

## Agricultural Higher Education and Training in Europe

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**Abstract:** The article deals with the issue of agricultural education at European institutions. The author analyzes modern approach to the development of agricultural education according to globalization and integration processes that call new requirement for training experts in the field of agriculture. She points out that Agricultural education provides opportunities to learn basic agricultural skills and knowledge, occupation training and retraining, and professional growth and development. Students at European agricultural colleges learn through a combination of theory and practice, delivered within the college and in industrial placements. European agricultural colleges train students to operate within an enterprise, keeping the balance between economic demands and environmental issues. The author focuses on the analysis of the main principles applied to education and training in agriculture and also defines functions and characteristics of agricultural training institutions in Europe that looks at career prospects of future specialists in agriculture.

**Key words:** agricultural education, modern requirements, agricultural training institutions, sustainable development, globalization, new skills.

### I. Introduction

The modern stage of global development is characterised by dynamic intensification of globalization and integration processes, as well as the strengthening of international relations. Globalization increases interaction among people and this creates opportunities for new learning. According to Stromquist and Monkman [12] this process “increases the focus on education-for-jobs”. Education is now considered social mobility and works in the global imaginary as key economic competitiveness of countries.

UNESCO together with UNICEF [13] adopted the Incheon Declaration for Education 2030, which sets out a new vision for education for the next fifteen years. The Sustainable Development Goals constitute the core of the 2030 Agenda for Sustainable Development adopted by international community. Through Goal 4, The Member States of the United Nations call upon the international community to “by 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship”. Knowledge and education are increasingly considered as key factors in sustainable development and economic growth. Executive Director of UNICEF Anthony Lake [3] has pointed out that “Education is the key to better life for every children and the foundation of every strong society...”

The concept of education and training as we understand it today starts with a basic education, which is followed by specialization and then continues in a learning process that accompanies us for the rest of our lives. The continuous learning process is of particular importance, as it is the only

way that we can keep pace with technological and social developments. Good education and training thus provide an important basis for meeting the new challenges and for treating them as an opportunity rather than a threat.

In all EU Member States, agricultural education is an integral part of general education and training. It is mainly aimed at students who wish to pursue a career in the land-based sector, either as an employee or a manager. There are different levels of attainment, ranging from basic certificates to engineering degrees or PhDs in agronomy. The organization of agricultural education varies according to the various national educational systems. It can be centralized or partly devolved to regions (as in Germany). It includes initial vocational training, apprenticeship, undergraduate and postgraduate higher education. Agricultural education usually falls under the remit of either the Ministry of Agriculture or the Ministry of Education.

**The purpose** of the article is to provide general overview of agricultural education in Europe, determine the main principles applied to education and training in agriculture, main functions and characteristics of agricultural training institutions in Europe in order to use their experience in professional training of relevant experts in Ukraine.

### II. Theoretical framework and methodology

While researching we have taken into account various scientific resources. First of all, we have analysed the findings by such scholars as Acker [1]-[2], Brooks, Frick and Bruening [6], Batra [5], Garrat [7], Green [8], Kilpatrick [9], Stromquist and Monkman [12], Spring [10]. This article is based on recent literature, the outcomes of several conferences, and the author's observation of agricultural education in different countries of Europe. In article we used the methods of analysis and synthesis, deduction and induction, individualisation, generalisation and systematization and a method of comparison was used to assess the views of scientists to determine the directions of research.

### III. Principles of education and training in agriculture

The farming sector needs to attract a new generation of farmers with the necessary skills to live and work in a challenging context. They will have to produce more efficiently while protecting the environment; contribute to the fight against climate change; meet society's demands regarding healthy and balanced diets; and keep up with increasingly rapid scientific and technological progress. It is therefore essential that farmers benefit from adequate

agricultural education and training and acquire the various skills needed to adapt to a changing environment [11].

The evolution and specialisation of agriculture, linked to the rapid evolution of scientific knowledge in all fields relevant to agriculture and forestry, requires an appropriate level of technical and economic training. Farmers need the means and skills to meet the new agriculture and forestry challenges [3].

All-round education and professional qualifications are the key to economic and social security. Creativity, flexibility, a willingness to learn, initiative and the desire to work innovatively with others are more in demand than ever. With the increasing globalization of our society, this is the only way that Europe's farmers will be able to successfully maintain a high standard of living in rural areas.

The future of European agricultural education and training is directly related to the European policies for agriculture and rural areas. Therefore, the following principles apply to education and training in agriculture:

- 1) Ensuring food supplies. The task of the agricultural industry is to offer high-quality foods that are produced taking the needs of the environment and animals into account. To provide food supplies to the rapidly growing world population, global food production must increase significantly.
- 2) Diversification. In addition to the provision of food supplies, agriculture's task is to redesign the rural areas, maintain our natural resources and living space, as well as to supply various services, for example in community and leisure areas. Agriculture and forestry are essential to a sustainable cyclical economy – starting from supply (e.g. energy supplies) and ending with recycling techniques (e.g. composting).
- 3) Agriculture and Rural Areas. Development of agriculture and rural areas are inextricably linked.
- 4) Importance of the land-based sector. Despite its decreasing share in the gross domestic product, agriculture is gaining social importance through its multi-functionality.
- 5) Integral Development. Economic, ecological and social development goes together. One-sided development can be unstable; integrated development is sustainable.
- 6) Network structures. Cooperation strengthens not only entire structures but also individual fields. This applies to agriculture (from basic production to refining and marketing) and the land-based sector, as well as the whole rural area.
- 7) Conditions for successful development. Development programmes are successful if they are

accepted by the people. Identity, participation, self-confidence, awareness of strengths and opportunities, motivation and other “soft factors” are key elements of successful regional development.

- 8) Decentralisation. Complex and regionalized development creates new jobs, relieves population centres and enhances the quality of life in rural areas.
- 9) Proper management and use of the land. An evaluation of agriculture that only considers its industrial management efficiency does not do justice to the multi-functionality of the land-based sector. It is necessary to include political and economic criteria in order to assess the success of the multi-functional land-based sector.

#### IV. The Function of European Agricultural Colleges

Prof. Acker D. G. [1, p.49] stated, “We need to prepare students for the world of work of tomorrow when graduates will have multiple careers. Strong cases have been made for moving more aggressively away from memorization of facts and a reductionist approach. These approaches are being replaced by an increase in real life experiences, experiences that teach students how to learn throughout their lives and careers and to present a more systems oriented, holistic view of agriculture”.

For this reason the change in farming operations from basic producers to multifunctional service providers should be encouraged with a view to safeguarding the function of farming as the backbone and driving force behind rural development. In this context individual farming colleges have the important task not only of providing well qualified graduates, developing personality and teaching students to work in teams, but also of encouraging students to acquire new skills and of broadening their knowledge. So, we can define the following function of European Agricultural Colleges:

1. Professional training. European agricultural colleges facilitate learning for all people who intend to pursue a career in the land-based sector. The colleges are open learning centres where the exchange and transfer of knowledge is facilitated by teams of professionals in land based education and training. European agricultural colleges, in addition to giving professional training, aim to develop students' key competencies (e.g. flexibility; adaptability; entrepreneurial skills; social and communication skills), and an awareness of the local and global environment and their responsibilities towards sustainable land use. European agricultural colleges encourage students' awareness of the wider world, and develop international citizenship through trans-national exchanges, cooperation and work placements. Students at European agricultural colleges learn through a combination of theory and practice, delivered within the college and in industrial placements. European agricultural colleges train

students to operate within an enterprise, keeping the balance between economic demands and environmental issues. Because of the many requirements brought about by rapidly changing general conditions, agricultural education will become the most important resource in world-wide competition. Modern training in agriculture ensures the future of people in the land-based sector and is, therefore, the basis for a viable rural area, worth living in.

2. Other functions. European agricultural colleges have a range of other functions. They are also centres; open to the whole community, for:

2.1. Experimentation and innovation: research and development

2.2. Service: information and resource centres (e.g. libraries, information and communication technology); accommodation; laboratory analysis; advice and guidance, etc.

2.3. Lifelong learning: training at all levels; specialized training in a variety of subjects, etc.

2.4. Rural development: environmental education, cultural events, consumer information etc. European agricultural colleges work in partnership with a range of relevant bodies and institutions, e.g. governmental, regional authorities, employers, research institutions, schools and universities, at local, regional, national and international levels.

The European Union statistical office, Eurostat, defines three levels of agricultural training:

- 1) practical agricultural experience: experience acquired through work on a farm;
- 2) basic agricultural training: any courses completed at a general agricultural college or an institution specialising in certain subjects (horticulture, viticulture, silviculture, pisciculture, veterinary science, agricultural technology); a completed agricultural apprenticeship is considered basic training;
- 3) full agricultural training: any course continuing for the equivalent of at least two years full-time training after the end of compulsory education, completed at an agricultural college or at university, in agriculture, horticulture, viticulture, silviculture, pisciculture, veterinary science, agricultural technology.

Agricultural colleges provide students with professional training encompassing different types of skills: job-specific (such as plant cultivation, care and breeding of animals, equestrian activities), generic (time management, resource planning, entrepreneurial skills), IT, green (awareness of sustainability issues), and technological skills. In general, careers in agriculture and forestry typically cover farm work, working with livestock, forest management, advisory work, and research. Agriculture is a research intensive area, in particular in fields such as sustainable development, environmental protection, the fight against climate change, disease and pest control, organic farming, and land erosion. Students can also find opportunities within the agricultural product industry, and work in the marketing of feed, fertilisers, or forestry equipment. Food sciences also offer

career opportunities. Students learn through a combination of theory and practice, attending classes in colleges and gaining practical experience on farms. They can be encouraged to take part in international exchanges, so as to widen their horizons.

## V. Characteristics of Agricultural Training Institutions

Commissioner for Education, Culture, Youth and Sport, Tibor Navracsics, said, "As we look to Europe's future, we need to equip ourselves with an ambitious, shared agenda for how we can use culture and learning as a driver for unity. Education is key, because it is education that equips us with the skills we need to become active members of our increasingly complex societies. It is education that helps us adapt to a rapidly changing world, to develop a European identity, to understand other cultures and to gain the new skills one needs in a society that is mobile, multicultural and increasingly digital" [11].

Agricultural education encompasses the study of applied sciences (e.g., biology, chemistry, physics), and business management principles. One of the major purposes of agricultural education is to apply the knowledge and skills learned in several different disciplines to agricultural education.

Agricultural education goes beyond knowledge and skills development in that students are able to develop an understanding of: 1) the significance of agriculture in a global society through the application of scientific and business principles and problem solving strategies; and 2) the interdependency and relationships between the agricultural industry and other significant business interwoven with the entire economic and social structure of the community, state, nation, and world.

Agricultural education prepares students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber and natural resources systems. Through agricultural education, students are provided opportunities for leadership development, personal growth and career success. Agricultural education instruction is delivered through three major components:

- Classroom/Laboratory instruction (contextual learning);
- Supervised Agricultural Experience programs (work-based learning);
- Student leadership organizations (National Young Farmer Educational Association and National Post-secondary Agricultural Student Organization).

Here we briefly present the alternative existing possibilities in the four countries for studying higher education programmes in agriculture:

1. The Royal Veterinary and Agricultural University (KVL) is the only university in Denmark offering programmes within agricultural science. At the same time, it is a specialised university in the sense that it only offers programmes within the fields of veterinary and agricultural science. In total KVL offers seven BSc Programmes. This evaluation covers the BSc programme in agricultural science. In recent years, the student intake of this programme has accounted for approximately 25 % of the yearly intake of the university. All applicants with an examination pass at upper secondary level are accepted provided they have graduated

with certain levels in mathematics, physics and chemistry, all of which are provided through optional courses at upper secondary level. Four technical/agricultural colleges in Denmark also provide a higher education programme in agriculture. Graduates from this programme obtain the title Agricultural Technologist, and the nominal duration of the programme is two years.

2. University College Dublin (UCD) is the only university in The Republic of Ireland offering a degree in agricultural science. In addition, UCD offers a programme in veterinary medicine and a number of programmes within the social sciences and humanities. This evaluation covers the BSc programme in agricultural science with particular focus on three of the nine specialisation options within the programme, namely, Animal Science, Animal and Crop Production and Agribusiness and Rural Development. The yearly intake of the programme in agricultural science accounts for 6 % of the yearly intake to all programmes offered by UCD. The "Leaving certificate", which is taken after 13 years of school, is the general entry requirement. Furthermore there are subject requirements including Irish, English, a third language, mathematics, one laboratory science subject and one other recognised subject. In The Republic of Ireland, higher education programmes in agriculture are also offered at four Institutes of Technology/Agricultural Colleges. Graduates from these institutions acquire a certificate or a diploma in agriculture after two to three years of study.

3. University of Hohenheim (UH) is only one among nine German universities offering a programme in agricultural science. Apart from the BSc programme in agricultural science, UH offers programmes in Biology, Food Technology, Nutrition Science, Agricultural Biology and programmes within the fields of Economics and Social Sciences. Besides a Bachelor programme in Business Informatics, the BSc in agricultural science is the only bachelor programme offered at UH. All other programmes still follow the traditional German structure of 4 - 5 year diploma degree programmes. This evaluation covers the BSc programme in agricultural science with particular focus on three of the five specialisation options within the programme, namely, Animal Science, Crop Science and Agricultural Economics. In recent years, the annual student intake for the programme in agricultural science has accounted for less than 9 % of the total yearly intake of UH. Applicants to the programme must have the Abitur examination which is a university entrance qualification, normally acquired after completing 13 years of school. The programme does not have specific supplementary entry requirements beyond the national admission requirements for university studies. Several colleges in Germany also offer higher education programmes in agriculture. Graduates from these institutions acquire a professional degree in agriculture and the nominal duration of the programmes is three years.

4. Wageningen University (WU) is the only university in The Netherlands offering agricultural science related BSc programmes. WU is a specialised university in the sense that it mainly offers agricultural science related programmes. In total, it offers 14 BSc programmes of which the BSc programmes in Animal Science, Crop Science and Biology are covered by this evaluation. Together these account for 26

% of the yearly intake of students at WU. The admission requirements for the three programmes are a pre-university education diploma with the subjects chemistry and mathematics or physics, or at least one year of professional education from an agricultural college. The acquisition of these normally requires 13-14 years of schooling. In The Netherlands, several professional colleges also offer higher education programmes in agricultural science. The nominal duration of these programmes is 4 years and the graduates obtain a professional bachelor degree in agricultural science.

The four institutions are all strong on production sciences (animal and crop sciences) while compulsory courses in the fields of economics and social sciences are not being emphasised sufficiently at any of the institutions. They share common strengths and weaknesses relate to different areas. Therefore, the institutions are provided with an opportunity to learn from each other. Generally, at the four institutions participating in the evaluation, there has been a shift from a production-oriented approach towards a life science approach in terms of the content and understanding of the subject of agricultural science [4, p.12 – 14].

The background for this tendency mainly relates to the following developments:

- extended number of new sciences into the field of agricultural science ;
- continued decline in the economic importance of agricultural production in Europe and a growing importance of new areas such a food safety, human health related to food and agriculture, and the environmental and natural resource dimensions of agricultural production;
- globalization of agriculture, including growing international trade, mobility of labour and capital;
- rapidly expanding world demand for food in the next decades through a considerable population growth in mainly third world countries, which creates the need for productivity growth;
- demand and need for new approaches to teaching and learning at higher education institutions, involving life-long learning, distance education, and computer based interactive teaching and learning (due to globalization).

So, the main characteristics of Agricultural Training Institutions are as following:

#### 1. Mobility:

1.1 Mobility of Students, Teachers and Instructors. Tailor-made training involves mobility. Student mobility on a European level implies teacher and instructor exchange as well.

1.2 National and International Networks of Schools. It is not possible for every school to offer everything. Therefore, it is necessary to cooperate with other schools that complement each other. The goal is basic training in the regional school and specialized training in the suitable complementary school.

1.3 Practice. Besides practical lessons, a training period at agricultural enterprises is essential for a comprehensive training. The promotion of training periods in European countries (and others) should be encouraged and facilitated.

1.4 Special Subject Seminars. Schools should agree on a certain number of special seminars on various subjects, to be offered each year on a national and international level.

Students may apply to participate in whatever seminar they find interesting, both to improve their knowledge of a specific subject and also to have an opportunity to practice a foreign language they have learned.

1.5 Compatibility. We should strive for mutual recognition of training periods as well as the recognition of participation in courses (modules, special subject seminars): The development of a transferable and mutually agreed EU-Certificate of Agricultural Training remains a primary goal.

2. Contents and Methods:

2.1. Modular System. Training modules enable colleges to offer efficient, specialized training to all students and make networks and mobility easier on a European level.

2.2. Educational Innovations. New forms of teaching (e.g. interactive learning programs, tele-teaching, student-centred learning) should be used to revolutionized teaching and learning. The role of the teacher must be transformed from merely imparting knowledge to teaching people how to learn.

2.3. Information Communication Technology. The use of ICT, with its many possibilities, should be promoted. Such training can bring tele-jobs to rural areas and connect the residents of remote areas to each other, to learning centres and to urban centres.

3. Administration:

3.1. Autonomy. Each country's type of school autonomy should be used to determine regionally pertinent topics, carry out relevant projects and make better use of available resources.

3.2. Internal Organization of Schools. There is a number of prerequisites for the implementation of various points mentioned above. Each country must determine which legal and budgetary conditions have to be created or adapted in order to achieve the goals outlined.

## VI. Conclusions

Modern agricultural training not only safeguards the future of farming populations but also provides an indispensable basis for maintaining the vitality and quality of life in rural areas. Agricultural training networks founded on basic education, advanced training, adult education and consultancy can considerably improve development prospects for rural regions. Agriculture is the largest private sector enterprise in the world. It is intended to provide sufficient, safe, high quality food to make life healthy and fulfilling. It is a complex enterprise because it is transforming and interactive [5].

Agricultural Education is the teaching of agriculture, natural resources, and land management through hands on experience and guidance to prepare students for entry level jobs or to further education to prepare them for advanced agricultural jobs. The performance of the agricultural sector – including forestry, fisheries, aquaculture and processing of

raw materials – is dependent on the performance and knowledge of the people working in it. This is why education, training and advisory services play such an important and fundamental role. We were considered that knowledge and education in the field of agricultural science are the key factors in sustainable development and economic growth of any country of the world.

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