Changing Concepts in Veterinary Medical Education

James E. Lovell, DVM, MS, Ph.D

EDUCATIONAL REVOLUTION

Education in veterinary medicine is being influenced by the revolution that is taking place in the entire field of education. All over the United States, colleges and universities are scrutinizing the value of traditional curricula that have characterized our educational system for the last century. Many institutions of higher learning are experimenting with departures from the rigid prescribed schedule of courses known as the "lock-step" type curriclulum. Flexible patterns based upon the student's interest, ability and background are being developed which include tutorial instruction and free time for independent study. Methods of testing and grading are also being examined and many schools are experimenting with a reduction in the number of examinations and more emphasis on comprehensive examinations which deal more with concepts and understanding rather than regurgitation of detailed, factual information. It is the opinion of some educators that less emphasis on testing and grading by using the pass-fail system eases the pressures that arise among students from the fear of low grades and failure. Some students feel that when they dig things out for themselves they understand them better. Others need the security of regular assignments, lectures and the motivation brought about by frequent examinations. We are in a period of inquiry and experimentation and there are proponents of both the traditional and the newer methods that are being proposed.

Dr. Lovell is associate professor of Veterinary Anatomy and Obstetrics, Iowa State University, and is a staff member of the Veterinary Medical Research Institute. At the present time he is chairman of the curriculum committee.

CHANGING CONCEPTS IN MEDICAL COLLEGES

Some educators in medical colleges feel that the traditional process of fact-cramming should be replaced with instruction in the principles of thinking. No matter how well taught, medicine remains an inexact science. Medical students and graduates must exist in a state of not knowing. Decisions must be based upon incomplete knowledge. Some medical educators have said that what medical students need most is to learn basic principles. After that the young doctor must put his training to practice as soon as possible. These changing concepts could just as well apply to veterinary medicine.

PRE-VETERINARY TRAINING

The training and preparation that an individual receives prior to beginning professional studies may vary considerably, depending upon several factors. For the sake of discussion, these factors may be divided into three categories: home environment during the high school years, type of high school study program, college or university pre-veterinary courses.

It has been well demonstrated that individuals from a farm background are often singularly well suited for careers in veterinary medicine. Four-H and Future Farmers of America experience in exhibiting animal projects develop attitudes and understandings that are important in dealing with livestock programs and disease prevention. An early knowledge of farm animals is desirable but not essential for the study of veterinary medicine. A survey of the alumni of the College of Veterinary

DISTRIBUTION OF 1050 VETERINARIANS ANSWERING QUESTIONNAIRE ACCORDING TO LOCATION OF HOME WHILE IN HIGH SCHOOL

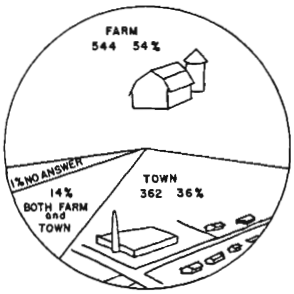

Figure 1

Medicine at Iowa State University showed that 36% of the veterinarians responding to the questionnaire lived in town while attending high school (Figure 1). Many individuals from non-farm backgrounds are successful as students and as graduates in various phases of practical veterinary medicine.

The educational system from which pre-veterinary students come is constantly changing. Now there is a tendency to teach what used to be taught in college in high schools, particularly in the fields of physics, chemistry and mathematics. Not all high schools have adapted their curricula to the same extent to the rapid changes that are taking place. Generally speaking the larger high schools offer greater opportunities for college preparation than the smaller rural high schools. Students that have the opportunity to take enriched or accelerated high school course work should have the opportunity to pass out of college beginning courses in mathematics, physics, and chemistry by examination and thus shorten the number of years needed to fulfill the requirements for admission to a college of veterinary medicine. Students that do not have the college preparation courses in high school will have to spend more time developing proficiency in the scientific requirements for admission to professional college.

Prior to the late 1930's, candidates for colleges of veterinary medicine were accepted directly after finishing high school. All of the scientific information that was considered important for the study of veterinary medicine at that time was included in the veterinary curriculum. In the late 30's, one year of pre-professional study was instituted to include English, chemistry, biology, animal husbandry, and other electives. In the late 40's the pre-professional requirements were increased to two years including organic chemistry, mathematics and other electives. Figure 2 illustrates the percentage of veterinarians that responded to the questionnaire that have had the various number of possible years of pre-veterinary training. The chart also shows that many have had 3 or 4 years of pre-professional training. In this age of rapid changes in education, there is much variation in the courses offered in junior colleges, liberal arts colleges and universities. Not all institutions of higher learning are adapting to the higher level of presentation that is occurring in the primary and high school systems. Admissions committees must evaluate a student's performance on the basis of the academic standing of the school as well as the grades.

Animal science courses have been deleted as requirements for admission to the college of veterinary medicine but this area is still considered as an important elective and pre-professional students are encouraged to take 8–12 hours of animal science, especially if they have not had a farm background with 4-H and FFA experience.

DISTRIBUTION OF VETERINARIANS ANSWERING QUESTIONNAIRE ACCORDING TO NUMBER OF YEARS OF PRE-VETERINARY TRAINING

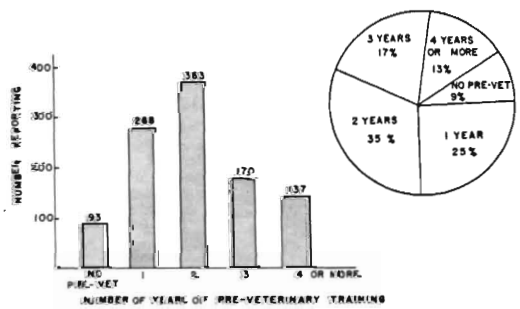

Figure 2

Increased emphasis is being placed upon physics and quantitative analysis because of the enlarging importance of these disciplines in medical sciences. It is now possible for a student pursuing studies at a liberal arts college that has a strong background in science to be accepted into veterinary college without having animal science courses. There is a growing awareness among veterinary medical educators that there is great variability in the training and background as well as ability of veterinary medical students. Consequently, it should be expected that various students will have different goals and will proceed toward them at different rates. There seems to be increasing interest in including liberal arts and humanities perhaps leading to a bachelor of arts degree before admission to professional college. The concept of flexibility in pre-veterinary training, according to individual need is undergoing change and development.

NUMBER OF COLLEGES OF VETERINARY MEDICINE

Due to the great need for more veterinarians there will probably be 5 to 10 new colleges started during the next 10 to 20 years. During the last 20 years there has been a 50% increase in the number of veterinary colleges in North America. If this trend continues, we can expect a 50% increase in the next 20 years that will mean 10 new schools in North America. It must be remembered that colleges of veterinary medicine have a responsibility to supply veterinarians to neighboring states that do not have schools. Figure 3 illustrates the fact that almost 50% of the alumni of the Veterinary Medical College at Iowa State are located outside of Iowa.

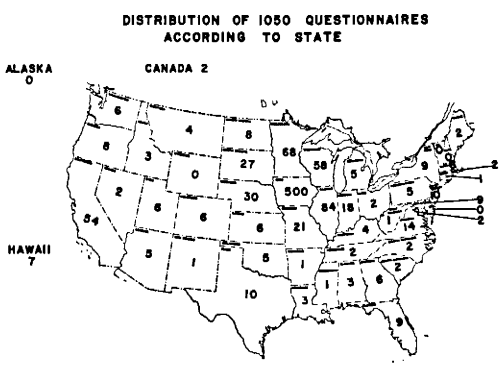

Figure 3

ENROLLMENT

Again, due to the great number of opportunities for graduating veterinarians there is continual pressure in all schools for increased enrollment. There will probably be a 50% increase in the number of veterinarians graduating from all of the presently existing colleges of veterinary medicine by 1975. Between the increase in the number of colleges and the increase in enrollment the number of graduating veterinarians will increase from 1,000 each year at the present time to 2,000 each year by 1980.

CURRICULUM PLANNING—COLLEGE OF VETERINARY MEDICINE

The philosophy of curriculum planning is changing to the viewpoint that course content is the business of the entire faculty rather than of each department. University administrators are recognizing more and more that curriculum programs developed by the entire faculty are superior to those developed by an individual or small group. The professional curriculum should be presented as an integrated unity rather than a series of autonomous fragments.

TESTING AND GRADING

The philosophy of testing and grading is also undergoing change in colleges of veterinary medicine. One college has employed a full-time Ph.D. educational psychologist as a regular staff member. This individual is working with each instructor in order to define course objectives and goals and to improve the testing and grading procedures. One concept that is emerging is that the qualification or certification that students have passed the minimum material required for promotion from one year of professional study to the next is the business of the entire faculty embodied in a committee rather than the business of

the course instructors or department heads. There is a strong tendency to reduce the number of examinations employed and to use the periodic exams during the quarter only as a learning experience for the purpose of letting the students know what is required rather than determining whether the student will pass or fail. Comprehensive examinations given at the end of each year would determine promotion or progress through the curriculum.

SPECIALIZATION IN UNDERGRADUATE PROGRAM

Various groups of specialized interest in the veterinary profession have suggested that some opportunity should be made available for veterinary students to specialize during the undergraduate program. There seems to be a prevailing opinion among veterinary educators in Iowa that the undergraduate program should give a broad exposure to all aspects of the profession. The college of veterinary medicine has the responsibility to give a general background from which the graduate may enter any specialty of the profession. It is important for the graduate to continually exercise the problem solving skills developed during the undergraduate program which will lead to a life-time of learning in any specialty he chooses.

GRADUATE TEACHING PROGRAM

It seems obvious that there will be a great increase in the need for graduate study programs in all colleges of veterinary medicine. This will be necessary to provide training for the undergraduate teaching staff that will be increasing in existing schools and to staff the new schools that will develop during the next 10 years. Also, the need for research workers in industry, research stations, and departments of veterinary science will utilize many veterinarians with the masters of science or doctor of philosophy degree. According to the 1964 survey,[1] approximately 10% of the Iowa State Alumni

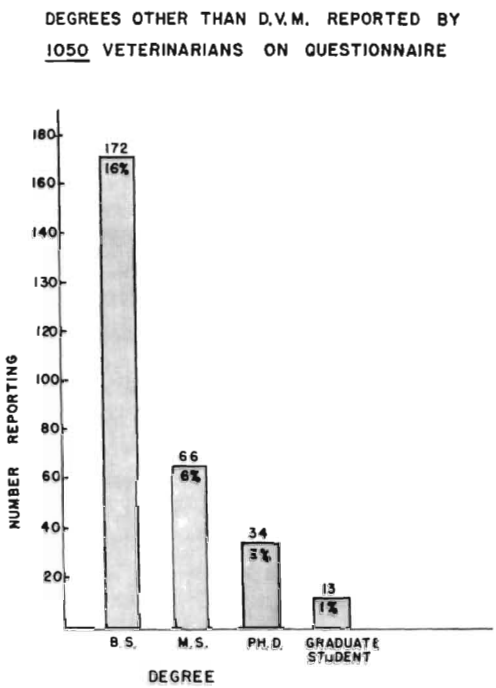

Figure 4

have advanced degrees (Figure 4). Due to increasing opportunities for veterinarians with advanced degrees it would not be surprising if the percentage of veterinarians with advanced degrees would increase during the next 10 years. For this type of program a college of veterinary medicine must have a core of mature Ph.D. trained individuals on the graduate faculty with considerable research experience. This leads to an increase in the number of staff members as well as an increase in quality, level of training and salary. In some instances colleges of veterinary medicine may rely on the graduate schools connected with medical centers or colleges of medicine. When this is the situation, the development of a graduate faculty within the veterinary college is not so essential.

CONTINUING EDUCATION PROGRAM

Social and economic changes are causing adjustments to take place in all commercial and professional activities. Agricultural enterprises and veterinary prac-

[1] Profiles of Veterinary Medical Education in Iowa. This is the questionnaire that was sent to 2126 Iowa State Alumni and members of IVMA in March, 1964. Approximately 50% or 1050 of the questionnaires were returned.

tices are constantly undergoing modifications year after year. Many veterinarians are finding that there is no longer a great need for the service for which their training and experience have prepared them. Some feel inadequate to compete with recent graduates. It has been said that technical and economic advances will eliminate the need for 50% of the veterinarians now in practice within 15 years. As practice changes, other aspects of veterinary medicine will become more important. The opportunities for graduating veterinarians will continue to exceed the number available, but it is likely that the percentage going into practice will decrease each year for the next 20 years. There are some middle aged veterinarians that would like to change from large animal to small animal practice or change to meat inspection, regulatory work or government employment. In order to make this change they will need additional training or retraining. Colleges of veterinary medicine have a responsibility to help in this adaptation process by organizing and conducting continuing education programs which meet the needs of the veterinarians in the region. This places an increased work load on the staff members of the college of veterinary medicine. In addition to regular undergraduate teaching and service work, staff members must work evenings and weekends to prepare for the presentation of short courses. Most faculty members are glad to do this but if this activity continues indefinitely, something will have to give. This work must be carried on because it is very important, but it cannot continue indefinitely on the emergency extra effort basis. As university administrators become aware of the need for these programs, additional staff must be provided to prevent weakening of the undergraduate teaching program.

SPECIALIZATION NON-DEGREE POST-GRADUATE PROGRAM

The concept is developing that there is a great need for post-graduate non-degree specialization programs of study. This would be a program for six months or a year to train graduate veterinarians in specialties such as public health, preventive medicine, laboratory animal medicine, etc. There have been suggestions that some schools are particularly suited for specialization programs because of animal populations around the school and availability of clinical cases. Some specialties that have been suggested are equine, small animal, bovine, porcine, poultry and zoo animal medicine. If this type of program develops it will also require an increase in the number of staff members to carry out the additional instructional program.

NUMBER OF FACULTY MEMBERS

Because of the trend for increased undergraduate enrollments, continuing education, specialization non-degree programs, and graduate degree opportunities it is expected that the staff members of the presently existing colleges of veterinary medicine will double in the next 10 years. Consequently more emphasis must be placed upon the problem of obtaining *good* men and *training* them to teach undergraduate veterinary students. This is the most important function of the colleges of veterinary medicine. A concerted effort to recruit teachers through additional fellowships and scholarships should be developed immediately. At the present rate of proliferation the increasing needs for veterinary faculty will never be satisfied. One of the most important functions of veterinary faculties is to replicate themselves.

PHYSICAL FACILITIES

Due to the increased need for expanded teaching programs of all types as outlined in previous sections, there will be a great requirement for enlarged, improved and modernized facilities. This will include office space for increased faculty members, research facilities for enlarged research programs, enlarged classrooms and teaching laboratories to accommodate increased enrollments, enlarged clinic, hospital and clinical science laboratories. Updating and modernization of classroom facilities is necessary to incorporate new concepts of closed circuit television, programmed learning and learning resources centers with booths for self-service single concept films and Kodachrome slide sets, for inde-

pendent study and review. Also, according to the recommendations of the Council on Education of the American Veterinary Medical Association each college of veterinary medicine should have its own professional library for use by faculty members and students.

Four colleges of veterinary medicine have completed new facilities within the last 10 years and an equal number are planning new physical facilities at the present time. Because of the fact that there is usually little room on most campuses at the site of the original veterinary buildings, there is a tendency for colleges of veterinary medicine to move to the edge of town. This usually allows less expensive land to be used for pasturing animals and plenty of space for future expansion. At Iowa State University there is a trend towards removing all facilities that require housing of large numbers of farm animals from the campus area to outside the city limits of Campustown.

INFORMATION EXPLOSION PROBLEM

The rapid rate of increase of scientific knowledge is almost overwhelming and no longer can any one person know all there is to know about any subject. In the past, new information was merely added to the curriculum as it was accumulated. Over the years this has caused a severe congestion of the professional subject material. The faculty of the college of veterinary medicine is faced with the problem of resolving the problem by deciding what should be left out or what courses can be consolidated to prevent unnecessary duplication or repetition. There is a growing concept that a core of essential subject material should be identified for the veterinary curriculum that can be presented in a four-year course without overloading the students with excessive schedules of lectures and laboratories. Presently it is difficult to find free time for independent study and electives in the veterinary curriculum. Improved methods of presenting material and careful selection of information together with correlation of closely related subjects seems to offer great promise for a solution to this problem.

Colleges of veterinary medicine are contributing to the information explosion through their research programs which create new knowledge. It is good to have undergraduate veterinary students exposed to the research projects that are going on in the veterinary colleges because research is an important part of veterinary medicine. The research programs in a college of veterinary medicine should enhance rather than detract from the instructional program.

METHODS OF TEACHING

The concept is developing that students should be given significant blocks of free time so that they can do some creative independent study under the inspiration and leadership of their teachers. The student-instructor ratio should be improved so that small groups of students can work under the direction of a teacher, especially in the clinics. There is a strong trend in medical colleges for clerkship tutorial teaching of clinical subjects. Under this method, information in clinical sciences is passed on during clinical experiences rather than by lecture or didactic presentation. There are some questions as to whether this can be done in veterinary medicine because of our lack of medical centers, hospitals and collections of specialists as the medical profession has. There are opportunities in veterinary colleges to employ clinical conferences and student participation to a greater extent than has been done in the past. Exploitation of these opportunities will require an increase in the number of staff members in the clinical teaching laboratories and hospitals of our veterinary colleges. There is a trend for more emphasis on bringing more basic science into clinical teaching, primarily by supplementing the clinical staff with individuals that have excellent foundation training in the basic science areas.

A changing concept that is being discussed in relation to veterinary medical education at great length is correlation of related subject material. Courses like anatomy, biochemistry and physiology can be arranged so that they follow one another hour by hour in the time schedule.

The same can be done for medicine, pathology and infectious diseases. By placing these courses close to one another in the time schedule the opportunity is created for team or cooperative teaching by instructors from the various departments involved. Efforts to correlate material in this way must be carried out over a period of time in a transitional manner because it is necessary to revise laboratory manuals, lecture schedules, and text materials. A committee or team of instructors representing three different departments must develop experience working together by sitting in on each others lectures and holding frequent meetings for planning how the material will be presented. This will take more time than traditional or conventional methods of teaching and will ultimately lead to the necessity for increased numbers of faculty members. Proponents of this method of instruction maintain that material can be covered in less time and that this method is more stimulating to the student and makes better use of the student's time.

The technology of teaching has developed a great deal during the last 10 years. Now closed circuit television is available. Some schools are experimenting with programmed instruction and learning resources centers which have single concept films, Kodachrome slide sets and teaching machines. These innovations tend to stir one's imagination to think about future possibilities for making the best use of the student's instructional time. The test of time will reveal the ultimate value of these methods. The results can be no better than the effort put into the preparation of the material that is presented by means of automatic and technological advances.

VETERINARIANS AS HIGHLY TRAINED SPECIALISTS

Each year there seems to be increasing opportunities for veterinary graduates in positions other than private practice. The trend for group practices in large animal has not progressed much farther than the two-man practice or partnership. Some larger groups have developed in small animal practices with considerable application of scientific principles and specialization. When this occurs the professional man begins to function as a member of a team working cooperatively within a group for a common purpose. The same is true in government, commercial, military, education and research employment of veterinarians. The opportunities for this type of employment are increasing each year.

Despite the fact that many people think the number of veterinarians required in large animal practice is decreasing, there will be an increasing demand for a supply of health program preventive medicine specialists for large animal programs that are capable of advising livestock operations from their inception and organization with follow-through on vaccination and testing programs for agricultural livestock enterprises. This will involve specialized knowledge of husbandry, genetics, ecology, nutrition and epidemiology. A new type of large animal practitioner may develop in the future that will function more like an attorney by virtue of being paid for what he knows and what advice he gives rather than how many farms he can visit each day. It may be necessary to train individuals as veterinary assistants to work under the direction of these highly trained specialists to conduct the day-to-day work and animal manipulations that are necessary in the program that is planned.

VETERINARY TECHNICAL INSTITUTE

A technical institute might be considered as a future part of the veterinary college that would train, in a two-year program, individuals that are interested in working with animals but do not want to spend 6 years studying chemistry, physics, mathematics, anatomy, etc. at the university level. Some examples of the positions that technical institute graduates might fill are: research laboratory technicians, lay meat inspectors, veterinary nurses who could specialize as either small animal attendants or large animal assistants. A stipulation of the training and licensing procedure would be that these individuals

must work under the direction of a highly trained veterinary specialist.

CONCLUSION

Many of the changing concepts in veterinary medical education are applicable to the instructional program in the College of Veterinary Medicine at Iowa State University. Some have already been embodied in the curriculum revision.

There are limitations to how far the changes can be carried because of administrative details such as funds for facilities, salary increases, new staff appointments, and cost of technological teaching equipment. The most important aspect of veterinary medical education is to have enthusiastic teachers and interested students in an environment of mutual learning which instills the habit of finding the information for problem solving that will lead to a life-time of learning in the veterinary medical profession.