

Exploration of the Characteristics of Animal Supply and Demand in University Experimental Teaching Practice

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Abstract: The supply and demand of laboratory animals for teaching in colleges and universities has its own internal characteristics. To grasp the supply and demand characteristics of laboratory animals for teaching is of vital importance to the planning, supply and use of teaching animals, the realization of teaching objectives and the completion of teaching tasks. Based on the supply of teaching experimental animals and the work of animal experimental teaching in our university in recent years, this paper expounds the inherent characteristics and practice of supply and demand of teaching experimental animals.

Key words: Experimental animals; Experimental teaching; Characteristics of supply and demand; Practice of supply and demand

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1 Introduction

Laboratory animal refers to the animal with clear source and clear genetic background, which is artificially cultivated to control the microorganism, genetics, nutrition and environmental factors^[1]. Experimental animals play an important role in experimental teaching. It is an important link in the theoretical knowledge verification, hands-on ability training, exploration and innovation spirit and team cooperation spirit cultivation in biology, medicine and pharmacy education system.

Animal experiment teaching is an important part of the experimental teaching in biology and medical colleges. Compared with other experimental teaching,

the biggest difference is that the experimental materials and experimental objects are living experimental animals, which account for a large proportion in the experimental teaching of medicine, pharmacy and biology, such as medical physiology, function, pharmacology, immunology and clinical medicine. Experimental surgery of medicine needs not only solid basic knowledge and basic theory, but also excellent practical skills. Animal experimental teaching has built a bridge between basic medicine and clinical medicine^[2,3].

Based on the teaching practice of animal experiment in our university in recent years, this paper discusses the key elements of the supply and demand of experimental animals in the process of experimental teaching, so as to provide reference for the teaching practice of animal experiment in Colleges and universities.

2 Characteristics of using laboratory animals in teaching experiments in Colleges and Universities

2.1 College, discipline and specialty characteristics of experimental animals used in experimental teaching

Colleges and universities generally set up animal experimental teaching colleges with many disciplines, involving many experimental teaching disciplines, such as histology and embryology, parasitology, function, pathophysiology, molecular biology, biopharmaceutics and pharmacokinetics, pharmaceutical biochemistry, pharmacology, biochemistry and so on. By investigating the characteristics of experimental animals used in

undergraduate teaching of various colleges and disciplines, such as the use time, animal species, quantity, and some special requirements, the experimental animal center provides the required experimental animals for various colleges and disciplines, and ensures that the experimental teaching is carried out on time.

2.2 Characteristics of varieties and strains of experimental teaching animals

Because there are many professional subjects in Colleges and universities, there are many subjects offering animal experiments, and there are relatively many varieties and strains of experimental animals used in teaching. According to statistics, there are more than 10 kinds of experimental animals in our school, mainly including: KM rats, SD rats, guinea pigs, rabbits, dogs, bullfrogs, in addition to a small number of chickens, pigeons, carp, mussels and

other animals. The teaching practice shows that although there are many kinds of animals used in undergraduate teaching, the kinds used each year are relatively fixed, which is beneficial to the supply and preparation of experimental animals.

2.3 Quantity and time characteristics of experimental teaching animals

2.3.1 Annual change of animal consumption in experimental teaching

Because there are many majors and students in Colleges and universities, the number of experimental animals used for teaching is large, and the use time is relatively fixed, so the demand for supply time is high [E]. From 2015 to 2019, the cumulative use of laboratory animals in undergraduate teaching has been increasing year by year, as shown in the following table:

2015	2016	2017	2018	2019
N=16165	N=17348	N=19375	N=21653	N=22571

The use time of teaching experimental animals in spring semester is concentrated in April to June, accounting for about 18% of the total amount of teaching animals in the whole year, and in autumn semester is concentrated in September to November, accounting for about 82% of the total amount of teaching animals in the whole year. It can be seen that the experimental animals used in teaching are mainly concentrated in the autumn semester.

2.3.2 Supply characteristics of experimental animals for teaching

The supply of experimental animals for teaching is very strict. As we all know, teaching animals are animals for students to use in experimental class, class is the first, the course time is fixed, the plan is strict, experimental animals must arrive at the laboratory on time, there is no time difference. According to the teaching animal use plan, the experimental animal center of our school prepares the teaching animals 2-3 days in advance, and has a specially assigned person to verify with the teaching and research department, and deliver them to the teaching place 30 minutes before the class.

2.4 Standardized control characteristics of teaching animals

Animal standardization refers to animal specifica-

tions, such as animal weight, gender, health status and genetic, microbiological, environmental and nutritional control. Most users think that teaching animals do not need physiological and biochemical indicators, and their experimental animals usually only need conventional closed group animals, and the degree of genetic control is relatively low, thus ignoring the quality and safety of teaching animals^[4]. In fact, the requirements of teaching animals for standardization have their own characteristics, and different experimental teaching purposes have corresponding animal standardization requirements. However, the standardization requirements of general teaching animals mainly focus on animal specifications, health status and microbial control level, and there are no special requirements for animal genetic control. The compliance of teaching animals with the requirements is the basis and basic guarantee for the completion of experimental teaching, and is an important guarantee for the biological safety of experimenters. According to the teaching requirements and needs, each experimental animal teaching unit of our school scientifically puts forward the animal standardization requirements, and the experimental animal center provides the standard animals, especially the biosafety qualified animals, in strict accordance with the requirements.

2.5 Aftertreatment characteristics of experimental animals for teaching

Experimental animals for teaching make great sacrifice and contribution to biology, medicine and other teaching, so the aftercare should meet the requirements of animal welfare, animal ethics and Biosafety to the maximum extent^[5].

Experimental animals for teaching are living experimental objects and materials. The use of experimental animals and aftertreatment should meet the requirements of animal welfare and ethics. In the practice of animal experiment teaching, we should strengthen publicity and education, popularize the idea of animal welfare, increase the proportion of experimental animal welfare content in the theoretical teaching of the course, and integrate the 3R principle into each chapter of the theoretical teaching for publicity and education. In the experimental teaching of the course, we should strictly follow the "5F" principle of animal welfare, emphasize the requirements of animal welfare, and let students cultivate the basic awareness of animal welfare in the stage of basic education. At the end of the experiment, the animals were euthanized and killed in a humane way to alleviate the pain of the animals.

3 Practice of plan, supply and ethical management of experimental animals in Colleges and Universities

3.1 Plan management of experimental animals for teaching

Experimental animals, as the main experimental materials of experimental teaching, must be supplied on time and on demand, otherwise it will inevitably cause major teaching accidents. Therefore, it is necessary to implement the special management and related supply guarantee system.

3.1.1 Planning, distribution and receiving personnel setting of experimental animals for teaching

The teaching animal demand planning staff is set up by each teaching and research department to be responsible for the preparation of the teaching animal demand plan, the distribution staff is set up by the experimental animal center to be responsible for the timely distribution of animals, and the teaching and research department is set up to assign special

personnel to accept the teaching animals. All kinds of personnel should set up full-time or part-time jobs according to the workload, strictly formulate the post responsibilities and standard operating procedures of all kinds of personnel, and ensure that each link is linked to ensure that the teaching animals arrive at the experimental classroom in time, according to the quality and quantity.

3.1.2 Development and practice procedure of animal plan for teaching

The animal plan for teaching includes the species, gender, weight and quantity of animals, as well as the unit, time and place of use of animals. It is based on the experimental teaching plan of the discipline, and aims to complete the teaching tasks and achieve the teaching objectives, such as: Training students' practical ability, knowledge verification, cultivating the spirit of exploration and innovation, etc.

The practice of making teaching animal plan in our school is that before the beginning of each semester, each teaching and research department submits the experimental animal plan for teaching this semester. The plan is attached with the teaching plan assignment and curriculum schedule issued by the teaching management department. After being signed and sealed by the person in charge of the Teaching department of our school, it is submitted to the experimental animal center. After verification, the experimental animal center will supply teaching animals on time according to the time, animal species and quantity arranged in the plan. The animals for temporary teaching plan must be reported in writing 2 weeks in advance, signed by the person in charge of the school's teaching management department and the experimental teaching management department of the equipment department, and then reported to the experimental animal center for implementation according to the plan.

3.2 Supply management practice of teaching animals

In order to ensure the quality and biosafety of experimental animals, our school adopts the mode of unified supply of experimental animals for teaching by the experimental animal center.

According to the teaching animal plan, the experimental animal center will prepare the experimental animals for teaching 2-3 days in advance according to the quantity, gender and specification,

and the experimental animals will be delivered to the experimental teaching place by a special person, which will be accepted by the experimental teaching special person, and go through the relevant level procedures. If the teaching plan (schedule) of the teaching and research department changes, it is necessary to contact the experimental animal center 3 days in advance to confirm the teaching animal supply plan. If there is no confirmation, it will be implemented according to the original schedule. The increase of the number of animals and the change of species shall be handled according to the temporary planning procedure.

3.3 Ethical practice of teaching animals

Like human beings, experimental animals have feelings and emotions, can feel pain and fear death, while teaching animal experiments inevitably cause harm and pain to animals^[6]. Therefore, the ethical requirements of teaching animals are more important. In order to meet the ethical requirements of experimental animals, our school mainly follows the following measures to meet the ethical practice of animals: One is to make a scientific teaching plan and reduce the amount of experimental animals. The teaching and research section formulates the demand of experimental animals in strict accordance with the teaching plan, and the experimental animal center verifies it. It is strictly forbidden to overstate the use of animals. Second, the teaching and research department should integrate the experimental items, reduce the dosage of experimental animals, and the repeated use of the same experimental animal is an important measure to reduce the dosage of animals. Third, in the experiment, we should strengthen publicity and education, popularize the idea of animal welfare, and explain animal welfare as the key content. The explanation can help students establish the concept of caring for animals and standardizing operation, and put the idea of animal welfare into the process of animal experiment. The fourth is to optimize the experimental scheme and technology, to understand and master the basic techniques and methods of animal experiments as much as possible, such as grasping, fixation, anesthesia and experimental surgical techniques of animals, which can reduce the pain of experimental animals. Fifthly, after the experiment, we should do a good job in dealing with the aftermath. Euthanasia should be

chosen when the animals are killed. It is strictly prohibited to use inhumane methods such as beating and drowning. In addition, we should avoid the presence of other animals in the process of execution, so as to reduce the nervous and uneasy mood of living animals. At the same time, we must make sure that the animals are dead before they can be put into the designated animal carcass freezer for non-invasive treatment by qualified institutions Harmful treatment.

4 Conclusion

Animal experiment teaching is an indispensable link for biomedical students, and it is an important part of the teaching plan whether it is teacher's classroom demonstration teaching or student group experiment. The purpose is to cultivate students' practical ability, integrate theory with practice, increase students' perceptual knowledge, and cultivate their innovative spirit and team spirit. As experimental materials and experimental objects, the key lies in the cooperation between the supplier and the demander to make animal use plan in advance, to make clear the type, specification and quantity of teaching animals, as well as the time and place of animal use, and to make a good linkage between the relevant distribution and acceptance personnel. Only by ensuring that the teaching animals are delivered on time before the class starts, and ensuring the biological safety of animals, can we prevent the occurrence of teaching responsibility accidents and better maintain the smooth progress of school animal experiment teaching courses.

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