 DOI: 10.19601/j.cnki.issn1943 -9903.2022.11.014

Teaching Reform and Practice of Animal Products Processing under the Background of Intelligent Agriculture

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Abstract Effective food professional personnel training strategies are explored and implemented, and interdisciplinary talents of food science and engineering in accordance with the background of intelligent agriculture are cultivated from the aspects of construction of teaching staff, reform of teaching content, upgrading of teaching model, construction of industry-education integration platform, which is of great significance to the modernization development of Chinese animal products processing industry.

Key words Animal products processing, Intelligent agriculture, Talent training, Integration of production and education

1 Introduction

Animal Products Processing is an applied subject integrating science, industry and agriculture, which mainly involves meat science, egg science, dairy science and processing technology. The subject expounds the basic processing principle and modern processing technology of animal products, with wide research scope and strong application, therefore, puts high requirements on students' innovation ability and comprehensive practice ability. With the rapid development of information technology, intelligent agriculture is the inevitable trend of agricultural modernization, and its rapid development and extensive application have new requirements for the modernization of animal products processing industry in China. In this paper we discussed the reform of this course in Chengdu University, which is intended to provide the reference for future reform of training food professionals in colleges and universities nationwide.

2 Development status of animal products processing industry in China

Intelligent agriculture refers to intelligent perception and decision-making of agricultural production environment information, and immediate feedback of early warning information to achieve precision management of agricultural production through sensing, remote sensing and other devices by using modern information technology and integrating Internet, cloud computing, big data and artificial intelligence as a whole, which is the concrete embodiment of agricultural modernization[1]. In recent years, leading enterprises in the field of agriculture have vigorously developed digital agriculture and intelligent agriculture, and made a series of breakthroughs in the deep combination of robots and agriculture in livestock and poultry breeding and food processing scenes. At present, the application scenario of "planting, raising and processing" with deep integration of intelligent manufacturing and animal husbandry is being explored, and the agricultural system of intelligent breeding, precision feeding, intelligent slaughtering and meat products cold chain is constantly being improved[2].

China is a major producer and consumer of meat, ranking first in the world for more than 20 consecutive years. The total meat production in China accounts for about one third of the global total. China's production and consumption of animal products affect the world's meat structure and supply balance. At the present stage, the processing of animal products in China has begun to take shape, but there is still a big gap with the world's advanced level in raw material quality control, processing depth and equipment technology levels. The extensive development mode dominated by quantity expansion has not been changed, and processed meat products account for less than 20% of the consumed meat products. Single type of traditional meat products and low degree of standardization and by-products utilization can not meet the increasing demand for diversified meat products in today's market[3]. In *Made in China 2025*, China proposed that the manufacturing industry should strengthen the leading role of complex labor force and accelerate the in-depth integration of industrialization and informatization. Therefore, in the context of intelligent agri-

Received: August 15, 2022 Accepted: October 20, 2022
Supported by Chengdu Animal Products and Food Safety Science Popularization Base (2019-HM03-00073-SN); School-level First-class Curriculum Construction Project of Chengdu University "Online and Offline Mixed First-class Course—Animal Products Processing" (2020); First-class Curriculum Construction Project of Sichuan Province "Online and Offline Mixed First-class Course—Animal Products Processing" (2021); China Agricultural Industry Research System (CARS-43); Experimental Teaching Reform Project of Chengdu University in 2022 (cdsyjg2022046).

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culture, it is of great significance to drive the high quality development of the whole industry chain of animal husbandry by promoting the standardization and modernization of animal products processing industry, improving the conversion rate of animal products and the degree of intensive processing, which also puts forward higher requirements on the culture and skills of animal production and animal products processing personnel.

3 Importance of teaching reform of animal products processing

Animal Products Processing is an applied discipline combining science, industry and agriculture, with a wide range of researches. All the processing and production with animal products including milk, meat, eggs, skin, hair and their by-products as raw materials belong to its research scope. It is a compulsory science and engineering course for food science and engineering, animal science and other majors. This course aims to cultivate the basic knowledge, theories and skills of animal products storage and processing for graduates engaged in related fields in the future, to get familiar with all kinds of animal products processing technical knowledge, to broaden their own knowledge, and to cultivate students' comprehensive application ability of professional theoretical knowledge and practical skills. Since the establishment of Food Engineering in 1986, Chengdu University has continuously deepened the teaching reform of classroom courses and gained valuable experience in the teaching of many courses. Animal Products Processing is the core course for undergraduate majors of food science and engineering, and food quality and safety, and a series of exploration and practice have also been carried out. It was rated as the provincial excellent course in 2009, and was selected as the first-class course of online and offline hybrid in Sichuan Province in 2021. According to the study situation analysis, the students of relevant majors can better master the basic knowledge of the course, but there are common problems such as lack of practical ability, insufficient ability to link theory with practice and innovation, especially limited understanding of the application of artificial intelligence technology in food processing.

4 Practice of teaching reform of animal products processing

4.1 Establishing a double tutorial teaching team With the evaluation of undergraduate teaching level and the promotion of teaching quality project, Chengdu University has implemented provincial characteristic specialty, provincial experimental teaching demonstration center, provincial fine courses and other teaching reform projects in recent years, which have boosted the construction of applied innovative talents training mode and promoted the overall improvement of teaching quality. A teaching team consisting of authoritative experts and backbone teachers in the field of animal products processing, including national post scientists, post scientists of Sichuan Province, discipline leaders, famous teaching teachers of Sichuan Province, experts enjoying special allowance of the State Council is formed for the course of Animal Products Processing, while the proportion of academic, applied and skilled full-time teachers are taken into account. In practice teaching, engineering and technical personnel with relevant professional background and rich practical experience are employed as part-time tutors, forming a double tutorial teaching team with reasonable structure, and a talent exchange mechanism is established. The enterprise assigns scientific and technological talents to carry out teaching and training for the school, provides more than 200 students with production and practical training every year, and provides more than 10 teachers with refresher courses, which plays a positive role in improving the academic level of full-time teachers, students' teaching practice and graduation design.

4.2 Innovative use of modern teaching methods In undergraduate teaching, Chengdu University constantly tries to carry out heuristic, inquiry, discussion and participatory teaching to avoid the phenomenon of only relying on teachers' "cramming education" in teaching, and focuses on cultivating students' ability to solve practical problems. The National Virtual Simulation Experiment Project Base and Sichuan Virtual Simulation Experiment Center have been established. The experimental teaching is divided into basic cognitive virtual simulation experiment, professional design virtual simulation experiment and scientific research innovation virtual simulation experiment, so as to achieve the goal of training innovative and applied talents. In terms of teaching methods, case teaching method is adopted to closely combine theory with practice, guide students to analyze and study cases with cases as the basic materials, and inspire students to think independently and make decisions. In terms of teaching content, multimedia is introduced into the teaching process, and teaching content is presented by means of text, picture, sound, animation and video. Through classroom teaching + network platform teaching, students can obtain more direct graphic information in a limited time. In terms of teaching mode, flipped classroom is widely implemented to effectively transfer the learning decision from teachers to students, to strengthen the interaction and communication between teachers and students, and to improve the effectiveness of classroom teaching.

4.3 Adding the content of intelligent processing course Course teaching is the basic approach to achieve the goal of talent training. In traditional teaching design, theoretical learning courses account for a high proportion, while practical teaching is relatively few. Most students stay at the theoretical level, while engineering thinking ability and industrial development application ability can not be well cultivated. Based on the current development trend of intelligent agriculture, the curriculum content of Animal Products Processing is appropriately adjusted. In terms of course content arrangement, intelligent breeding, intelligent cultivation, intelligent slaughtering and precise intelligent control of cold chain logistics

of animal products under the background of intelligent agriculture are incorporated into the course system, in addition to the knowledge of processing principles and technologies of meat, dairy, eggs and slaughtering by-products of livestock and poultry. The application content of artificial intelligence in the food industry under the background of big data is added; the cross-professional course cooperation of teachers from various disciplines is coordinated and organized; enterprise engineering and technical personnel are invited to provide sufficient teachers for the opening of relevant course content and to teach intelligent agriculture in production. The courses of wireless sensor network, artificial intelligence raw material sorting and packaging, commodity marketing decision-making, food processing automation application and other topics are provided to ensure that students can acquire intelligent processing application scenarios and preliminarily master system components and application skills of intelligent agriculture.

4.4 Construction of pilot production line teaching scene The teaching of applied undergraduate colleges should pay attention to the frontier, comprehensiveness and application of the subject, so as to better stimulate students' interest and enthusiasm in learning and achieve the goal of talent training. The engineering practice experience of teachers is especially emphasized in the teaching course of Animal Products Processing, so as to avoid too much emphasis on scientific research, which leads to insufficient classroom application of teaching research and advanced teaching concepts, and low integration of research and teaching. Teaching should be combined with the actual situation of production knowledge points, so that the practical content of the processing line and technology of the enterprise is introduced into the classroom. Relying on the joint investment of the university and the enterprise, the experimental training room and pilot production workshop meeting the needs of the industrial development of meat products have been built in the school, including R&D laboratories of food technology, Sichuan cuisine pre-preparation, biochemical extraction, microbial fermentation and safety control, with a total area of 1 600 m^2. Pilot production workshop in line with the needs of industrial development is constructed, equipped with more than 15 million yuan of instruments and equipments, and an open and shared public training base integrating teaching, scientific research, production, training, technical services and skill appraisal is established, laying a solid foundation for promoting students' mastery of theoretical knowledge, as well as production practice, practical training and internship.

4.5 University-enterprise co-construction and industry-education integration platform Taking full advantage of the geographical advantages of Chengdu, the university has established a stable industry-university-research base with Chengdu Hope Food Co., Ltd., Sichuan Gaojin Industrial Group Co., Ltd., Sichuan Tianwei Food Group Co., Ltd., and other leading meat processing enterprises in the province, and formed industry-university-research innovation alliances with more than 20 enterprises. Especially in 2007, it jointly established R&D and industry-university-research cooperation technology innovation platforms such as Meat Processing Key Laboratory of Sichuan Province, Sichuan Engineering Laboratory of Meat Food Quality Improvement and Safety Control Technology, and Sichuan Industrial Research Institute with Suining Gaojin Food Co., Ltd. Through the university-enterprise co-construction platform, they have jointly applied for and implemented all kinds of scientific research projects at all levels. With the project as the carrier, scientific research, achievement transformation and teaching are closely linked, and talents are trained according to industry demand and market orientation. At the same time, the enterprise deeply participates in the teaching process of Animal Products Processing to strengthen students' application and innovation ability. The enterprise has changed from a simple employer to a joint training unit, which can create and select talents suitable for its own needs at close distance or even personally, realize the training of practical senior talents, and solve the employment problem of graduates.

5 Conclusions

With the progress of science and technology and the improvement of people's living standards, it is difficult for traditional manual labor and technology to meet people's demand for food, especially with the advent of Industry 4.0 era, artificial intelligence and intelligent manufacturing have shown up prominently in the application of food processing industry[4]. Therefore, effective food professional personnel training strategies are explored and implemented, and interdisciplinary talents of food science and engineering in accordance with the background of intelligent agriculture are cultivated from the aspects of construction of teaching staff, reform of teaching content, upgrading of teaching model, construction of industry-education integration platform, which is of great significance to the modernization development of Chinese animal products processing industry.

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