Animal Facilities in Medical Research: Final Report (1964)

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FOREWORD

This is a final report of the work of the Institute's Committee on the Animal Facilities Survey covering the examination of laboratory animal facilities, space, equipment, budget, personnel, and training in 561 nonprofit, non-federal medical research institutions in the United States. The data contained in this report is a compilation of the material obtained from 58 institutions which were site surveyed as well as that obtained from questionnaires mailed to the remaining 503 institutions.

The site visits to 58 institutions in five geographic areas of the U. S. were completed during the first four months of 1961. The ten members of the survey teams and the Chairman of the Committee, Dean W. T. S. Thorp of the University of Minnesota College of Veterinary Medicine, devoted much time and energy to the completion of this study, and their efforts are gratefully acknowledged by the Institute. Dr. William I. Gay, Animal Resources Branch, Division of Research Facilities and Resources, National Institutes of Health, rendered valuable assistance to the Committee in the design of the survey, the questionnaire and the final report. The deans and directors of the institutions included in the survey were most cooperative and extended many courtesies to the site visitors. Cooperation by the Association of American Medical Colleges, American Veterinary Medical Association, American Dental Association and American Hospital Association aided greatly in the successful completion of this program. Mr. Jacob E. Lieberman of the National Heart Institute was of tremendous assistance to the Institute staff in preparing and evaluating the material.

A total of 503 institutions responded to the mailed questionnaires, supplying data for the year 1960. Appreciation is expressed to those individuals who gave generously of their time to provide the information requested.

INTRODUCTION

The care and management of laboratory animals is an integral part of research in biology and medicine. Recently, laboratory animal medicine has evolved as a specialized professional field with the responsibility of providing proper maintenance of experimental animals in research institutions. This development is a natural outgrowth of the increased financial support of medical research in recent years, of the consequent increase in the numbers of laboratory animals used, and of the great refinement in research techniques which requires better quality animals and animal care.

Medical research programs seem destined for further expansion in the future, with an increase in numbers of animals required. This will require an increase in facilities and personnel for laboratory animal care. However, a detailed analysis of the present status of this field should precede any expansion in these programs. Without this information, it would be difficult or impossible to estimate future requirements and to determine where the greatest emphasis is needed. For this reason, the Office of the Director, National Institutes of Health, expressed interest in Academy-Research Council sponsorship of a survey of laboratory animal facilities in nonprofit, nonfederal medical research institutions in the United States.

The Executive Committee of the Institute of Laboratory Animal Resources approved the submission of a grant proposal for this survey on July 27, 1960. On November 5-6, 1960, a conference of twelve veterinarians, experienced in laboratory animal care, was held to recommend the extent of

the survey, develop an appropriate questionnaire and recommend the institutions to be site surveyed. Approximately fifty nonfederal, nonprofit medical research institutions in the United States were chosen, and their laboratory animal facilities evaluated with respect to space, equipment, personnel, budget and administration. The objectives of the study were to determine the present status of animal care in these institutions, and to obtain estimates of their present and future requirements to assure proper care of their experimental animals.

The Division of General Medical Sciences, National Institutes of Health, provided funds for the survey, for the period January 1 - December 31, 1961. (The termination date was later extended to September 30, 1962.) It was conducted according to the following plan: Approximately ten research institutions, in each of five geographic regions in the United States, were selected for site visits. Letters were written to each institution soliciting assistance in conducting the survey. Ten of the veterinarians who participated in the preparatory conference were designated as regional consultants. They made the actual surveys, operating as two-man teams in each region. A total of 58 institutions was surveyed. Some institutions could not answer all questions since the information requested was not available or the question was not applicable. Excellent cooperation was received from the personnel of all institutions surveyed. After each site visit, the survey teams returned the completed questionnaire to the Institute of Laboratory Animal Resources; and the information was tabulated by the Institute staff. The regional consultants then met to prepare a report which was published as ANIMAL FACILITIES IN MEDICAL RESEARCH - A Preliminary Study.

Since the data obtained could not be applied to all institutions across the country, the remaining institutions were requested to supply

information by way of mailed questionnaires. Many questions on the general site survey questionnaire did not apply to the research situation existing in the majority of hospitals. A one page questionnaire was drafted for use by these institutions. Completed questionnaires were returned to the Institute of Laboratory Animal Resources and the information was tabulated by the Institute staff. The members of the Committee then prepared this final report.

Data contained herein was obtained from the numbers of various institutions in appropriate geographic areas noted in the following table:

NUMBERS OF INSTITUTIONS PARTICIPATING

	MEDICAL	VETERINARY	DENTAL	PRIVATE LABS	HOSPITALS
Northeast	22	2	13	10	134
Southeast	22	3	3	3	60
North Central	17	6	12	6	119
South Central	9	4	5	3	33
West	9	3	5	2	56
TOTALS	79 (86)	18 (18)	38 (51)	24 (37)	402 (620)

Total number of institutions: 561

The numbers in parentheses represent the total number of questionnaires sent to the various institutions.

It must be emphasized that conclusions drawn in this report are only as accurate as the information supplied on the questionnaire and also reflect the individual experiences of the site surveyors.[1/]

1/ Objective criteria and standards for evaluating animal care have only recently become available with the publication of the Guide for Laboratory Animal Facilities and Care, U. S. Public Health Service, March, 1963.

SUMMARY OF RECOMMENDATIONS

The recommendations that follow are based on the findings summarized in this report, and on the opinions of the Committee regarding the further progress of laboratory animal care. They follow the organization of the report and are not necessarily in the order of their importance.

1. Professional direction of animal care facilities - In an institution providing animal care services on a centralized basis, the administration of this department is best vested in an individual professionally qualified in laboratory animal medicine. In addition to his primary responsibility for directing animal care activities, this person should also serve as a consultant to the professional staff on laboratory animal problems, teach in areas in which he has professional or academic competence, and engage in appropriate research. In academic institutions the director should qualify as a member of the faculty, rather than serve as an administrator without academic status. In small institutions this responsibility may, of necessity, be given over to a part-time professional consultant or to a research investigator experienced in laboratory animal care. The plan outlined in Figure 1 is a summary of the administrative structure considered desirable by the site visitors, based on their visits to 58 institutions. Since this figure is a chart of specific duties, in smaller animal care organizations, the same duties may be partially combined and performed by fewer individuals. Obviously, this schematic arrangement may require adjustment for each institution; however, the basic pattern of the administrative design need not be altered.

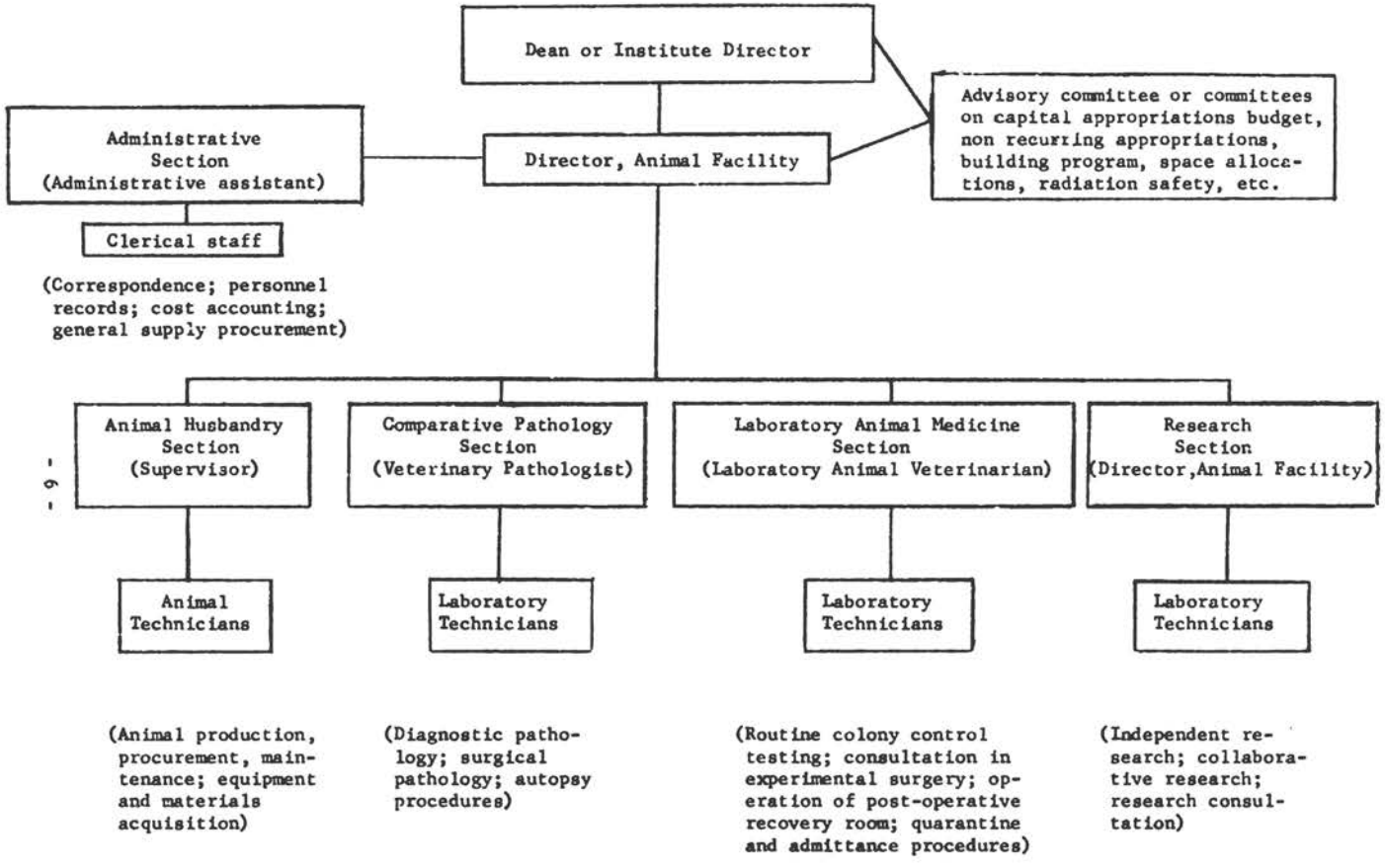

Figure 1. General Plan of Administration for Central Animal Facility

2. Advisory committee on animal care - An advisory committee on animal care (or committees on various aspects of animal care) is helpful in advising the Dean or Director of the institution and the animal care department on policy matters, although this need not be the sole area in which advice is rendered by the committee to the head of the institution. This committee should be representative of both the major and minor users of animals. The director of animal care should be a member of this body. The animal care committee should be kept small, if possible. The committee structure provides an equitable method for adjudicating the various departmental needs for equipment and space.

3. Centralization of facilities - Wherever feasible, laboratory animal maintenance colonies and service areas should be physically centralized within a research establishment, and under the administrative control of a professional director. Even where such physical centralization is not possible, central administrative control of the animal colonies may still be feasible. It appears that, as an institution moves toward greater centralization of animal facilities, greater efficiency of operation and an increase in the quality of animal care is obtained.

4. Adequate financial support - An efficient institutional animal care program can be achieved only when adequate financial support is available. A fair proportion of budgetary support for these facilities should be provided by the institution, in order to assure a high level of animal care.

5. Provision for maintenance, improvement and replacement - Financial provision should be made for the maintenance and improvement of existing facilities, and for necessary equipment and its replacement.

6. Proper cost accounting - Each institution should maintain financial records to provide an accurate summary of the various costs for the animal care operation. These records should include the costs for equipment, materials and animals, building and equipment depreciation and charges for utilities, as well as the cost of labor and professional assistance.

7. Additional animal holding, quarantine and disease diagnosis and treatment areas - Most of the institutions examined need supplementary space and equipment for the maintenance of animals, their quarantining, and for the diagnosis and treatment of their illnesses.

8. Laboratory animal disease research - The importance of research on laboratory animal diseases in relation to the problems of diagnosis, prevention and treatment cannot be overemphasized. However, the experiences of the site survey teams appear to indicate that much of what is described as investigation into laboratory animal diseases is, in fact, little more than casual observations of animals. Support should be given to the expansion of research into the diseases of experimental animals.

9. Need for research on environmental controls - A concerted effort should be made to increase the amount and quality of research into the environmental requirements of experimental animals. Such items as humidity, air circulation, air filtration and air conditioning demand increased research before accurate standards for the physical ecology of laboratory animals can be recommended.

10. Construction of animal facilities - In many laboratories, the animal care service is housed in quarters originally planned for other purposes. This has increased both the difficulty and the cost of operating such facilities. Institutions should be encouraged to design and construct efficient facilities

specifically for experimental animal housing. In many instances significant savings in both capital and operating expenses could be realized by the construction of new well planned animal quarters.

11. Renovation or reconstruction of existing facilities - In spite of the need for specifically designed animal facility buildings noted in 10 above, the funds necessary to carry out this recommendation may not become available immediately. However, significant progress in the housing of experimental animals can be made by the renovation or reconstruction of existing facilities.

12. Emphasis on the preventive approach to disease control - The need for additional space for quarantine and disease diagnosis and treatment areas was suggested in 7 above. The availability of such facilities and the necessary trained personnel and equipment would aid the implementation of a preventive approach to the control of enzootics and epizootics which are primary hazards of the animal house.

13. Training opportunities in animal care at the professional level are also improving with the development in recent years of research training programs at a few universities where there is some emphasis on problems of laboratory animal diseases.[2/] Also, residency programs in laboratory animal medicine have been established in the military.[3/] Similar programs are needed in nonfederal biomedical research institutions where post-doctoral training

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2/ Post-doctoral training is now available at the Bowman Gray School of Medicine, Winston-Salem, North Carolina, the New York University, New York City, the University of Michigan Medical School, Ann Arbor, Michigan, Tulane University, New Orleans, Louisiana, and the Ohio State University, Columbus, Ohio.

3/ A program for Air Force veterinarians is also in operation at Brooks Air Force Base, San Antonio, Texas.

in laboratory animal medicine can be made available. At the present time there is no means of support available for such programs.

14. Training opportunities for animal technicians - Several training programs for nonprofessional laboratory animal personnel have been offered in the United States. However, these courses are not yet reaching the majority of the persons involved in the day to day operation of experimental animal colonies. The availability of these programs should be increased greatly.

15. Career opportunities for animal technicians - Concomitant with the increased insistence upon training, the vocation of animal technology should be upgraded. The modern "animal technician" is not the old time "laboratory diener" or the modern "janitor." The same prestige accorded those in the field of medical technology should be given to laboratory animal technicians; and their salaries should be commensurate with the knowledge and skills demanded of them.

16. Responsibility of investigators and administrators - These recommendations can be realized only if there is enlightened recognition, by research workers and institutional administrators, of the importance of the care of experimental animals to modern biomedical investigation.

Section I - Animal Use and Procurement

The proper evaluation of an institutional animal care program must take into account the size of the institution and the number of laboratory animals involved in its research, teaching and service programs.

Table 1 summarizes the use of thirteen species in 1960. Table 2 provides information on the use of laboratory animals in the categories of research, teaching and service by the various institutions. Table 3 is a summary of total animal use in these three categories.

Sources of animals used are summarized as a percent of total number reported in Table 4. They are divided according to whether the animals are bred within the user institution, obtained from commercial sources, collected from nature or obtained from other sources. The large number of dogs and cats obtained from pounds demonstrates the importance of this source to research institutions. In addition, a large percent of dogs and cats "purchased commercially" had municipal pounds as their point of supply with a commercial vendor intervening. The large percent of primates collected from nature is largely the result of direct collection in Africa by one institution.

Section II - Administration

Administrative organization of animal care facilities does not fit a single pattern for all institutions.

Obviously, the diversity in function of these institutions accounts for some of the differences. The administrative organization of these facilities will generally fall into one of three general categories: Centralized, non-centralized or a combination of the two.

The centralized facility may be housed in one building or area, and thus physically centralized, or it may be widespread, yet administratively under centralized directorship. This places animal procurement and maintenance responsibilities with one individual or group. Such a centralized unit may be under the directorship of one individual or possibly a committee.

The noncentralized facility is more often than not dispersed with management problems being the responsibility of those utilizing laboratory species. It is, however, possible to have a physically centralized unit which is administratively not centralized; that is, being located in one area or building but each department providing for its own animal procurement and maintenance.

The combination of these two would be the third broad category: A unit with several departments under one director and several other departments maintaining their own facilities.

Of the 493 institutions responding to this question, 60.9% had centralized facilities with an individual breakdown as follows: Medical schools, 39.2%; Veterinary schools, 5.6%; Dental schools, 73.1%; Private laboratories, 50%; and Hospitals, 68.3%.

Table 5 shows the variations possible in direction of animal facilities in the various institutions. More specific details of organization structure are obtainable only from those institutions which were site-surveyed.

Section III - Personnel and Training

Research workers in all of the institutions surveyed have accepted the concept that proper care of laboratory animals is essential to the success of their investigations. They recognize that the adquacy of animal care

is determined by the competence and training of responsible professional and non-professional personnel. Accordingly, investigators are supporting efforts by national professional and scientific organizations to promote a more adequate career opportunity for these personnel.

In the experience of the site visitors, the present overall performance of animal care is greatly superior to that practiced as recently as 10 years ago. In many of the institutions professional personnel with excellent training and experience now direct or supervise animal care; the training of animal technicians has improved, and this has resulted in improved sanitary conditions, disease control, and better handling and management of animals. Despite unquestioned progress, however, certain problems related to personnel are hindering some institutions from achieving the best possible standards. These are listed below along with suggestions for dealing with them.

1. Professional direction for animal care activities.

Data contained in Table 5 are also pertinent to this topic. Of the 143 medical, veterinary and dental schools and private laboratories, 30.8% are under professional direction. Of the 351 hospitals reporting, 58.7% are under professional supervision. These two figures could create misimpressions if the word professional director was interpreted to mean the same thing in all cases. It is reasonably safe to assume that the figure for hospitals represents individuals trained in a variety of disciplines and acting as part time directors of animal care units whereas the former figure can be considered to be made up predominately of veterinarians with either formal training or experience in the discipline of laboratory animal medicine.

As a natural consequence of the increasing specialization of research, not all investigators have the experience and training to provide completely

for their animals under modern laboratory conditions. In most institutions, animal facilities must be shared by many research workers. Frequently, this complicates the problems of disease control, utilization of space, management of personnel, and other related problems. These conditions present the investigator with administrative responsibilities which are not germane to his function.

It would appear that provision for adequate professional supervision is essential in promoting further progress of laboratory animal care. All institutions, regardless of size, should have access to professional knowledge and skills in this field. Those installations having extensive research programs should consider full time direction of their animal care programs. In smaller institutions, part time consultation with specialists may be feasible; or a member of the staff with appropriate experience could devote the time necessary to assure the adequacy of animal care.

2. Career opportunity for animal technicians.

Ultimately, the quality of animal care depends on the skill with which animal technicians meet their daily responsibilities. In some institutions the care of animals is organized primarily as a custodial rather than a technical activity. The salary scale for this group frequently is based on a comparison with building maintenance positions rather than with more skilled laboratory or craft positions. These limitations greatly restrict the development of career positions for animal technicians, and add to the difficulty of recruiting better quality personnel. In spite of these restrictions, the site visitors were impressed with the obvious devotion of many technicians to the animals in their charge, and with the dependence of the professional staffs on these people for effective day-to-day operation of the animal facilities.

In some institutions the decentralized organization of animal care also serves to limit the opportunity for animal technicians to develop comprehensive skills. For example, a technician employed by one investigator to care for mice may have no opportunity to learn about the care of rabbits, even though both activities may be carried on in close proximity to each other. In this situation it is difficult to promote uniformly high standards and a broad interest in laboratory animal care.

In 1960 there were 4,944 full time animal care technicians according to the data collected by site surveys and mailed questionnaires. By including part time animal care technicians on a man-hour basis for an eight hour day a total of 5,088 full time caretakers is derived.

3. Training of animal care personnel.

In some instances inefficient animal care could be attributed to inadequate training of animal care personnel. If there is limited professional competence in an institution's laboratory animal care program, animal technicians cannot be well trained. Proper training is not simply a matter of association of technicians with laboratory animals. It requires systematic presentation of a specific body of information, as well as the acquisition of manual skills. Table 6 depicts the various types of training offered to lay personnel in biomedical instituions.

Recently, animal technician training courses have become available through the Technical Guidance Committee of the Institute of Laboratory Animal Resources, and through the Animal Care Panel and its local branches. A technician certification program has been initiated by the Animal Care Panel. Films, books, pamphlets, and even a correspondence course for animal technicians are available.

Training opportunities in animal care at the professional level are also improving. Post-doctoral training in laboratory animal medicine is available in a few institutions and several institutions offer graduate courses in the care and use of animals.[4/]

In summary, substantial progress is being made in improving animal care through improved personnel performance. However, not all institutions yet have achieved the best possible standards. There is need for additional professionally trained directors of animal facilities, for better status and salary for animal technicians, for better training of animal care personnel, and for informing administrators of research institutions and investigators themselves of these needs.

Section IV - Building, Space and Environmental Controls

Increased emphasis has been given to experimental animal housing in recent years as evidenced by Table 7 showing the dates of origin of building and Table 8 giving dates of renovation in the various institutions. The possibility that Health Facility Research Act funds have had a substantial effect on construction is evidenced by the amount of building noted in the 1951-61 period. (Tables 7 and 8.) Despite this construction and renovation activity, the majority of those institutions site surveyed were in need of renovation or new construction. Renovation needs included resurfacing of walls and floors, installation of better ventilation and air handling equipment, enlargement of sewer drainage and reduction of animal population density in some areas.

4/ The recently established Committee on Professional Education of the ILAR is undertaking an evaluation of the need for pre- and post-doctoral training in the field of laboratory animal medicine so that recommendations may be proposed for fulfilling the much needed requirement for individuals with training in this discipline.

Table 9 is an accumulation of figures pertinent to floor space in animal rooms and service areas, farm animal facilities and outdoor housing. It also includes total net research space for the various institutions. Figures in parenthesis represent the number of institutions reporting.

A general lack of specialized holding areas such as quarantine facilities for incoming animals was noted by the site surveyors. Site visitors frequently were informed that these areas were planned originally; but the increased demand for animals had resulted in their sequestration and conversion to use as experimental animal maintenance quarters. Shortages of storage space and other service facilities of the animal quarters also were noted. Progress in enlarging animal facilities, while marked over the past few years, has kept up with the demand only by "borrowing" space from areas originally planned for supporting activities. As a direct result these necessary support activities have been slighted in some institutions. It is essential to allow for an increase in facilities for laboratory animal care to parallel that of the increase in research facilities.

Of 493 institutions reporting, 66% had a thermostatically controlled heating system; 51.3% reported air conditioned quarters, 14.4% had partial and 27.0% had no air conditioning. Table 10 indicates the number of air changes per hour in the various institutions. Of the 152 institutions reporting, 57.2% had no recirculation of air, 52.0% had filtering systems, and 13.8% had pressure controlling systems.

Information on the precise environmental requirements of many species is needed since future research will require better control of the laboratory animal environment. Much of the fundamental research on disease problems is now concerned with chronic diseases. Animals used in these programs will

have to be maintained for long periods of time. Such animals must be kept free of extraneous diseases. Where the environment is carefully controlled this objective can more easily be realized.

Progress in estimating the space and environmental requirements of experimental animals has been made in the past few years. Much empirical information has been gathered by surveys of outstanding installations. Investigations of these problems should be encouraged, specifically the talents of biological and physical scientists, and those of specialists from architectural and engineering fields should be brought to bear on the problems of the laboratory animal environment.

The Federal government makes significant contributions to animal care in research grants. Better utilization of research grant expenditures could be realized if specific grants were made for the construction and equipping of modern experimental animal facilities resulting in increased research productivity. Such facilities should be encompassed in the long range plans of the institution. In many of the laboratories visited, the site visitors noted that old animal quarters have not been vacated when new facilities were completed; but have been continued in use because of failure to anticipate long range plans.

It cannot be emphasized too strongly that the budgets should include adequate funds for the maintenance and needed expansion of animal care facilities. Specific budgeting consideration should be given to the modernization of these facilities where needed. Institutional administrators frequently underestimate the cost of maintaining animals. Some may include only the initial procurement expense; and fail to take into account the true maintenance costs and depreciation expenses for cages and equipment. Supplemental

expenditures made specifically for these purposes as well as for such items as resurfacing walls and ceilings, and improvement of ventilation and drainage systems would be prime investments.

Section V - Equipment and Materials

Metal is the most widely used material for the construction of cages for animals (Table 11). Ease and thoroughness of cleaning and maintenance as well as the length of useful life are the primary reasons for the use of metal cages. Stainless steel is a desirable metal for cage construction, not only for the aforementioned reasons, but also because of its high resistance to corrosion by animal discharges, detergents, solvents and cleaning compounds. Galvanized metal is the most commonly used metal. The high percentage figure for stainless steel mouse cages, given in Table 11 was strongly influenced by one private laboratory. High impact plastic cages are also widely used.

One-half or less of the institutions surveyed had post-operative recovery rooms for animals (41%), cage washing machines (32%), and autoclaves (50%) for bedding and equipment. (This suggests a need for greater emphasis on providing specialized facilities and equipment, since it is apparent that institutions need them for proper operation of their animal colonies.)

Regardless of the physical state of buildings and equipment, the quality of animal care was generally good. In some institutions, despite the use of old facilities and equipment, service was adequate because of good management. In contrast, in a very few institutions with superior cages, equipment and quarters, poor management or overtaxing facilities resulted in animal odors, poor cleaning and cluttered rooms.

Section VI - Disease Control

The site surveyors noted that there was a lack of emphasis on disease control in laboratory animals. Few institutions have adequate quarantine and isolation facilities and procedures for newly arrived animals. In only a limited number of facilities was there sufficient space for quarantining all incoming animals. Because of ordering procedures there was rarely sufficient time to do so. Necropsies were performed routinely for all colony deaths only in rare instances and predominately in veterinary schools. In the remaining institutions, they were made only upon the request of the investigator. Occasionally, necropsies were performed when the laboratories were not sure of the causes of death.

Of 152 institutions reporting, 61% indicated that they had facilities for the treatment and diagnosis of animal diseases. This figure may well be misleading, since many institutions included clinical research or diagnostic laboratories as representing facilities for the treatment and diagnosis of animal diseases. Such laboratories might be used for these purposes, but, in practice, seldom were.

Twenty-four percent of 152 reporting institutions indicated that they were investigating diseases of laboratory animals incidental to their research programs. It was the opinion of the surveyors that many of these projects in the institutions visited, were in the nature of casual observations on animals rather than research on a particular infectious disease problem.

Access to certain areas by laboratory personnel was restricted for disease control purposes in 36% of the reporting institutions. Although all

institutions practiced some form of insect and rodent control, methods of control varied greatly. About 40% employed commercial rodent control firms.

Most of the institutions (84%) required animal care personnel to wear other than street clothing. Most of the clothing (84%) was furnished and laundered by the institutions.

Incineration was the most common method of disposing of animal carcasses and animal refuse, although central collection services were also used.

It would appear that the general attitude toward disease control stems from a concept prevalent in the institutions themselves - that the chief function (and perhaps the only function) of the animal area is as a holding and service area. Most individuals recognize the need for competent management of disease problems once a research project is launched. However, few seem to appreciate the value of a "preventive medicine" approach. Such an approach should, and would, provide better quality animals. Far more than buildings and funds are required to improve laboratory animal care. Medically trained personnel and space and equipment for diagnosis and treatment are also needed.

Section VII - Budget

A. Site Survey Data and Impressions:

Of the total number of institutions comprising the field survey group, only 32 gave information sufficient to determine that proportion of the entire research budget utilized in the care of animals. The percent of the total research budget allocated to professional and non-professional salaries, supplies, equipment and operating costs for the animal facility ranged from 1.0% to 33.3% with an average of 6.76%. The average percentage of research

funds available for animal care in 19 medical and dental schools was 5.42% while that for 5 veterinary colleges was 9.31%.

The same 32 institutions mentioned above were subjectively rated by the survey consultants as having a generally "good", "fair", or "poor" standard of animal care. Sixteen institutions, under these subjective criteria, rated "good", eleven "fair" and five "poor". It is interesting to examine the amounts of the research funds allotted to animal care services in the three categories. For the 16 laboratories considered "good", the funds available for the animal care service averaged 8.4% of the research budget. The percentage for "fair" institutions averaged 5.3% while those in the "poor" category spent an amount of the research funds having a mean of 5.0%. Actually, the latter figure is probably far smaller than indicated simply because institutions rated as "poor" rarely provided sufficient data on research budgets and animal service costs to allow an accurate determination of the proportion of research monies expended on animal facilities and service. The cost information provided suggested that less money was provided animal care activities in "poor" laboratories than in "fair" or "good" ones.

The question was asked concerning the percentages of the animal care budget which were derived from Federal, institutional, and nongovernmental sources. Thirty-four institutions replied to this inquiry. Taking these establishments as a whole, 40.4% of the monetary resources for animal care were obtained from Federal sources, 44.1% from institutional funds and 15.5% from nongovernmental sources. The percentages of the animal facilities budget obtained from these three funding categories varies markedly with the type of institution. Table 12 shows the variation in percent of support

provided the 428 institutions surveyed by the site visit or mailed questionnaires.

Some institutional budget administrators found it impossible to estimate expenditures for animal care. This was particularly apparent at institutions with decentralized animal care programs. Animal care was supported largely by contracts and research grant awards which provided for the purchase of animals, feed, and labor, but covered major overhead expenses such as purchase of equipment, depreciation, and repairs only incompletely. Few of these institutions were able to report their animal care costs accurately. At institutions with a central animal care program, cost records were readily available. Operating funds were derived primarily from charges (per diem) levied against research grants for the care and maintenance of the research animals. The per diem charges were usually determined by totaling the costs in the above noted categories.

B. Cumulative data from site surveys and mailed questionnaires:

Refer to Table 13. The number in parenthesis is the total number of institutions reporting; the other numbers represent the total values for respective descriptions.

The cost for purchase of animals by institutions (Table 14) and by regions (Table 15) is included.

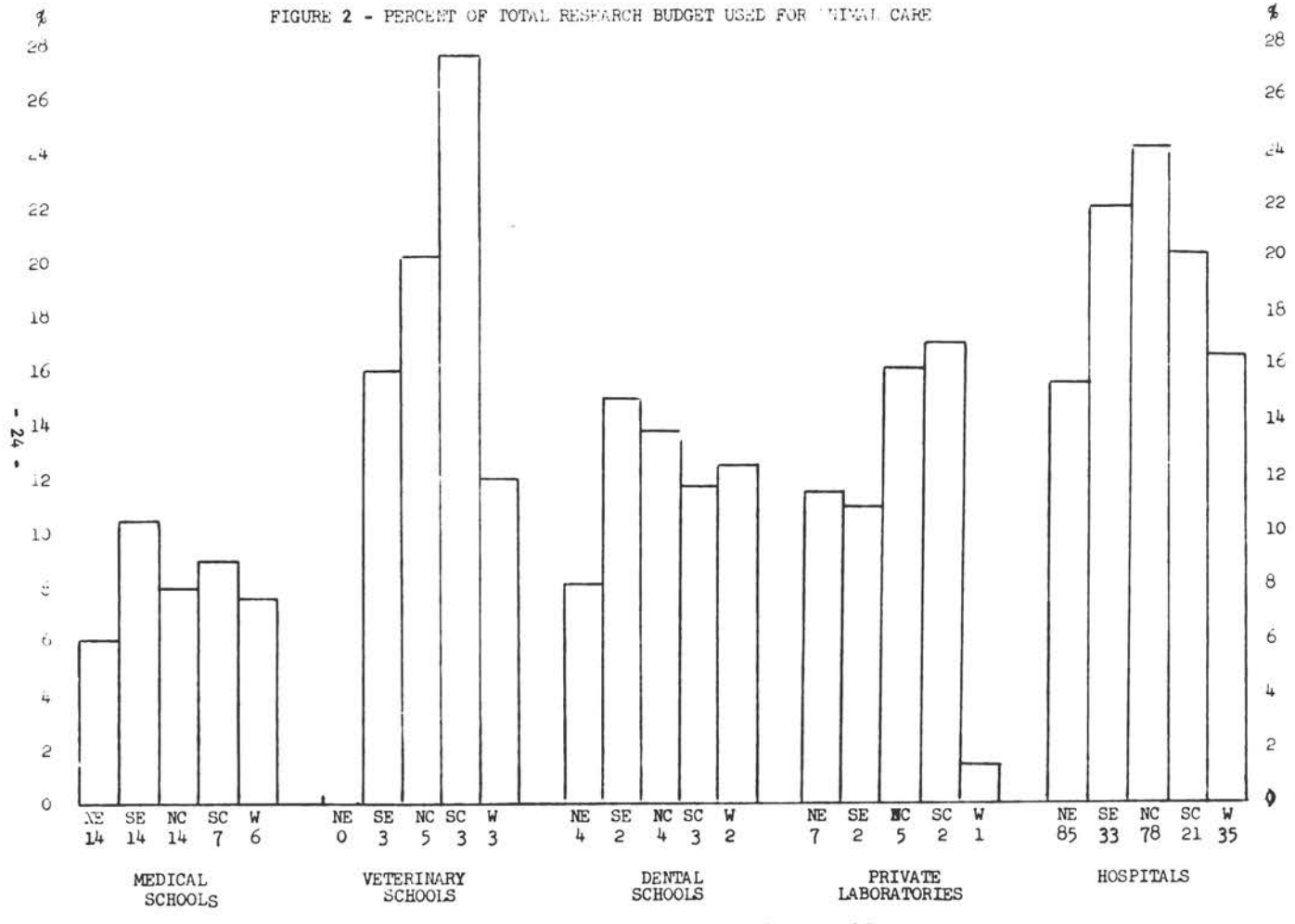
Figure 2 shows the average percent of the total research budget used for animal care by the reporting institutions.

Section VIII - Unfilled Requirements

A. Site Survey Data and Impressions:

Two of the items on the questionnaire concerned unfilled requirements in the areas of personnel and training, and buildings and equipment. Although the responses were difficult to analyze, the following summary seems appropriate.

FIGURE 2 - PERCENT OF TOTAL RESEARCH BUDGET USED FOR [illegible] CARE



Number of Institutions Reporting from Designated Geographic Areas

Eleven (19%) of 58 institutions failed to answer the question of personnel and training. Twenty-six (45%) stated they had no unfilled needs in this area. While this proportion of the total is high, it should be noted that many of these institutions, because of the vagueness of administrative responsibility and the loose budgetary control of animal care activities, probably are not aware of many existing personnel and training requirements. The remaining 21 laboratories (36%) listed a total of twenty-nine personnel and training needs. They can be categorized as follows:

Professional animal care director	-	11	(38%)
Additional nonprofessional supervisory personnel	-	2	(7%)
Additional animal caretakers	-	11	(38%)
Personnel manager	-	1	(3%)
Training programs for research staff and animal facility staff	-	4	(14%)

Fifty-five institutions replied to the question on unfilled building and equipment needs. Ten of these (18%) had no construction or equipment problems. The remaining 45 (82%) listed requirements under this section of the questionnaire. Twenty needed new buildings; 7 would like to centralize animal facility operations and space. Thirty-nine of the requisites concerned equipment. The following listing summarizes equipment needs:

Cages	10
Cage racks	2
Cage washing machines	9
Autoclaves	7
Incinerator	1

Germ-free isolators	1
X-ray machines	1
Air conditioning equipment	4
Air filtration equipment	1
Animal disease diagnostic equipment	3

Finally, a total of 60 separate comments concerned needs for animal facility space. The following types of space were noted:

Animal holding space	11
Additional small animal rooms	7
Dog kennels and exercise areas	8
Additional space for breeding of dogs	2
Space for maintenance of pathogen-free animals	3
Experimental dog surgeries	4
Quarantine and animal treatment rooms	10
Space for animal disease diagnosis	3
Remodeling of existing facilities	12

B. Cumulative Data Obtained from Site Surveys and Questionnaires:

Table 16 shows the needs for both funded and non-funded buildings and equipment as well as projected ten-year needs.

TABLE 1

ANNUAL USE OF SPECIES
(TOTALS BY INSTITUTION)

SPECIES	MEDICAL	VETERINARY	DENTAL	PRIVATE LABS	HOSPITALS	**TOTALS
Mice	(78) 1,662,126	(17) 59,614	(20) 24,725	(17) 2,318,650	(155) 574,538	4,639,653
Rats	(78) 735,273	(18) 17,696	(19) 22,671	(16) 287,634	(152) 202,772	1,266,046
Hamsters	(58) 41,166	(9) 1,172	(13) 4,430	(7) 73,660	(45) 11,024	131,452
Guinea Pigs	(77) 110,439	(17) 14,845	(15) 1,728	(13) 13,135	(156) 30,738	170,885
Rabbits	(77) 122,246	(18) 6,995	(16) 871	(13) 17,118	(186) 40,131	187,361
Rhesus Monkeys	(56) 5,350	(2) 18	(10) 131	(7) 1,614	(35) 2,846	9,959
Other Primates	(23) 1,228	--	(1) 20	(3) 407	(11) 1,289	15,938
Dogs	(77) 120,603	(16) 9,403	(15) 1,207	(6) 3,296	(198) 46,962	181,471
Cats	(74) 37,113	(15) 1,692	(4) 327	(5) 781	(50) 6,002	45,915
Poultry	(65) 54,854	(17) 31,369	(2) 7,690	(8) 16,606	(2) 1,972	112,491
Swine	(17) 533	(15) 3,176	(1) 6	(3) 646	--	4,361
Sheep	(30) 654	(14) 3,326	--	(2) 10	--	3,990
Horses	(5) 9	(14) 678	--	(2) 8	--	695

**The variation in total figures is due to many institutions providing answers to one question or series and not to others.

The numbers in parentheses represent the numbers of institutions responding.

TABLE 2 - TOTAL USE OF SPECIES AND PERCENTS USED FOR RESEARCH TEACHING AND SERVICE

	MEDICAL SCHOOLS			VETERINARY SCHOOLS			DENTAL SCHOOLS			PRIVATE LABORATORY			HOSPITALS		
	Total Used			Total Used			Total Used			Total Used			Total Used		
	% Res	Teach	Serv	Res	Teach	Serv	Res	Teach	Serv	Res	Teach	Serv	Res	Teach	Serv
Mice		1,636,353 (76)			59,574 (17)			24,525 (20)			1,904,559 (17)			63,887 (8)	
	92.3	6.3	1.4	71.4	17.2	11.4	78.7	21.3	--	98.6	0.4	1.0	70.4	4.3	25.3
Rats		712,871 (76)			17,696 (18)			22,370 (17)			284,023 (16)			29,994 (8)	
	89.5	8.9	1.6	70.1	26.3	3.6	96.0	4.0	--	96.2	0.3	3.5	95.9	4.0	0.1
Hamsters		40,852 (55)			1,162 (9)			4,230 (12)			73,655 (7)			2,934 (4)	
	98.1	0.8	1.1	73.2	12.8	14.0	97.6	2.4	--	100	--	--	100	--	--
Guinea Pigs		109,277 (75)			14,845 (17)			1,728 (15)			13,135 (13)			2,799 (8)	
	85.4	7.8	6.8	76.3	11.8	11.9	80.7	19.3	--	84.2	3.6	12.2	92.2	0.3	7.5
Rabbits		121,491 (75)			6,883 (17)			826 (16)			17,018 (13)			2,952 (7)	
	87.7	10.3	2.0	66.1	27.0	6.9	65.0	35.0	--	94.8	2.8	2.9	90.8	2.5	6.7
Rhesus Monkeys		5,330 (55)			18 (2)			126 (9)			1,614 (7)			4 (2)	
	97.6	2.2	0.2	100	--	--	94.4	5.6	--	100	---	--	100	--	--
Other Primates		1,201 (20)			0			20 (1)			407 (3)			100 (1)	
	98.0	2.0	--		Not Reported		100	--	--	100	--	--	100	--	--
Dogs		119,585 (75)			9,403 (16)			1,201 (13)			3,296 (6)			2,496 (7)	
	80.8	19.2	--	18.6	81.0	0.4	72.0	27.9	0.1	99.0	1.0	--	77.2	22.8	--
Cats		34,914 (70)			1,692 (15)			323 (3)			781 (5)			121 (1)	
	81.3	18.7	--	16.8	83.0	0.2	37.8	62.2	--	100	--	--	100	--	--
Poultry		55,762 (59)			31,359 (16)			7,690 (2)			16,600 (7)			1,972 (2)	
	95.0	2.7	2.3	85.4	9.6	5.0	100	--	--	100	--	--	100	--	--
Swine		400 (13)			3,176 (15)			6 (1)			646 (3)			--	
	100	--	--	85.6	14.0	0.4	100	--	--	100	--	--	--	--	--
Sheep		651(28)			3,056 (14)			--			10 (2)			--	
	68.4	1.2	30.4	83.6	16.2	0.2	--	--	--	70.0	--	30.0	--	--	--
Horses		9 (5)			678 (14)			--			8 (2)			--	
	100	--	--	15.2	84.2	0.6	--	--	--	75.0	--	25.0	--	--	--

TABLE 3

TOTAL SPECIES AND PERCENTAGE USE IN
RESEARCH, TEACHING AND SERVICE

SPECIES	TOTAL** SPECIES USED	RESEARCH	TEACHING	SERVICE
Mice (138)	3,688,898	94.8	3.5	1.8
Rats (135)	1,066,954	91.3	6.6	2.1
Hamsters (87)	122,833	99.0	.5	.5
Guinea Pigs (128)	141,784	84.4	7.8	7.7
Rabbits (128)	149,170	87.5	10.2	2.5
Rhesus Monkeys (75)	7,092	98.1	1.8	.1
Other Primates (25)	1,728	98.6	1.4	--
Dogs (117)	135,981	76.8	23.1	<.1
Cats (94)	36,831	80.6	19.4	<.1
Poultry (86)	113,383	93.5	4.0	2.5
Swine (32)	4,228	89.2	10.5	.3
Sheep (44)	3,717	80.9	13.6	5.6
Horses (21)	695	17.0	82.2	.9
Weighted Average Percents		93.0	5.0	2.0

**See explanation on Table No. 1

Numbers in parentheses represent the numbers of institutions responding.

TABLE 4

TOTAL NUMBERS AND PERCENT OF
ANIMALS FROM VARIOUS SOURCES

SPECIES	TOTAL	OWN BREEDING	PURCHASED COMMER-CIALLY	ANIMAL POUND	COLLECTED FROM NATURE	*OTHER SOURCES
Mice (131)	5,811,079	56.2	43.1	-	-	.6
Rats (133)	1,040,905	17.3	81.4	-	-	1.3
Hamsters (87)	123,575	6.4	91.9	-	-	1.7
Guinea Pigs (127)	141,248	6.9	93.0	-	-	.2
Rabbits (127)	150,735	11.0	87.8	-	1.2	<.1
Rhesus Monkeys (72)	6,854	4.1	95.8	-	-	.2
Other Primates (26)	11,244	.4	10.8	-	88.8	<.1
Dogs (116)	130,934	1.0	49.6	48.8	-	.6
Cats (95)	47,855	.1	61.8	16.9	21.1	<.1
Poultry (89)	102,426	6.0	90.4	-	-	3.6
Swine (33)	3,850	47.6	43.6	-	-	8.9
Sheep (40)	3,590	27.4	49.3	-	-	23.3
Horses (19)	273	.7	86.8	2.2	-	10.3

*Included in this category are animals received from other research institutions, private sources, etc.

Numbers in parentheses represent the numbers of institutions responding.

TABLE 5

ADMINISTRATION OF UNIT

*RESPONSIBLE PERSONS	MEDICAL *(79)	VETERINARY (18)	DENTAL (26)	PRIVATE LABS (20)	HOSPITALS (351)
No single person	16.5	83.3	42.3	35	7.7
Professional	40.5	5.6	23.1	25	58.7
Non-Professional	12.7	5.6	15.4	25	7.7
Committee	26.6	--	11.5	5	21.1
Undetermined	3.8	5.6	7.7	10	4.9
	TOTALS (494)		TOTALS (Excluding hospitals) (143)		
No single person	14.8		32.2		
Professional	50.6		30.8		
Non-professional	9.5		14		
Committee	20		17.5		
Undetermined	5.1		5.6		

Numbers in parentheses represent the numbers of institutions responding.
Values in the table are percentages of these numbers.

*The above categories would be further defined as follows:
No single person: No individual responsible for the overall administration. Include those facilities utilizing janitorial care for animals.
Professional: One responsible individual with a degree in some field of the biological sciences.
Non-professional: One responsible individual who would be classed as a layman.
Committee: A variable number of professional people sharing the responsibility of animal care.

TABLE 6

TRAINING COURSES AVAILABLE TO ANIMAL CARETAKERS

A. Number of institutions reporting training programs within the institution.

	MEDICAL	VETERINARY	DENTAL	PRIVATE LABS	HOSPITALS	TOTALS
On the Job Training	65	15	24	15	8	127
Informal	7	1	--	2	1	11
Formal	6	1	1	2	-	10
Undetermined	1	1	1	1	-	4

B. Number of institutions reporting training programs organized by local groups.

No	58	15	18	15	6	112
Yes	20	1	6	4	3	34
Undetermined	1	2	2	1	-	6

TABLE 7

ORIGINAL DATES OF ANIMAL FACILITY CONSTRUCTION

DATES	MEDICAL *(79)	VETERINARY (18)	DENTAL (26)	PRIVATE LABS (20)	HOSPITALS (9)	TOTALS (152)
Before 1901	11.4%	--%	3.8%	--%	--%	6.6%
1901 - 1910	3.8	16.7	3.8	--	--	4.6
1911 - 1920	2.5	27.8	--	5.0	11.1	5.9
1921 - 1930	17.7	16.7	7.7	15.0	--	14.5
1931 - 1940	12.7	5.6	--	5.0	22.2	9.2
1941 - 1950	15.2	16.7	19.2	20.0	22.2	17.1
1951 - 1961	33.0	16.7	46.2	50.0	44.4	36.2
Unreported	3.8	--	19.2	5.0	--	5.9

TABLE 8

DATES OF MOST RECENT RENOVATION OR ADDITION TO ANIMAL FACILITIES

DATES	MEDICAL (79)	VETERINARY (18)	DENTAL (26)	PRIVATE LABS (20)	HOSPITALS (9)	TOTALS (152)
Before 1945	1.3%	--%	7.7%	--%	--%	2.0%
1946 - 1950	3.8	--	3.8	5.0	--	3.3
1951 - 1955	5.1	--	3.8	--	--	3.3
1956 - 1961	62.0	94.4	46.2	55.0	55.6	61.8
None	22.8	--	30.8	15.0	33.3	21.1
Unreported	5.1	5.6	7.7	25.0	11.1	8.6

*Numbers in parentheses represent the number of institutions responding. The values in the tables are percentages of these numbers.

TABLE 9

AMOUNT OF FLOOR SPACE AVAILABLE FOR RESEARCH AND ANIMAL MAINTENANCE*

INSTITUTIONS	FLOOR SPACE IN ANIMAL ROOMS	FLOOR SPACE IN ANIMAL SERVICE AREAS	FLOOR SPACE OUTDOOR HOUSING
MEDICAL	794,819 (75)	176,516 (74)	111,480 (75)
VETERINARY	225,354 (17)	128,419 (17)	55,511 (17)
DENTAL	20,711 (25)	6,196 (25)	5,396 (24)
PRIVATE LABS	174,501 (20)	36,978 (19)	29,680 (15)
HOSPITALS	353,612 (324)	131,212 (328)	77,542 (8)

INSTITUTIONS	FLOOR SPACE FARM ANIMAL FACILITIES	FLOOR SPACE CONTRACTED OUTSIDE	TOTAL NET RESEARCH SPACE
MEDICAL	222,857 (74)	17,804 (73)	3,835,205 (54)
VETERINARY	120,569 (17)	600 (17)	433,170 (14)
DENTAL	-- (25)	1,850 (24)	82,361 (23)
PRIVATE LABS	1,000 (19)	-- (20)	655,283 (19)
HOSPITALS	22,190	44,059 (311)	2,413,330 (319)

*Square feet.

Numbers in parentheses represent the numbers of institutions responding.

TABLE 10

NUMBER OF AIR CHANGES PER HOUR IN ANIMAL ROOMS

NO. OF CHANGES	MEDICAL (79)	VETERINARY (18)	DENTAL (26)	PRIVATE LABS (20)	HOSPITALS (9)	TOTALS (152)
0 - 5	7.6%	22.2%	7.7%	--%	33.3%	10.0%
6 - 10	26.6	22.2	11.5	20.0	11.1	21.7
11 - 15	22.8	11.1	3.8	35.0	33.3	20.4
16 - 20	8.9	--	--	5.0	--	5.3
21 - plus	1.3	--	--	--	--	.7
Not Reported	33.0	44.4	77.0	40.0	22.2	42.1

Numbers in parentheses represent the numbers of institutions responding. The values in the tables are percentages of these numbers.

TABLE 11

TOTAL NUMBERS AND PERCENTAGES OF VARIOUS TYPES OF CAGES USED

SPECIES	TOTAL	STAINLESS STEEL	GALVANIZED	PLASTIC	WOOD
Mice (136)	151,305	56.9%	19.5%	17.8%	5.8%
Rats (133)	108,243	24.3	72.6	3.0	.1
Hamsters (92)	10,398	23.4	67.1	5.8	3.5
Guinea Pigs (126)	14,366	35.0	60.2	3.7	1.0
Rabbits (127)	25,134	29.6	65.6	2.1	2.8
Rhesus Monkeys (73)	2,582	38.2	59.8	<.1	2.0
Other Primates (25)	369	2.7	97.3	-	-
Dogs (116)	16,557	28.7	67.1	3.0	1.2
Cats (93)	4,200	31.0	67.3	-	1.7
Poultry (31)	614	1.1	80.9	-	17.9
Swine (9)	74	36.5	44.6	-	18.9
Sheep (11)	2	-	100.0	-	-
Horses	-	-	-	-	-

TABLE 12

SOURCES OF ANIMAL CARE FUNDS

SOURCE OF FUNDS	(61) MEDICAL	(16) VETERINARY	(19) DENTAL	PRIVATE (17) LABS	(315) HOSPITALS	TOTAL
FEDERAL	57%	29%	62%	51%	24%	32%
INSTITUTIONAL	30%	61%	30%	38%	48%	45%
PRIVATE	13%	10%	8%	11%	28%	23%

Numbers in parentheses represent the numbers of institutions responding. The values in the tables are percentages of these numbers.

TABLE 13

BUDGETARY DATA DERIVED FROM SITE SURVEYS AND MAILED QUESTIONNAIRES
(Dollars)

	MEDICAL	VETERINARY	DENTAL	PRIVATE LABS	HOSPITALS
TOTAL RESEARCH BUDGET	110,306,280 (52)	8,741,139 (13)	3,132,708 (14)	28,823,825 (17)	68,412,295 (280)
% RESEARCH BUDGET FOR ANIMAL CARE	8.2 (55)	19.14 (14)	11.67 (15)	12.94 (17)	19.68 (252)
TOTAL ANNUAL COST FOR ANIMAL CARE	7,352,325 (69)	1,182,086 (15)	286,184 (19)	2,976,705 (19)	2,366,865 (266)
ANNUAL COST FOR PROFESSIONAL SALARIES	544,811 (70)	211,512 (15)	24,558 (20)	105,332 (17)	25,000 (9)
ANNUAL COST FOR NON-PROFESSIONAL SALARIES	3,1[illegible],211 (74)	396,376 (15)	135,228 (21)	1,032,146 (17)	121,812 (8)
ANNUAL COST FOR SUPPLIES	3,165,948 (74)	388,146 (15)	116,024 (22)	1,512,069 (19)	141,270 (8)
ANNUAL COST FOR OPERATING	234,955 (24)	39,237 (6)	30,774 (11)	39,530 (8)	--
ANNUAL COST FOR BUILDING AND EQUIPMENT DEPRECIATION	221,193 (20)	70,480 (6)	5,600 (7)	15,460 (5)	--

Numbers in parentheses represent the numbers of institutions responding.

TABLE 14

COST FOR PURCHASE OF ANIMALS BY TYPE OF INSTITUTION

SPECIES	MEDICAL	VETERINARY	DENTAL	PRIVATE LABS	HOSPITALS	TOTAL
Mice	(59) 343,323	(15) $ 7,681	(18) $ 9,291	(16) $316,263	(6) $ 9,112	$ 685,170
Rats	(59) 515,875	(15) 5,428	(18) 17,498	(15) 200,870	(5) 3,931	743,602
Hamsters	(47) 45,891	(9) 3,843	(11) 1,368	(5) 46,212	(1) 300	97,614
Guinea Pigs	(58) 129,783	(13) 3,926	(13) 3,295	(11) 23,731	(5) 1,598	162,333
Rabbits	(59) 280,229	(16) 4,929	(14) 2,561	(10) 24,251	(4) 4,218	316,188
Rhesus Monkeys	(39) 192,366	(2) 740	(9) 3,318	(6) 118,750	(2) 98	315,272
Other Primates	(12) 11,594	--	(1) 900	(3) 51,100	(1) 2,300	65,894
Dogs	(58) 565,189	(15) 16,192	(15) 6,112	(6) 30,249	(5) 14,511	632,253
Cats	(57) 129,629	(11) 1,101	(3) 1,754	(4) 1,546	(1) 484	134,514
Poultry	(38) 14,373	(14) 3,328	(2) 1,154	(7) 2,726	(1) 2,621	24,202
Swine	(9) 3,160	(13) 17,285	(1) 150	(3) 1,575	--	22,170
Sheep	(20) 17,813	(11) 17,308	--	(2) 190	--	35,311
Horses	(3) 690	(14) 16,519	--	--	--	17,209
GRAND TOTAL	$2,249,915	$98,280	$47,401	$817,463	$39,173	$3,252,232

Numbers in parentheses represent the numbers of institutions responding.

TABLE 15

COST FOR PURCHASE OF ANIMALS BY REGION

SPECIES	NORTHEAST	SOUTHEAST	NORTH CENTRAL	SOUTH CENTRAL	WEST	TOTAL
Mice	(31) $ 240,227	(23) $ 138,873	(33) $ 206,030	(14) $ 32,578	(13) $ 67,962	$ 685,670
Rats	(29) 332,297	(22) 57,850	(31) 292,202	(15) 32,573	(14) 28,680	743,602
Hamsters	(23) 57,694	(15) 28,280	(19) 8,348	(8) 1,395	(7) 1,897	97,614
Guinea Pigs	(28) 72,450	(20) 16,560	(27) 48,725	(14) 14,453	(11) 10,145	162,333
Rabbits	(28) 132,638	(20) 24,577	(27) 117,147	(15) 12,626	(13) 29,200	316,188
Rhesus Monkeys	(14) 47,251	(13) 16,890	(20) 192,401	(6) 42,339	(5) 16,391	315,272
Other Primates	(3) 1,292	(1) 500	(5) 8,775	(5) 51,125	(3) 4,202	65,894
Dogs	(26) 327,370	(19) 69,833	(30) 161,517	(13) 33,814	(11) 39,719	632,253
Cats	(18) 50,518	(18) 5,358	(23) 61,558	(8) 5,111	(9) 11,969	134,514
Poultry	(14) 12,208	(10) 972	(19) 4,182	(11) 2,283	(8) 4,557	24,202
Swine	(5) 2,123	(3) 1,250	(9) 11,722	(5) 3,758	(4) 3,317	22,170
Sheep	(5) 3,047	(6) 4,710	(13) 11,129	(5) 2,275	(4) 14,150	35,311
Horses	(2) 980	(2) 992	(5) 4,767	(4) 2,070	(4) 8,400	17,209
GRAND TOTAL	$1,280,095	$ 366,645	$1,128,503	$236,400	$240,589	$3,252,232

Numbers in parentheses represent the numbers of institutions responding.

TABLE 16

NEEDS FOR BUILDINGS AND EQUIPMENT

	FUNDED BUILDINGS AND EQUIPMENT (Sq. ft.)	FUNDED BUILDINGS AND EQUIPMENT (Dollars)	NON-FUNDED BUILDINGS AND EQUIPMENT (Sq. ft.)
MEDICAL	311,547 (78)	7,914,340 (53)	557,672 (47)
VETERINARY	77,437 (18)	1,490,362 (15)	253,000 (10)
DENTAL	3,330 (25)	72,000 (21)	46,475 (24)
PRIVATE LABS	59,092 (19)	1,594,000 (17)	17,700 (15)
HOSPITALS	228,895 (9)	30,000 (6)	285,616 (315)
	NON-FUNDED BUILDINGS AND EQUIPMENT (Dollars)	FUTURE TEN-YEAR NEED (Sq. ft.)	FUTURE TEN-YEAR NEED (Dollars)
MEDICAL	22,368,290 (45)	246,675 (29)	5,863,800 (26)
VETERINARY	6,434,175 (11)	67,000 (6)	3,041,900 (7)
DENTAL	1,120,650 (23)	29,910 (15)	921,000 (14)
PRIVATE LABS	427,800 (14)	41,400 (10)	1,160,000 (10)
HOSPITALS	40,000 (6)	--	1,000,000 (1)

Numbers in parenthese represent the numbers of institutions responding.