech Republic the higher education is free. Therefore, we expect a higher level of commitment to the field in the USA. Another issue is that in the USA there is a number of agriculturally oriented states (Ohio being a typical example); in the Czech Republic there are no such large agriculture areas. So hopefully Americans have clearer idea what the agriculture in reality is. In the Czech Republic there probably are many students of agriculture, who have no real experience with agriculture.

The research results give evidence of possible transfer of the tool developed by Crites et al. (1994) at the Ohio State University to different objects, in our case the agriculture and agriculture workers. The method revealed the distant attitude of the group of Czech students towards agriculture, the trend of our contemporary society. With a closer look to the components of attitudes it should be stressed that the base of global attitude is different in the two groups, while U.S. students rely more on facts and knowledge – cognitive base of attitude, Czech students are apt to confide in feelings and emotions – affective base of attitude.

Fogg (2009) studied the concept of persuasive technology and how we can design systems that impact the user also on an affective level. He has proposed the Fogg's Behaviour Model (Fogg, 2009) that studies the factors that can generate a certain behaviour.

In the USA, Frazee et al. (2011) organized a workshop on students' attitudes towards agriculture in connection with self-efficacy which may be a useful direction for future work with Czech students in order to enhance their willingness to stay in the field of study after graduation. Self-efficacy is a belief in one's capabilities to organize and execute the courses of ac-

tion required to produce a given outcome (Bandura, 1997). Bandura (1997) theorized that observational learning – seeing peers complete a task, would enhance the level of self-efficacy, which Frazee et al. (2011) proved to be true at a group of agricultural students.

In the Czech Republic, each school providing agriculture education has its own school enterprise – in the case of the Czech University of Life Sciences Prague it is the university farm estate, the school forest enterprise and the university wine centre. There would be a possibility to offer the students deeper involvement into the operation of these enterprises to gain more practical experience from agribusiness and enhance their self-efficacy in this field.

Vnouckova et al. (2016) stressed that Czech agriculture ranks among the industries with not only a high average age but also with a great shortage of talented young employees. In accord with that statement Stojanova, Tomšik (2014) reported that there is a significant lack of young professionals in the field of agriculture on the labour market.

## CONCLUSION

The researches in this field of study are rather limited and the psychological aspects of agribusiness are studied scarcely. Job preferences are influenced by the personal and societal attitudes, individual preferences and public opinion; therefore, the psychological aspects need to be studied profoundly.

From our research we may conclude that both groups of students are affective more than cognitive in their attitude basis. U.S. students display more positive attitudes towards agriculture workers than Czech students. The study tested several statistical hypotheses, one of them focused on the gender differences in the attitude bases, but these differences were not proved to be significant.

The exigency to pay attention to the psychological aspects in agribusiness is demonstrated also by the finding that all the students basically understand the role of agriculture and agricultural workers, but they still rely more on the feelings and emotions. Agriculture educators should therefore focus their work also on feelings and emotions. It is also easier to induce the change in emotions than of the cognitive component. Seemingly emotions have more impact on person's behaviour when there is a conflict between affective and cognitive component of the attitude (Haddock, Zanna, 2000). Maglio, Reich (2018) stressed the importance of feelings in forming the attitudes over the cognitive component.

Agricultural educators should therefore work on a positive media picture; work with a positive example of successful agri-businessman; work with the agricultural industry to develop informational programs aimed at further increasing students' familiarity with

the agriculture industry – in an attempt to strengthen their attitudes toward agriculture.

The educators are but just one of the agents of influencing the young peoples' attitudes towards agriculture. The other important functionary is the government of respective country as well as the EU representatives, as the contemporary situation in agribusiness is strongly guided by the EU policy. K o r k e a o j a (2001) in a report for the Committee on the Environment and Agriculture summarized the situation and problems of young people in rural areas. The negative trend has not changed and no active arrangements have been applied so far. S h u c k s m i t h (2010) stressed that policies for young people concerned with employment at EU states tend to neglect the rural dimension at all. Our results give the evidence that young people have negative or neutral attitudes towards agriculture so they are not keen to pursue their career in agribusiness. According to these outputs young people are easily susceptible to negative feelings and so the active support and implementation of programs directed at agribusiness are necessary to slow down the trend of ageing in agriculture. In the design of future work with agriculture students the psychological characteristics of the respondents should be taken into account, self-efficacy may be one of them, next to the attitudes themselves in order to create a synergic effect.

All around the world, business in all the spheres is affected by the financial policy and allocated budget. The agriculture and the education are not exceptions. Young people studying a field of education they are not willing to pursue in their future career are a considerable source of financial waste. Thanks to the outcomes of our study we may consider proven that the attention paid to the psychological aspects of agribusiness may contribute to the suppression of such losses.

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