

FARMERS' EDUCATION AND FARM PRODUCTIVITY. EVIDENCE FROM DENMARK AND FROM ROMANIA

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Abstract

The structural issues of the agricultural sector have important consequences for the productivity and efficiency of farming. The paper focusses on the impact of farm managers training structure upon farm performance. Based upon data from Eurostat and Statistics Denmark, it is shown that, as expected, basic or full agricultural education of the farm manager has a positive impact on farm productivity, measured as statistical output divided by number of employees on the farm. Results are discussed in terms of the training structure of the farm managers in the two countries as capacity to perform better. In the case of Romania, the impact is striking. The productivity for farm managers who have basic agricultural training is 152% higher than productivity for farm managers, who have only practical experience, and productivity for farmers with full agricultural education is 106% higher than productivity for managers with only basic farm education. For Denmark the effect is less striking, but still very impressive.

Key words: Denmark, farmers' education, farm performance, Romania.

INTRODUCTION

It is generally assumed that agricultural education and training has a major role as a creator of capacity and supplier of the human resources necessary to increase agricultural productivity and sustainability of farming systems.

Several studies confirm that this is indeed the case in developing economies. Most studies have focused upon the effects of general education on farm productivity, measured as farm output. Early studies were summarized by Lockheed et al. (1980). The main conclusion was that 4 years of schooling, on average, resulted in a 7.4% increase in output. Philips (1994) expanded the analysis and included studies performed between 1980 and 1994. This analysis confirms and strengthens above conclusions and more recent single studies further confirm the interdependence.

However, all of the above-cited evidence relates to the effects of basic schooling in developing economies. The effect of specific farming education upon farm productivity in developed economies has hardly been researched at all.

The aim of the present paper is to seek evidences of the relationship between education and farm productivity on macro level in Denmark and in Romania.

MATERIALS AND METHODS

Data from Eurostat were analysed in order to estimate effect of agricultural training upon farm structure and on farm productivity. Theoretically speaking, the term "productivity" can be defined as gross value added¹ divided by number of employees. No data are available concerning the relation between agricultural education and productivity, using this definition. It was therefore decided to use a more simple measure for productivity, namely statistical output² divided by number of employees.

¹Gross value added = Total output less outside purchases.

²Statistical output measures the output assuming that all farmers achieve average yields for the region in question. The actual output obtained by individual farmers may well differ from the statistical output.

This is a simplification in two manners. Firstly because this measure of productivity does not capture the actual output, only the potential output on specific farms as measured by average yields (crop yields, milk yields etc.) for the region in question. Secondly because the dependent variable is the gross output – not the gross value added, which would be the most correct measure.

In the case of Denmark, the analysis was supplemented by a further breakdown of the data obtained from Eurostat. The data for this additional analysis originate from Statistics Denmark.

RESULTS AND DISCUSSIONS

At the EU level the majority of farm managers have only agricultural experience, 20% of farmers have some agricultural training, mainly basic training, as only 8.5% of EU farm managers have full agricultural training. A simple comparison of farmers training level in Denmark and in Romania shows that 97.5% of Romanian farmers have only practical experience. The corresponding figure for Denmark is 51.5%. Only 0.4% of Romanian farmers have a full agricultural training. The corresponding figure for Denmark is 5.0%. Furthermore, probably the data from Eurostat underestimates the training level of Danish farmers. This is because of the Danish vocational training structure, which merges and integrates the theoretical and practical training elements. A further discussion of this will be given in the section “breakdown of data from Denmark.”

Table 1. Level of training accomplished by Farm managers

	Denmark	Romania
Total farm managers	42,100	3,859,040
Only practical experience	21,670	3,761,970
Basic training	18,340	81,490
Full agricultural training	2,090	15,580

Source: Eurostat, year 2010

Table 2 illustrates the well known fact that, on average, Romanian farms are smaller than Danish farms, Romanian farmers keep fewer livestock, the Standard output per farm is lower

and, consequently, the effective labour input per farm is lower.

The last 2 lines in Table 2 “Standard output per full time employed” and “Gross value added per full time employed” were calculated on basis of the raw data from Eurostat. The difference between Denmark and Romania is striking. The standard output per full time employed in Denmark being nearly 25 times than in Romania. Nevertheless the standard output (SO) does not give any indication of the actual profitability of the farm. It can be interpreted as a measure of farm potential income capacity since it is based on the type and extent of agricultural activities carried out³. An evaluation of farm profitability would require a consideration of the cost of the production.

Therefore, because the intermediate consumption pattern in Danish agriculture is so different from that of Romanian agriculture (Danish farmers buy huge amounts of feed, fertilizer, chemicals etc.), the gross value added per full time employee differs considerably less, yet on average approximately 10 times higher in Denmark than in Romania.

Gross value added per annual work agricultural unit in EU-27 was estimated at EUR 13 200 (Eurostat, 2010). There is clearly a big difference between the Romania and EU average and even more between Ro and Denmark. In Romania average farm sizes are small, the level of mechanisation is low, and a significant part of production is for on-farm consumption.

The Romanian data in table 3 clearly shows tremendous effects of increasing education. The farmers with basic agricultural education have bigger farms and keep more animals than farmers with only practical experience, they have a higher labour input and receive a higher standard output. And most important, when we talk about farm productivity: the standard output per full time employed is more than double as compared to the farmers with only practical experience.

The similar picture is showed when we compare farmers with full agricultural

³ The calculation of the SO is made starting from standardized SO coefficients that are multiplied by the number of hectares (for crops) or heads (for animals) present on the farm, expressed in Euros

education and farmers with basic education shows. Standard output per full for farmers with full education is more than double as big as for farmers with only basic agricultural education and more than five times bigger than for farmers with only practical experience. The evidence is convincing: the higher the level of education of farm manager, the more efficient is the farm.

In the case of Denmark, a comparison between farmers with basic agricultural education and farmers with only practical experience shows

same pattern as for Romania. The trained farmers perform considerably better than farmers with only practical experience.

However, the Danish data show only small, insignificant, differences between efficiency of fully trained farmers and farmers with basic agricultural training. In fact the data suggest that the farmers with only basic agricultural training perform slightly better than farmers with full agricultural training. This apparent paradox will be further discussed below.

Table 2. Production characteristics for Romanian farmers as compared to Danish farmers (2010)

	Denmark	Romania
Average size of holding	63 ha	3 ha
Livestock units per holding	117	1
Standard output, Euro per holding	200,257	2,700
Labour force on farm, full time employed	1.2	0.4
Standard output per full time employed (AWU), Euro	161,201	6,471
Gross value added per full time employed (AWU), Euro	50,650	4,895

Source: Eurostat, year 2010

Table 3. Production characteristics for farmers, broken down according to level of training completed (2010)

	Denmark	Romania
Average size of holding		
Only practical experience	31 ha	3 ha
Basic agricultural training	97 ha	19 ha
Full agricultural training	97 ha	136 ha
Livestock units per holding		
Only practical experience	37	1
Basic agricultural training	204	4
Full agricultural training	173	29
Standard output, Euro per holding		
Only practical experience	74,260	2,700
Basic agricultural training	334,202	11,374
Full agricultural training	331,259	89,565
Labour force on farm, full time employed (AWU)		
Only practical experience	0.7	0.4
Basic agricultural training	1.8	0.8
Full agricultural training	1.8	3.2
Standard output per full time employed (AWU), Euro		
Only practical experience	100,639	5,424
Basic agricultural training	188,303	13,680
Full agricultural training	184,131	28,207

Source: Eurostat

A comparison between Denmark and Romania indicates that Danish farmers are

more productive than Romanian farmers, also when same level of education is considered,

e.g. by comparison of farmers with full agricultural training.

However, because of the different patterns concerning intermediate consumption, it is highly probable that the difference would be less striking, if data for gross value added per full time employee had been available

Breakdown of the data from Denmark

The exact statistical definition underlying reporting from national statistical databases to Eurostat can be found in the Eurostat database. Basically the definitions are:

- Only practical experience = no vocational training in agriculture
- Basic agricultural training = vocational training of any duration up to 2 years
- Full agricultural training = a training course of duration at least 2 years at college, university or similar.

These definitions make good sense, as seen across Europe. However, in the case of Denmark, these definitions do not fully grasp the structure of the Danish agricultural education, which has a high focus upon apprenticeships on commercial farm as an integrated part of the agricultural education.

Thus, what in the Danish context is considered “a full agricultural education” currently consists of 19 month theoretical training at an agricultural college + 3 years apprenticeship on commercial farms, i.e. total duration nearly 5 years.

However, when reporting to Eurostat, what in the Danish context is considered as “a full agricultural education” in the European context will be reported as “Basic agricultural training.”

Only levels of education over and above, what in the Danish context is considered “a full agricultural education” can be reported to Eurostat as “full agricultural education.” Typically they hold a degree, e.g. B.Sc. or M. Sc.

Therefore, when interpreting the figures for Denmark in Table 3, the main lesson learnt is that a person holding a university degree is not necessarily a better farmer than a person, who in the Danish context has “a full agricultural training.”

In order to shed further light upon this issue, the Danish data are further broken down in Table 4.

Table 4. Farm managers’ training in Denmark (2010)

	Size of holding				Total
	Below 20 ha	20 – 49.9 ha	50 – 99.9 ha	100 ha and over	
All managers	18,895	9,200	5,925	8,079	42,099
Only practical experience	13,671	4,919	1,798	1,276	21,664
Basic agricultural training ⁴	2,321	1,617	1,127	1,335	6,400
Full farming education ⁵	2,200	2,178	2,669	4,895	11,942
University degree ⁶	703	486	331	572	2,092

Source: Eurostat

Table 5. Type of education: young and older farmers

Training	Practical experience only		Basic training		Full agricultural training	
	< 35 years	> 35 years	< 35 years	> 35 years	< 35 years	> 35 years
Denmark	34.5	52.3	56.5	42.9	9.0	4.8
Romania	97.1	97.5	2.4	2.1	0.5	0.4

Source: own calculation on Eurostat data

⁴For older farmers typically 6 month theory + internships at commercial farms. For younger farmers typically 1 year theory + internships at commercial farms

⁵For older farmers typically 9 month theory + internships at commercial farms. For young farmers typically 1½ year theory + 3 year internship at commercial farms

⁶ B. Sc. or M. Sc.

The table shows that the majority of farmers with only practical experience, have very small holdings, less than 20 ha. Typically such farmers have other professions as their main source of income, they are part time farmers. To some extent the same is true for the University degree holders. The majority of commercial farmers have either what in the Danish context is considered as “Basic agricultural training” or “Full agricultural training”. But when reporting to Eurostat, both these groups are reported as “Basic agricultural training.”

Therefore, seemingly there is a good explanation, why in the Danish data in table 3, there is no effect of training over and above, what in the Danish context must be considered as “full farming education.”

Farm managers’ age and training

The managerial characteristics of the farm matters not only in terms of the education level but also through age of the farm manager. Table 6 present the age structure on education levels of managers in the analysed countries. (Table 6).

The farming population in both countries is getting older; for each farm manager under 35 years, there were 13 older farmers in Romania, which a slightly more pronounced situation in Denmark.

For the majority of Romanian farm managers, the practical experience prevails, with no differential tendency between young and older farmers. In Denmark, farm managers with practical experience only are predominantly older population (>35 years), while young people dominate the category Farm Managers with basic training; Also almost 2/3 of farm managers with full agricultural training are young.

Training and farm profitability

Most studies on farm profitability have concentrated on size and on structural issues rather than on human and social capital issues.

It is true that national and cross national disparities in farm performance can to a very large degree be explained by the internal structure of farms (size, ownership), the differential use of inputs, including the level of human capital, and also the institutional and infrastructural environment (Mathijs and

Vranken, 2000). Especially the marketing environment is seen as a critical issue for small-scale farming (Gorton and Davidova, 2005).

However, these and other studies also demonstrate that human and social capital issues are extremely important. Danish research shows that the gap between farms, which are profitable, and farms, which are not profitable, is widening (Kaiser, 2012). This is explained partly by economy of scale, partly by increased specialization, partly by market volatility, both for inputs and for financial services, but also by fact that the normal “natural selection” among farmers is presently on stand-by, because lending to the agricultural sector is presently deep frozen in the aftermath of the financial crisis. It is suggested that the way forward should be increased focus upon management and upon human capital issues, like flexibility, adaptability, risk management in combination with better management tools, e.g. wider use of strategic planning, bench marking etc.

Other Danish research shows that differences in farm profitability within groups are far bigger than the variation between groups (Kjeldsen-Kragh, 2010). Apparently, the manager’s knowledge, adaptability, flexibility and innovative skills are immensely important, maybe even the primary determinants of farm profitability.

This is true for Denmark, but similar effects were found in Australian studies (Kilpatrick, 2000). Trained farmers were more likely to change farm management practice than not trained farmers. The higher the degree of education, the more willing farmers were to change practice. Farm businesses with managers, who had participated in more education and training were more profitable than farm businesses with managers, who had participated in less education and training, apparently to a large degree because of the resulting willingness to change management practices.

Implication for agricultural education

It is evident that farmers with a relevant full agricultural education perform better than farmers, who have not undergone such training. However, as the analysis of the data from Denmark show: longer training does not

necessarily lead to better performance. What matters is that the training is relevant to the problems, which a modern farm manager has to tackle.

It is of course necessary that the farm manager is a professional in technical matters and that she/he knows how to make sound economic calculations and decide accordingly.

Increasingly, however, the focus area has been enlarged so as to also include human capital issues in training of farm managers.

In Denmark the curriculum for the agricultural education was thoroughly revised in 2009. The basic structure: relatively short periods of theoretical training at agricultural colleges with longer internships at commercial farms in between, was left unchanged. However, there were major changes in the last part of the education. Management issues like preparation of strategy plans, leadership skills, management of employees, risk management and other issues related to enhancement of human capital issue are focus areas in the new Danish agricultural education.

It is expected that these changes will better equip students to tackle the problems of farming in the future.

CONCLUSIONS

The discrepancy between the training structure of the farm managers in the two countries is huge at the level of full agricultural training and also basic training.

Both in Romania and in Denmark, the productivity for trained farmers is much higher than the productivity for untrained farmers. It is likely that the reason is that trained farmers are more flexible, more likely to change, more innovative than untrained farmers.

Romania needs to increase the proportion of young people with basic and full agricultural training, considering the complementarity of this structural change with the use of new technologies, bigger farm, effective research and advisory services, and therefore better productivity.

The importance of providing related policy making for the generational transfer of farm business is obvious.

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