

Implications for the Development of Agricultural Colleges in China from the Characteristics Analysis of Wageningen University and Research in the Netherlands

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Abstract: As we all know, our country has a large population, and agriculture has long been regarded as the foundation of our country. With the progress of our economy and science and technology, the development of our agricultural colleges towards a higher level will inevitably bring more benefits to our country. The Netherlands is located in Europe. Although the geographical area is far less than our country, the level of agricultural science and technology development has been at the forefront of the world, and also for a long time in the forefront of the world's agricultural exporters. Wageningen University and Research in the Netherlands is recognized as the world's top agricultural and environmental science research institutions, and according to the Dutch national evaluation, Wageningen University has enjoyed the reputation of "the most popular university in the Netherlands" for many years. Through analyzing the characteristics of Wageningen University and its research center, this paper discusses the successful advantages of Wageningen University, in order to provide positive reference value for the development and progress of "double first-class" agricultural colleges in China.

1. Introduction to the basic situation of Dutch agriculture

The Netherlands is located in the northwest of Europe, with the agricultural land area of about 2.49 million hectares, the total population of about 17 million, and the population density is relatively large. Its agricultural area accounts for only 0.07% of the world's arable land, and the number of people engaged in agriculture in the Netherlands is less than 0.02% of the world's agricultural population^[1]. The Netherlands is the world's leading exporter of agricultural and food products. In 2005, the total agricultural output value of the Netherlands reached 14.5 billion US dollars, accounting for 2.5% of the total GDP of the Netherlands that year, becoming the world's top net exports of agricultural products, and even leading the first place. In 2017, the Netherlands exported agricultural products of \$111 billion, including \$10 billion in flowers and \$7.4 billion in vegetables^[2], just as shown in Figure 1.



Figure 1: Agri-food export figures 2017^[2]

2. Basic Information about Wageningen University and Research in the Netherlands

2.1 Basic Information on the Geographical Location of the University

Wageningen University & Research is located in Wageningen, the Netherlands. Wageningen is a beautiful city located in the middle of the Netherlands, belonging to the temperate maritime climate, warm in winter and cool in summer, east of the Dutch province of Helderland, south of the Rhine north, 5.1 degrees east longitude, 52 degrees north latitude. The land area is about 30.53 square kilometers, and the water area is 1.83 square kilometers. ^[3] With the establishment of the Wageningen University and Research, Wageningen became the center of the "Food Valley". The Food Valley, home to the Dutch Food and Nutrition Research Cluster, consists of many research institutes, companies and facilities representing the state of the art in the field of food and nutrition around Wageningen University.

2.2 Basic Information about the University and Research

Wageningen University and Research is a world-renowned research university. Its ecology, agricultural science, life science, food science, environmental science, etc., enjoy a top reputation in the world. In the QS World University Rankings by Subject published on 6 April 2022, Wageningen University & Research has been named the "world's Best agricultural University" for the seventh consecutive time ^[5].

According to the 2021 Wageningen University Annual Report, Wageningen University currently has 13,676 students, of which about 43% are undergraduate students and 53% are graduate students. Wageningen University has five faculties and nine institutes, and the proportion of non-Dutch undergraduate students is 7%: 377 of the 5,792 students are non-Dutch, spread across 60 countries ^[4], just as shown in Figure 2 and 3.

Table 2.3 Students

	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022
Number of enrolled students	12,000	12,439	12,847	13,275	13,676
Bachelor's students (including Pre-MSc)	5,655	5,902	5,928	6,037	5,904
Master's students	5,822	6,105	6,409	6,936	7,249
Other enrolments	523	432	510	302	523
Influx of first-year students	2,977	3,003	2,923	3,032	2,982
Bachelor's (including Pre-MSc)	1,711	1,744	1,629	1,745	1,557
Master's	1,266	1,259	1,294	1,287	1,425
Number of diplomas ²	3,190	3,323	3,239	3,663	
Bachelor's	1,162	1,268	1,295	1,345	
Master's	2,028	2,055	1,944	2,318	
Number of student nationalities	106	106	102	106	111
Percentage of international students					
Bachelor's students	3	3	5	6	7
Master's students	40	38	36	34	35

Source 2021: Osiris, Source previous years: AIR.

Figure 2: Student Data of Wageningen University and Research^[4]

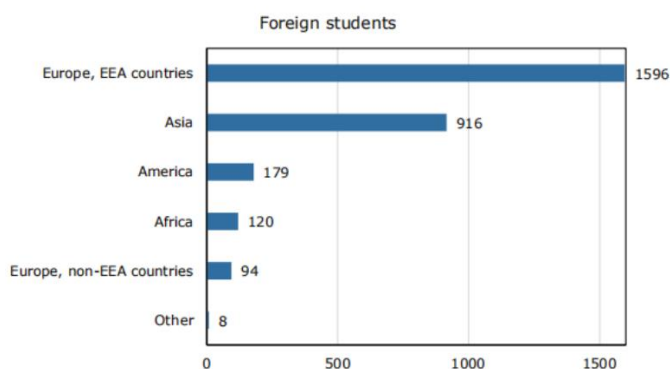


Figure 3: Number of students from Different Countries of Wageningen University and Research^[4]

At present, the total number of faculty members is 6,256, and the staffing ratio of the university and the research is approximately 50%, just as shown in Figure 4 and 5.

	2017	2018	2019	2020	2021
Average number of employees (in FTE)	4,852	5,040	5,400	5,880	6,256
Distribution on the basis of appointment:					
Wageningen University	2,492	2,590	2,743	2,951	3,179
Wageningen Research Foundation	2,360	2,450	2,657	2,929	3,080

Relates to staff with a regular employment contract.

Figure 4: Employee Data of Wageningen University and Research^[4]

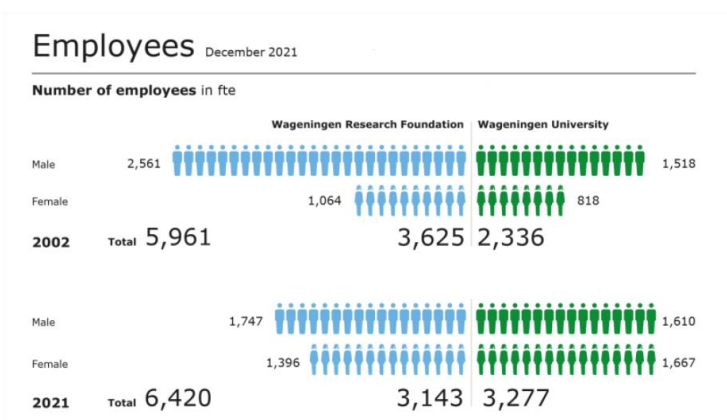


Figure 5: Number of Employees in Wageningen University and Research in 2002 versus 2021^[5]

2.3 History and Philosophy of Wageningen University and Research

According to the Wageningen University website, in 1876, the Dutch government took over the agricultural college of the local council in Wageningen, and this year is considered to be the beginning of the Dutch national agricultural education. Since 2000, Wageningen University and its Research Center have continued to grow, adding research centers and new research projects ^[5].

Wageningen University and Research Center consists of three components: Wageningen University, Research Center and Marriott-Laurenstein Institute^[5]. The philosophy of Wageningen University and Research is "To explore the Potential of Nature to Improve the Quality of Life" ^[5].

3. Characteristic Analysis of Wageningen University in the Netherlands

3.1 Educational Features: Interdisciplinary Research is Encouraged

Surrounding the research area of healthy food and living environment, Wageningen University organically combines the natural and social sciences, and students are encouraged to carry out interdisciplinary research with a view to helping students broaden their horizons and apply their expertise to other disciplines. Because disciplines will interact with each other and promote each other, students will be helped to form new inspiration and build a bridge between professional knowledge and practical application ^[4]. For example, the integration of environmental studies with economics, sociology, and food technology with health and social issues. Under this learning method, students accumulate new knowledge and skills, develop themselves in the process of research, enhance their potential, and find the right opportunities under the right conditions.

3.2 Educational Characteristics—Value Creation

Wageningen University attaches particular importance to value creation, and the creation of additional value from the education and research institutes is an ongoing process involving many stakeholders, including governments, business groups, entrepreneurs, regional and social groups, in which Wageningen University plays a central role ^[4]. The professional knowledge and scientific research and technology results obtained by the students will be expected to be used to solve the problems in the industry and society, with the purpose of creating social value, applying the scientific research results to solve practical problems, and realizing the commercialization of products, that is, applying scientific knowledge to production practice.

3.3 Degree and Curriculum

Wageningen University offers bachelor's degrees, Master's degrees and doctoral degrees. The university offers 20 undergraduate majors to choose from, 7 of which are taught in English, such as animal science, environmental science and food technology, which is very friendly to international students. 46 graduate programs ^[5].

3.4 The Combination of Research Institutes and the University: for application services

Commissioned by government, business and non-profit organizations, the University's research institutes carry out applied and domain based research. Usually, a research project involves a collaboration between multiple institutes, or with Dutch or international knowledge partners, and university departments are sometimes involved in research. The research purpose of each institute is to put the application into practice, and the research project will involve cooperation with a number

of domestic and foreign institutions, and the research results and directions are diverse.

3.5 Wageningen's Vertical Management Structure

The use of vertical management structure, that is, the management committee can directly guide the work and issue instructions to all levels, so as to enhance the enthusiasm and initiative of staff at all levels. The Management section and its associated staff fully serve the five subject areas [7].

Education and scientific research are carried out independently in five research divisions and nine research institutes, respectively, and report directly to the Executive Committee of the institution [5]. The Executive Board is the highest governing body of Wageningen University and is supervised by a Supervisory Board whose members are jointly appointed by the Minister of Education, Culture, Science and Technology of the Netherlands and the Minister of Agriculture, Natural Food Safety, and meets regularly two or three times a year, just as shown in figure 6.

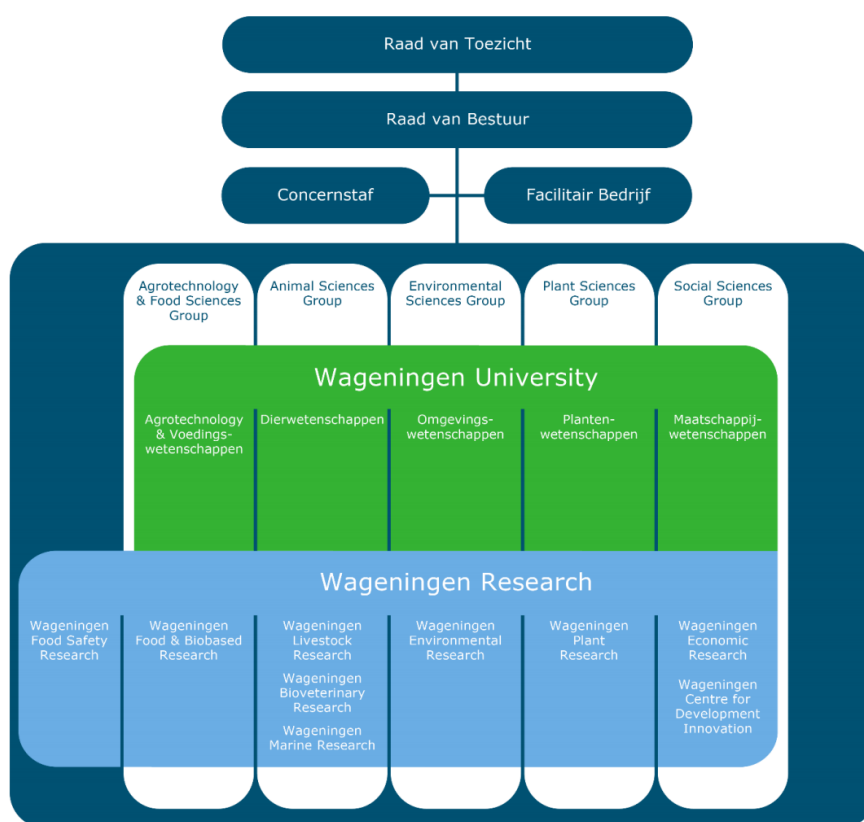


Figure 6: Theme Diagram of Wageningen University and Research

3.6 Integration of Innovation and Entrepreneurship Education System into University Education

3.6.1 Set up Innovation and Entrepreneurship Courses

Continuous learning entrepreneurial skills were introduced, so that more and more Wageningen University students are exposed to entrepreneurial skills. In the 2020-2021 academic year, there are more than 20 programs focused wholly or partly on value creation or entrepreneurship [6]. There are 1,400 undergraduate, master's and doctoral students involved in this course. More than 600 students were exposed to the core curriculum this academic year. Through the StartHub program, more than 1,236 students have participated in extracurricular entrepreneurship education [6].

3.6.2 Minor in Innovation and Entrepreneurship for BSC Minors

The minor in Innovation and Entrepreneurship education is open to all undergraduate students. The major is designed to develop students' innovative and entrepreneurial spirit and ability to actively seek business value and opportunities based on all their professional areas. In the process of positive thinking, students are guided to transform the scientific knowledge and research results they have learned into practice, thus creating social value. These minor majors cover a variety of areas, including intellectual property, business models, marketing management, company operations and other essential knowledge of entrepreneurship.

3.6.3 MSC Track Entrepreneurship Comprehensive Program

For postgraduate students, the university has set up an MSC Track Entrepreneurship project [6], which is directly related to the main research content of university research. The program requires students to combine theory and practice in order to stimulate innovative entrepreneurial ideas and enhance exchanges and cooperation between students and entrepreneurs inside and outside the school. This program consists of three modules: the first module is an elective course in which students take at least two courses from eight courses that deal with the basic theory of entrepreneurship. The second module is the completion of an Entrepreneurial training project based on the "Pursuing and Realizing Entrepreneurial Projects "(PREP) course, that is, in the form of small assignments, Choose a real case (or problem) as your startup project. The third module is based on the second module, entering the actual practice process, this stage requires students to enter the school's startup space (StartHub Wageningen) to carry out the project practice, in this startup space, under the guidance of teachers and the support of previous experience, students have the opportunity to personally time, Get involved in social, industrial and business activities.

3.6.4 Accredited Training Program

For doctoral students and postdoctoral researchers with entrepreneurial ideas, the university provides this program to help researchers with entrepreneurial spirit to have the opportunity to transform the results based on their own research fields into projects with commercial value or practical value through entrepreneurial projects, because in the actual practice operation process, this part of the high-end talent has made the biggest contribution.

3.6.5 StartHub Programs

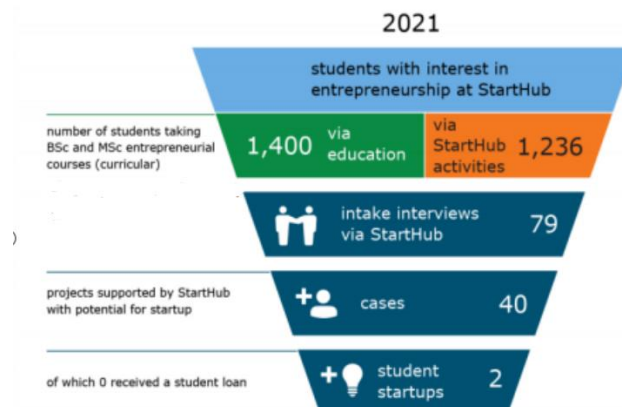


Figure 7: StartHub of Wageningen University and Research in the Entrepreneurship [5]

The StartHub program plans to not only target all students, but also expand to students within two years of graduation. To provide students with a comprehensive variety of entrepreneurship education and support services. To enhance students' ability of innovation and entrepreneurship in practical ways. Students can choose from a variety of seminars and extracurricular programs, just as shown in Figure 7.

3.6.6 Services, Management and Resources

Innovation and entrepreneurship services, management and resources are comprehensive and multi-angle entrepreneurship services provided for students based on the entrepreneurship space. The entrepreneurial space is operated and managed by a dedicated management team. The services of the startup space include a library with books on entrepreneurship, business operation, business management, etc., and a multi-functional laboratory (providing various high-tech experimental instruments, such as laser cutting machines, 3D printers, etc.). There are also different types of offices, such as FLEX Spaces, shared FOUNDER offices, and PRIVATE offices. Through professional services, students' entrepreneurial activities can be accelerated and enhanced^[6].

4. Enlightenment to Agricultural Colleges and Universities in China

4.1 Promoting Organic Cooperation between Government, Enterprises and Scientific Research Institutes

The outstanding and top scientific research talents in the university make use of their professional knowledge and ability in the academic field to comprehensively analyze the current problems encountered by mankind and the problems that may be encountered in the future, and provide think tank services for the formulation of future policies and development plans of the government; at the same time, it will contribute to the development of agriculture, health food scientific research and development, and scientific research strength and application ability will also improved.

4.2 Research Institutions as the Center to Develop China's Food Valley

The development of the university has led to the formation of a unified organism associated with the surrounding area. The scientific research of the university not only drives the development of the surrounding enterprises, but also the success of the business model of the enterprise in turn provides financial support for the scientific research and further exploration and application of the university, which is mutually beneficial, and finally forms the famous FOOD VALLEY. Therefore, China's agricultural colleges and universities can also make full reference to this method, form an organic combination of research colleges and enterprises, and develop China's food valley model, so that the development of China's agricultural field can stride to a higher level.

4.3 Attracting International Talents

It is hoped that to increase the proportion of international students and attract talented people from all over the world. Scientific research should not be confined to a certain country or region, but should be the common concern and commitment of all human beings in the world.

At the same time, internationalization should not be limited to the recruitment of students, the construction of the teaching team is also the same. For one thing, the introduction of international outstanding talents to China's agricultural colleges and universities to do scientific research and teaching, training of international teachers, the government and colleges will set up a reasonable

and attractive talent policy; for the other, the ability of the existing faculty team should be improved, such as going abroad for further study, participating in the research of international projects, participating in international seminars, etc^[7], and excellent teachers, especially young teachers, can be selected and are sent to visit world-class universities and laboratories more often to increase the opportunities for exchanges and cooperation with first-class universities like Wageningen.

4.4 Encouraging Interdisciplinary Research

It is hoped that to encourage the interaction between different disciplines and majors in China's agricultural colleges and universities to achieve interdisciplinary research. In the process of interdisciplinary communication, new inspiration can be burst out, so that students can develop themselves in interdisciplinary research on the basis of completing the study of this professional knowledge; make scientific research not limited to a single discipline, but the combination of multiple disciplines, such as social sciences and humanities, and the organic combination of scientific research. In the long run, this will make us better prepared to solve the problems that humanity will face in the future.

4.5 Developing Innovation and Entrepreneurship

4.5.1 Combine the Concept of Innovation and Entrepreneurship with the Philosophy of the university

The educational philosophy of agricultural universities should combine the trend of agricultural development, implement professional scientific research into specific practice, increase the sense of mission of education, and reflect the importance and role of agriculture for all mankind into specific educational concepts. The idea of innovation and entrepreneurship should also be integrated into the school philosophy, and the teaching process, scientific research and business practice should be organically combined to achieve the goal of agricultural colleges.

4.5.2 Improve the School's Innovation and Entrepreneurship Management System

The management system of innovation and entrepreneurship needs to be further improved. Universities should set up innovation and entrepreneurship services that meet the needs of The Times and improve the management that helps students to start businesses. This management system is not only limited to effective soft services, such as entrepreneurship courses and entrepreneurship guidance, but also to improve the services that are conducive to students' entrepreneurship, such as actual entrepreneurship LABS, well-equipped entrepreneurship incubation bases, office Spaces, etc.

4.5.3 Develop a Systematic Education Structure and Resource System for Innovation and Entrepreneurship

We should establish a reasonable university curriculum system and project management structure, and provide targeted guidance and related services for students at different stages of entrepreneurship, which can not only effectively solve the problems in the process of student entrepreneurship, but also summarize the problems, and provide effective support and experience accumulation for future entrepreneurial students. Through effective entrepreneurial education courses, we hope to accelerate the development speed of students' entrepreneurship, improve efficiency, complete entrepreneurship as soon as possible, and produce value on the ground; make use of the advantages of the school to attract social and enterprise resources to provide strong

support for students' innovation and entrepreneurship.

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