

Comparative Study on the Cultivation of Agricultural Master's Talents between China and Japan

-- Case Analysis based on China Agricultural University and Tokyo University of Agriculture and Technology

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Abstract

Agricultural master's degree talents are an important driving force for the development of agriculture and rural areas. Improving the quality of agricultural master's degree talent training is an important guarantee for promoting China's transformation from an big agricultural country to an agricultural powerhouse. With the promotion and implementation of a series of national macro strategies such as rural revitalization and modernization of agriculture and rural areas, how to promote the high-quality development of agricultural master's education has become an important issue in the new era. Taking China Agricultural University and Tokyo A&M University as examples, this paper compares and analyzes the similarities and differences between the training objectives, selection system, curriculum system, thesis, and employment prospects of agricultural master's students in China and Japan, and condenses the inspiration of Japanese agricultural master's talent cultivation for China.

Keywords

Master of Agriculture; Talent cultivation; Comparison between China and Japan.

1. Question Raising

Due to the constraints of resource endowments, the development of rural economy in China has shown a certain degree of weakness. The shortage of talent and technology has seriously constrained the smooth implementation of rural revitalization strategies and hindered the high-quality development of agriculture and rural areas[1]. Master's education in agriculture aims to cultivate advanced applied professional talents required in the fields of agriculture, rural areas, and farmers. It is an important component of higher education and a main way to cultivate top-notch innovative talents in the agricultural industry[2]. In serving the development of agriculture and rural economy and promoting the implementation of rural revitalization strategy, it has a unique advantage in knowledge background and can provide talent guarantee for accelerating the transformation of agricultural scientific and technological achievements into real productivity. As an educational powerhouse, Japan's agricultural master's education began in the 1950s. Tokyo A&M University established the Agricultural Research Department in 1965[3], which has developed to a certain extent. Its agricultural master's talent training measures have certain reference significance. Based on this, taking China Agricultural University and Tokyo A&M University as examples, this study compares the training processes of agricultural master's talents in the two universities, analyzes the differences between China and Japan in terms of training types, training objectives, selection

systems, curriculum settings, degree theses, and employment destinations, and summarizes the experience and inspiration of cultivating agricultural master's talents in Japan. To provide reference and guidance for improving the quality of agricultural master's talent cultivation in China.

2. Case Introduction

2.1. China Agricultural University

China Agricultural University is a university directly under the Ministry of Education and is the birthplace of modern agricultural higher education in China. At the same time, China Agricultural University is a research-oriented university with characteristics and advantages in agriculture, life sciences, agricultural engineering, and food science, forming a distinctive and complementary discipline group in agriculture and life sciences, agricultural engineering, and automation science. In 2021, nine disciplines including Biology, Agricultural Engineering, Food Science and Engineering, Crop Science, Agricultural Resources and Environment, Plant Protection, Animal Husbandry, Veterinary Medicine, and Grass Science of China Agricultural University were selected for the second round of "Double First Class" construction of universities and disciplines. The school's master's degree authorization covers 33 first level disciplines and 151 second level disciplines, with 15 types of master's degree authorization and 62 authorized fields, covering disciplines such as agriculture, engineering, science, economics, management, law, and literature. China Agricultural University has 28 master's degree programs in agriculture, distributed among various colleges, including Crop Cultivation and Cultivation in the College of Agriculture, Plant Nutrition in the College of Resources and Environment, Animal Genetics and Breeding and Veterinary Biotechnology in the College of Animal Science and Technology, Agricultural Pharmacy in the College of Science, and Rural Development in the College of Humanities and Development. China Agricultural University is the first in the country to implement a specialized enrollment and training system for professional master's degrees, and has achieved remarkable results in the reform of professional degrees. In 2021, the practical teaching and training of agricultural professional degrees won 8 national awards for agricultural professional degree practical teaching achievements, and has one characteristic base for agricultural professional degree graduate practical education.

2.2. Tokyo University of Agriculture and Technology

Tokyo A&M University was founded in 1874 and opened university education in 1949. It is a top research-oriented national university in Japan. In 2018, it became one of the first 13 top universities selected for the Japan Excellent Graduate Program. Tokyo A&M University currently offers two undergraduate colleges, the Department of Agriculture (Fuzhong Campus) and the Department of Engineering (Kokinai Campus). The Graduate School is composed of the University of Engineering, the University of Agriculture, the University of Applied Sciences in Biological Systems, the Joint Agricultural Research Department, and the Joint Veterinary Medicine Research Department of Gifu University College. In April 2019, the Agricultural School of the Graduate School of Tokyo A&M University will offer majors in "Biological Production Science", "Sustainable Sociology of Symbiosis", "Applied Life Chemistry", "Biological Control Science", "Environmental Resource Material Science", "Material Cycle Environmental Science", and "Natural Environmental Conservation Science" Nine majors (master's courses), including "Agricultural Environmental Engineering" and "International Environmental Agronomy", have been reorganized into one "Agronomy Major". And six master's courses, including "Biological Production Science", "Applied Biochemistry", "Natural Environment and Resources", "Food and Agriculture Information Engineering", "Earth Sociology", and "International Innovative Agronomy", will be offered. After the restructuring, the Agricultural University consists of a

two-year master's program in agriculture and a four-year doctoral program in joint veterinary medicine[4]. Among them, the Agronomy major (2-year Master's program) aims to cultivate outstanding talents with higher professionalism and broader perspectives, who can effectively solve the severe problems faced by fields such as agriculture, life sciences, environmental sciences, and animal medicine in terms of food, population, resources, environment, and climate, thereby promoting the formation of a sustainable development society.

3. Comparison of Agricultural Master's Talent Training between China and Japan

3.1. Comparison of Training Objectives

As a research-oriented university, China Agricultural University has always followed the research tradition of "rooted in the countryside, rooted in the field" and the talent cultivation positioning of "action education". It is committed to cultivating students to apply the theories, methods, and tools of sociology, management, economics, and other disciplines in the action of serving grassroots rural revitalization, and to study many issues related to rural social development. And adhere to the following talent cultivation goals: guide students to actively explore relevant themes of rural governance, rural education, rural culture, rural policies, rural organizations, and other aspects of rural revitalization, so that students have the ability to understand the reality of rural China, tell stories of rural revitalization, and provide strategies for rural development. They can also cultivate innovative talents for government departments, public institutions, and social organizations to analyze and solve rural development problems Excellent applied talents.

The Agricultural College of Tokyo A&M University in Japan has always adhered to the goal of promoting "sustainable social formation" as a talent cultivation goal. Therefore, in the teaching process, emphasis is placed on the collaborative cultivation of students' professional knowledge, practical ability, and comprehensive literacy. Not only does it require students to master advanced professional knowledge in production technology and environment, plant production, animal production, agricultural management economics, etc., but it also requires students to have practical abilities to solve problems in related fields such as agriculture, life sciences, environmental sciences, etc. At the same time, it also requires students to have comprehensive qualities such as international strategic thinking and English expression ability.

3.2. Comparison of Selection Systems

The selection of Master's degree in Agriculture at China Agricultural University is divided into two parts: the initial examination and the second examination. The initial examination, also known as the written examination, mainly consists of public theory subjects and professional subjects. The exam subjects vary among different majors. Among them, the majors of Crop Cultivation and Cultivation mainly take the exams of Ideological and Political Theory, English (1) and Chemistry (Agriculture), as well as Plant Physiology and Biochemistry. The main exam subjects for agriculture and seed industry are ideological and political theory, English (II), comprehensive agricultural knowledge, crop cultivation and breeding and seed science, and the professional course proposition method is independent proposition by the university. The interview method is on-site interview. The re examination rules are differential admission, and the number of candidates for each major (center) is generally not less than 120% of the enrollment scale. The re examination content is divided into comprehensive ability written test, English listening and speaking test, and comprehensive interview. The comprehensive interview mainly assesses professional quality, comprehensive quality, experimental or research analysis skills test, ideological and political quality, and moral quality.

The selection system for master's degree in agriculture in Japan is divided into three categories: general selection, special selection for social individuals, and special selection for foreign students, which are held annually in April and October.

3.2.1. General Selection

For those who have obtained a bachelor's degree or have completed a 16 year course of education abroad. Applicants need to prepare relevant materials such as a reason for their choice and proof of their graduation school grades. The general selection is mainly based on the applicant's application materials, learning ability tests, and oral test results. The learning ability test for general participants includes two parts: a written test and a foreign language (English) oral test. The written test is divided into professional written test and English written test, and the subjects and content of professional written test vary according to different majors. The English written test is only applicable to applicants majoring in Environmental Resources and Material Science, and no English written test is conducted for other majors. The foreign language (English) oral test is a mandatory part for all general participants, focusing on assessing whether the applicant has the ability to engage in relevant research in the field and demonstrate their research results in English communication and expression.

3.2.2. Special Selection of Social Figures

For individuals who have obtained a bachelor's degree or have completed a 16 year course of school education abroad, and have worked for at least two years in research institutions, laboratories, educational institutions, or private enterprises in Japan. Applicants are required to provide not only a statement of reasons for their choice and a research plan, but also proof of their experimental or research achievements in their workplace for at least 2 years. Specially selected professionals in society do not take written exams for professional subjects, and except for environmental and material science majors, English written exams are not required for other majors. But all participants from society are required to participate in a foreign language (English) oral test. The oral examination focuses on examining whether the applicant has the ability to engage in relevant research in the field, as well as the English communication and expression skills to showcase their research results. The special selection of social figures is mainly based on the applicant's examination of application materials and the results of the oral examination.

3.2.3. Special Selection for Foreign Students

The special selection of foreign students at Tokyo A&M University adopts an application system. Targeting three types of international students: Firstly, foreign students recommended by universities for national funding (those who have already studied in Japan (domestic recommenders) or have not yet studied in Japan (foreign recommenders) can apply, but they must not have Japanese nationality at the time of application); Secondly, self funded foreign students (those who wish to obtain a master's degree from Tokyo A&M University); The third is self funded foreign students (those who hope to obtain dual master's degrees through the dual degree program). From the perspective of language proficiency requirements, all three types of foreign students must meet the European Common Reference Standard (CEFR) B2 or above level, with no Japanese language requirements. From the perspective of application age, there is an age limit for foreign students recommended by universities for national funding, while there is no age limit for self funded foreign students. From the perspective of academic performance requirements, the academic performance coefficient of foreign students recommended by universities for national funding needs to be above 2.3, while self funded foreign students have no academic performance requirements. At the same time, all three types of foreign students must contact their intended tutors before applying, and apply after obtaining the consent of the tutors. They must also use registered letters to send their Japanese government scholarship applications, professional fields and research plans, abstracts of

bachelor's degree theses, letters of recommendation above the level of head of the research section of their university, certificates of achievement issued by the graduated university, copies of registered residence registration or citizenship certificates Mail relevant materials such as the final graduation degree, degree certificate, proof of excellent academic performance (such as GPA, specific ranking, etc.), language proficiency certificate such as TOEFL or IELTS, health diagnosis within 6 months, and personal photos within 6 months to relevant personnel. The selection will be conducted by the Faculty of Agriculture at Tokyo A&M University based on the information submitted by the applicant, and the selection results will be notified to the applicant by the intended supervisor.

3.3. Comparison of Curriculum Systems

China Agricultural University implements a credit system for agricultural master's degree programs. The curriculum includes public degree courses, public elective courses, professional compulsory courses, and professional elective courses. Among them, public degree courses focus on ideological and political education, English language ability cultivation, and research integrity education. Professional degree courses focus on cultivating students' professional knowledge and application abilities in basic theories, research methods, and characteristic topics, including courses such as modern agricultural development and practice cases, rural sociology, and rural public management. The credit requirement for professional degree courses is ≥ 7 credits. Professional elective courses aim to broaden students' theoretical cultivation in related disciplines such as sociology, management, and economics. Only those who score 60 or above (including 60 points) in the selected courses and training stages can receive corresponding credits. The total credit requirement for a Master's degree in Agriculture is not less than 28 credits, including no less than 22 credits for courses and 6 credits for training (including 4 credits for practical education and 2 credits for Thesis proposal). The specific credit requirements vary depending on different majors or talent development programs.

The Master's degree in Agriculture at Tokyo A&M University also operates on a credit system, with a curriculum that includes an international research demonstration exercise section that is mandatory for the first year of graduate studies and a final review section for the second year of graduate studies. The international research demonstration exercise section includes common practice subjects (2 credits or more), public basic courses (4 credits or more), and professional courses (4 credits or more). The final review section of the master's thesis includes subjects related to the thesis (12 credits). Intended to cultivate the following abilities of students: firstly, to cultivate their understanding and thinking ability of the scientific logic system related to agriculture, as well as the basic knowledge and application ability necessary for topic exploration; The second is to cultivate students' international perspective and literacy with the mission of contributing to the sustainable development of society; The third is to cultivate students' ability to organize and publish their own research and survey results, as well as the ability to conduct international academic exchanges and discussions in English. The fourth is to cultivate students' ability to explore topics, plan and practice.

3.4. Comparison of Thesis

China Agricultural University requires applicants for a Master's degree in Agriculture to complete the courses and various assessments specified in the professional training program within the prescribed time limit of the university, pass the assessment results, and pass the thesis review and defense before graduation and being awarded a Master's degree in Agriculture. A master's degree thesis in agriculture focuses on assessing students' scientific research ability, thesis writing, and academic exchange ability. It is required that each student must independently complete the thesis under the guidance of their supervisor, and the working time of the thesis is generally not less than one year. The content of the paper should be based on the first-hand experimental or survey data obtained by oneself. The basic

arguments, conclusions, and suggestions of the paper have certain theoretical and practical significance, and can demonstrate the author's ability to engage in scientific research or independently undertake specialized technical work in the "three rural" areas.

Tokyo A&M University also requires agricultural master's degree holders to complete the required credits according to the school's curriculum policy within the prescribed period of time, write a master's thesis, and pass the master's thesis review. The review committee or professors, associate professors, and lecturers in the field of the project will conduct a final examination of each student's thesis in the form of oral or written exams. Students who pass all assessments will be eligible for graduation, Grant an agricultural degree. The requirement for an agricultural master's thesis is that applicants must choose appropriate topics and research methods based on their understanding of previous research, conduct academic investigations, analyses, and display results, and have certain academic significance, novelty, creativity, and practicality.

3.5. Comparison of Employment Destinations

In 2020, in order to further deepen the reform of the professional degree graduate training mode, promote the implementation of national major strategies such as rural revitalization and sustainable development of agriculture and rural areas, China Agricultural University's agricultural professional degree graduate students will comprehensively achieve specialized training according to the "Rural Revitalization Special Project", "Science and Technology Small Institute (Yantai) Professional Degree Talent Training Special Project", and the horticultural industry quality and efficiency improvement talent training special project, The graduate students trained have a clear professional orientation. After graduation, most agricultural master's students widely serve industries such as local agriculture, forestry, animal husbandry, fishery, education, scientific research, and agricultural technology services. Other employment opportunities include entering central government agencies through civil service exams, entering universities, research institutions, and state-owned enterprises through talent introduction, or continuing to pursue a doctoral degree. However, due to the limitation of recruitment quotas, the proportion of this type of employment destination is relatively small.

As a pillar of deepening professional education research at Tokyo A&M University, the agronomy major focuses on the curriculum offered of cultivating students' international perspectives and literacy, cultivating a large number of high-level international talents in the field of agronomy. According to data from the official website of Tokyo A&M University, the number of graduate students who have taken courses in biological production science in the past five years who have worked in agriculture and food enterprises after graduation accounts for 20% and 21% of the total number of graduates, respectively. The number of graduate students who continue to pursue doctoral courses or serve as civil servants in departments such as agriculture, forestry, and aquatic products, labor and social security accounts for about 14%. The proportion of graduate students who have taken courses such as natural environmental resources, food and agricultural information engineering, and applied biochemistry who choose to continue their doctoral studies or work in administrative agencies after graduation is relatively high.

4. The Enlightenment of Japanese Agricultural Master's Talent Training on China

4.1. Reforming the Entrance Examination System and Strengthening the Autonomy of Universities in Organizing Enrollment

Through comparison, it was found that the talent selection targets of China Agricultural University and Tokyo A&M University both include both students and working groups in

society, and both schools offer both full-time and part-time learning forms. The difference between the two is that the Agricultural Master's Selection Examination at Tokyo A&M University is divided into two sessions per year. The Agricultural Master's Selection Examination of China Agricultural University implements an annual national unified enrollment examination, and there are clear regulations on the examination content and admission scores. Secondly, when Tokyo A&M University selects social individuals, it requires them to not only meet the basic requirements listed in the master's selection qualification, but also to have at least 2 years of research or experimental achievements in national, public research institutions, examination centers, educational institutions, or private enterprise experimental and research institutions. The part-time enrollment of China Agricultural University does not require research or experimental results, but only targeting directive breeding population.

The graduate entrance examination system should be reformed in accordance with the actual needs of social development and talent cultivation, in order to meet the needs of enterprises, the market, and students[5]. Firstly, at the national level, we should strengthen the autonomy of enrollment in Chinese universities. Firstly, in terms of enrollment frequency, Chinese universities are allowed to organize two or more admissions per year based on their own professional characteristics, faculty strength, and student capacity, combined with the actual needs of social development and talent cultivation, in order to increase the possibility of Chinese universities obtaining more high-quality student sources. Secondly, in terms of enrollment examination content, universities are allowed to flexibly adjust the examination content based on their own talent cultivation goals and professional characteristics, in order to improve the satisfaction of students and universities in two-way selection. Thirdly, universities are allowed to incorporate students' professional practical abilities into the entrance examination subjects according to research needs. Secondly, in the selection and examination of social talents, universities should put forward appropriate requirements for students in terms of their prior majors, work experience, scientific research achievements, etc. based on talent cultivation goals and professional development needs, and strive to avoid situations where targeted training students pursue a master's degree in agriculture to enhance their academic qualifications.

4.2. Flexibly Adjust the Length of Study to Meet the Diverse Learning Needs of Society

Through comparison, it was found that there is a significant difference in the flexibility of the length of study between the two universities. The forms of study for the Master's degree in Agriculture at China Agricultural University are divided into full-time and part-time. Full time agricultural master's students are required to study full-time on campus, with a basic duration of 2-3 years, which varies depending on their major. Non full-time agricultural master's degree students only recruit in-service targeted employment personnel, and universities can flexibly arrange weekends or winter and summer vacations, using a combination of online and offline teaching methods. The basic duration of study is 2 years. Although the forms of study for the Master's degree in Agriculture at Tokyo A&M University also include full-time and part-time programs, with a basic duration of two years, students can apply for partial course exemptions or flexible adjustment of the length of study if they meet the corresponding research achievement requirements or complete all credits in advance.

Firstly, Chinese universities should adopt flexible education systems for full-time agricultural master's students. By formulating and implementing a flexible regulatory system for adjusting the length of study, agricultural master's students are allowed to apply for partial course exemptions or shortened study periods while meeting corresponding standards[6], in order to gain more personalized learning time and space for agricultural master's students and improve

the quantity and quality of scientific research output. Secondly, due to the fact that agricultural master's degree programs that are targeted for enrollment generally possess corresponding professional foundational knowledge and practical abilities, a segmented dual mentor responsibility system can be adopted on campus and off campus, allowing students to flexibly adjust the chronological order of on campus course learning and off campus professional practice under the guidance of mentors.

4.3. Optimize Course Teaching Content and Optimize Course Settings based on Orientation

Through comparison, it was found that both universities have established a complete curriculum system for agricultural master's education, and both adopt a credit system for degree granting and assessment. The difference between the two in terms of curriculum design is that, firstly, from the perspective of curriculum design, Tokyo A&M University focuses on offering specialized courses related to international research demonstration exercises during its first year of graduate studies, reflecting that Tokyo A&M University places more emphasis on cultivating students' international agricultural perspectives, thinking, and literacy. Secondly, under the guidance of the important decisive role that thesis plays in whether students can graduate smoothly, Tokyo A&M University pays more attention to the systematic establishment of related subjects such as "Special Practice for Thesis Review", "Special Exercise in Agronomy", "Research in Agronomy", and "Special Research in Agronomy". From the abundant academic research achievements and cross international projects of existing agricultural master's students[7], the curriculum design of Tokyo A&M University has had a positive promoting effect. Firstly, under the trend of international agricultural development, the cultivation of agricultural master's students in China should attach importance to offering professional degree courses related to international agricultural policies, characteristics, technology, and development trends, in order to cultivate students' international strategic thinking, deepen their understanding of the international trend of agricultural and rural modernization development, as well as the current situation of national conditions and agricultural development in various countries around the world. Thus stimulating the patriotic enthusiasm of students, cultivating a strong sense of knowledge, love, and development of agriculture, and fulfilling the mission of serving and revitalizing rural areas, firmly grasping the correct direction of promoting China's transformation from an agricultural powerhouse to an agricultural powerhouse. Secondly, under the guidance of thesis writing, the cultivation of agricultural master's degree students in China should attach importance to the establishment or addition of relevant subjects for thesis writing training and guidance, in order to improve the academic research ability of agricultural master's degree theses in China[8], and thereby improve the overall quality and value of agricultural master's degree theses.

4.4. Increase Corresponding Administrative Positions and Expand the Attractiveness of Majors to Students

Through comparison, it was found that the employment prospects of agricultural master's students in both universities are generally concentrated in agricultural related enterprises, continuing education, or working in the administrative industry. The main difference between the two is that Japan has a higher proportion of graduates with a master's degree in agriculture who work in the administrative industry, while China has a relatively lower proportion. This is mainly due to the wide range of administrative positions that can be applied for in Japan's agricultural master's degree program. The application requirements for most positions are only based on academic qualifications, and there are significantly fewer administrative positions that require professional matching as a mandatory application requirement compared to China. Most administrative positions in China not only have clear requirements for academic qualifications, but also for professional directions. Some positions even require applicants to

have a bachelor's degree that is consistent with their graduate degree. Under this system, there are very few administrative positions that agricultural master's students majoring in rural development and agricultural management can apply for, resulting in poor attractiveness of agricultural majors. The talent supply is still unable to meet the talent needs of rural revitalization and modernization of agriculture and rural areas in China.

Firstly, universities should broaden the scope of primary disciplines in the field of agriculture. Actively referring to the professional restructuring methods of Japanese universities, we will timely optimize and integrate many interdisciplinary or trivial agricultural majors in China according to the talent needs of rural revitalization and modernization of agriculture and rural areas. To avoid the excessive differentiation of agricultural majors in the selection process, employers may have overly detailed requirements for agricultural master's degrees. Secondly, it is necessary to increase the corresponding administrative positions for agricultural master's degree, and promote the application requirements for employers such as the Agriculture and Rural Bureau and the Rural Revitalization Bureau. Except for special technical positions that require professional requirements, other administrative management positions, comprehensive law enforcement positions, etc. only require agricultural master's degree requirements, without specific professional requirements. In order to break down the barriers to applying for many administrative positions for agricultural master's degree programs, enhance the attractiveness of agricultural majors, and expand the enrollment of agricultural master's degree programs in various universities, providing talent support for the vigorous development of rural revitalization.

5. Conclusion

The quality of cultivating agricultural master's talents greatly affects the direction of agricultural and rural development. China should attach importance to reforming the entrance examination methods from the supply side and strengthen the autonomy of university enrollment; Flexibly adjust the length of study to meet the diverse learning needs of society; Optimize the teaching content of the course, optimize the course setting based on orientation, and add administrative positions to enhance the attractiveness of the major to students. To enhance the alignment between the cultivation of agricultural master's degree talents and the talent demand for agricultural and rural development. By fully leveraging the positive role of agricultural master's degree talents as a key force, we will accelerate the transformation of China from an agricultural powerhouse to an agricultural powerhouse.

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