NIH Rodent Repository (1975)

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National Academy of Sciences Washington, D.C./1975

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ABSTRACT

The committee appointed to study the NIH Rodent Repository was charged with the following duties.

1. *Identify and list those strains and stocks of rodents maintained within the genetic repository in relation to their importance or potential importance to biomedical research.*

2. *Develop guidelines to be used in determining if a strain or stock should be added to, maintained in or eliminated from the repository.*

3. *Approximate the costs for maintaining the repository over and above those costs necessary for the support of NIH intramural research.*

Specific evaluations of the strains and stocks are included in this report. General guidelines are presented, including the suggestion that a continuing advisory council is needed. Because of the complexities of shared space and effort, costs are analyzed in considerable detail and an estimate is made as to what costs should be considered as those of the Repository and not chargeable to NIH intramural research. The estimate is approximately $550,000. Because the committee visited the Repository and discussed problems with some of the NIH intramural scientists, a few ancillary but pertinent observations beyond those specifically requested are included in this report, especially for the benefit of the personnel of VRB.

INTRODUCTION

The Division of Research Services (DRS) of the National Institutes of Health (NIH) was established for the purpose of supporting many facets of NIH's biomedical research program. The Division has a service function and performs various roles as indicated by its five branches: Biomedical Engineering and Instrumentation; Environmental Services; Library; Medical Arts and Photography; and Veterinary Resources. The Genetic Repository of Rodents under study is an entity within the Small Animal Section (SAS) of the Veterinary Resources Branch (VRB) that includes strains and stocks whose lines have been maintained continuously over decades. There are now nearly 150 strains in the Repository.

The Director of the Division of Research Services, recognizing the importance of the Genetic Repository of Rodents to biomedical research as well as the fact that resources for support of the activity are limited, requested that the Institute of Laboratory Animal Resources (ILAR) conduct a study of the genetic repository for rodents and provide scientific and technical advice thereon.

I. DEFINITION OF REPOSITORY

The NIH Rodent Repository, a collection of strains and stocks of rodents and lagomorphs of known genetic characteristics, was established in order to maintain these genetic stocks and to provide a defined source of breeders for eventual production. As herein defined, the Repository includes foundation colonies of inbred and congenic strains and nucleus colonies of outbred and mutant stocks of rodents; it does not include expansion of production colonies and, as such, is distinct from production. Maintained and serviced under specific, controlled conditions, 70 percent of the basic repository colonies are housed in a barrier and gnotobiotics facility; 30 percent, in a conventional facility.

Although originally planned as merely a source of small animals for intramural scientists in support of their biomedical research in the NIH intramural program, the Repository has expanded beyond those immediate needs. It has evolved into a considerably more inclusive collection so that today this Repository of genetically defined animals is clearly recognized as a national and international resource. Many strains of rodents from the Repository are being sent free of charge to investigators in well-renowned laboratories in this country and abroad as breeding pairs for the establishment of genetically defined colonies elsewhere. In fact, certain strains or stocks are little used or not used at all by the NIH investigators. Nonetheless, major Repository support is still provided by the NIH intramural program

since each intramural user pays an inflated price for animals produced for and issued to him from DRS.

Contained within the Repository there are today some 149 strains or stocks of rodents, including 85 strains or stocks of mice (37 inbred strains, 26 congenic strains, 20 mutant stocks, and 2 outbred stocks); 45 strains or stocks of rats (24 inbred strains, 15 mutant stocks, 4 outbred stocks and 2 others); 11 strains or stocks of guinea pigs (2 completely and 5 partially inbred strains, 2 mutant stocks, and 2 outbred stocks); 4 outbred stocks of rabbits; 3 outbred stocks of hamsters; and 1 outbred stock of Mastomys. See Appendix A for a complete listing.

II. HISTORICAL BACKGROUND

Before the turn of the century scientists recognized the similarity of laboratory animal tumors to those in man; consequently, such animals came to be used as models for cancer research. Because the transplantation of tumors could be readily accomplished in inbred strains of mice, many strains were established in the early 1900's. Many original inbred strains of mice for the NIH Rodent Repository, as a consequence, were supplied to VRB by National Cancer Institute investigators who had in their laboratories strains established either by themselves or obtained from sources outside the NIH. Originally, most strains or stocks, obtained by VRB at the request of individual scientists within the intramural program, were maintained and produced in support of their investigations. More recently, requests have been made by university scientists in this country and abroad to add certain valuable strains to this Repository to ensure that they would not be lost to biomedical research. As indicated above, large numbers of particular strains or stocks have been produced for the use of intramural scientists, while at other times the same strains were little used. It is not surprising that this should occur since use of these experimental animals depends on investigative leads and results.

From the late 1940s to about 1965, the principal function of SAS was large-scale production of outbred stocks of rodents. The latter part of this period was characterized by an era of rapid turnover of geneticists more interested in their own research than in the necessary

service function. In 1964, however, Dr. Carl T. Hansen joined the staff of VRB as a geneticist and since that time has clearly demonstrated his ability to effect a balance between the service function and his own research interests. For the past 3 years another geneticist, Dr. Kitty P. Smith, a part-time staff member, has complemented the activities of the branch by assuming responsibility for the maintenance of the mouse mutants and rabbit stocks of the Repository.

Since about 1969 the Repository has changed considerably, particularly as regards the health status of the animals. This resulted from the decision by the division to derive mice and rats by Caesarian section and place them in specific-pathogen-free (SPF) colonies behind a barrier facility. In addition, certain breeding nuclei of outbred stocks of rodents have been supplied to commercial breeders. In short, these stocks are now available to NIH intramural scientists from commercial sources. At present, for example, DRS has contracts with various commercial breeders to produce the Swiss-Webster mouse, Sprague-Dawley rat, Golden Syrian hamster, and New Zealand White rabbit. It is from these sources that many NIH investigators will obtain most of these experimental animals. With this development, the Repository has become a source for more inbred and congenic strains and unique mutant stocks.

III. THE REPOSITORY AS A NATIONAL AND INTERNATIONAL RESOURCE

Breeding nuclei of the rodent strains and stocks, for some years, have been supplied from the Repository on request and at no cost (except shipping) to the scientific community in universities in this country and throughout the world. Similarly, commercial producers have been supplied with breeding stock in order to establish and produce specific colonies for which stock was not otherwise available. In addition to supplying universities and commercial houses with breeding stocks of rodents, the Repository continues to provide NIH contractors (such as Litton Industries which operates the Frederick Cancer Research Center)with the necessary animals.

Following negotiations between the World Health Organization (WHO) and the U. S. Government through Dr. Charles C. Edwards, Assistant Secretary of Health, Department of Health, Education, and Welfare, the Director General of WHO has designated DRS as a WHO Collaborating Center for Defined Laboratory Animals. At present only two laboratories have been so designated by WHO; the other is affiliated with the Medical Research Council of Great Britain. In this capacity, the NIH Rodent Repository has the following functions:

- *Supplying breeding nuclei of defined strains of laboratory animals for the foundation of production colonies. These animals normally are provided free of charge to Government institutions and well-renowned laboratories throughout the world which are essentially non-profit making and which maintain adequate animal facilities.*

- *Conduct regular microbiological screening of the Centers' animal colonies in accordance with internationally recognized techniques.*

- *Give expert advice to WHO and through WHO Collaborating Centers and other laboratories in member countries on laboratory animal medicine, particularly in relation to the selection of suitable animal models for specific purposes.*

- *Accept WHO-sponsored trainees in laboratory animal medicine, both at the technical and professional level.*

In addition to the functions prescribed by WHO, it follows that the center in DRS must keep abreast of the characteristics of the strains. These are determined by tests within the center, especially as revealed by research in NIH and elsewhere using animal strains from the center.

The NIH director's pledge of support for this center in VRB clearly places on NIH a responsibility to serve *"WHO and the member countries through this resource."* Requests for valuable strains and stocks originating from laboratories in this nation and abroad demonstrate the importance of the NIH Rodent Repository. Further, its designation as a WHO Collaborating Center for Defined Laboratory Animals clearly establishes it as a national and international resource.

IV. COMPOSITION OF AND SPACE OCCUPIED BY THE REPOSITORY

By definition, all animals contained in the colonies behind the barrier are considered to be 100 percent Repository. The barrier facility, located in wing G, consists of 10 rooms devoted entirely to the maintenance and service of mice and rat strains and stocks; mutant stocks of mice, however, are located in the conventional facility. (See Appendix B.)

The gnotobiotic facility, part of the Repository, is divided into two parts: Two rooms, forming the quarantine facility, are located at the NIH Poolesville Farm; five rooms are housed in wing G. All new strains or stocks of the various species of rodents for eventual introduction into the Repository are first held and monitored in isolators in the quarantine facility. The animals in this two-room facility are, therefore, 100 percent Repository. All strains and stocks of mice and rats to be established as colonies in the barrier facility are first Caesarian-derived under germfree conditions in isolators located in five rooms of wing G. However, not all of the activities in this wing are concerned with the Repository; other activities include producing gnotobiotic animals and holding such animals for intramural investigators. Sixty percent of the space in the five rooms, or the equivalence of three rooms, in the gnotobiotic facility in wing G is concerned with Repository and 40 percent with production of animals.

The Repository also includes certain strains and stocks of mice, guinea pigs, hamsters, Mastomys, and rabbits housed in the conventional

facility in wings B, C, and F. Repository animals in this facility are only those contained in colonies essential for maintenance and preservation of breeding nuclei for eventual production. Although a certain strain or stock may actually occupy several rooms, only the equivalent space devoted to Repository is considered. The six rooms identified in the conventional facility are, therefore, 100 percent devoted to Repository use.

Of 71 rooms, 21 are solely devoted to Repository use and 50 to production. In short, the NIH Rodent Repository comprises 30 percent and production 70 percent of the entire SAS facility. This analysis of space has been essential for defining the Repository as precisely as possible in order to estimate proper cost allocations.

V. CALCULATION OF REPOSITORY COSTS

Because the Repository is financed principally by a revolving fund, NIH intramural scientists as users of the various strains or stocks are almost exclusively supportive of establishing, maintaining, and servicing these animals. The financial support is derived by the Small Animal Section of DRS from the intramural programs of the various institutes of NIH. They purchase these animals for their biomedical research at an inflated price to their institutes to cover the Repository's operating expenses. For instance, a user of strain 2 or 13 inbred guinea pig now pays $22.46 for a weanling, or $50.40 for a pregnant animal. Such prices obviously create budgetary problems for large users of these animals. Further, to ensure adequate funding for the Repository, SAS adjusts the price of each strain or stock to the intramural scientist yearly. Such cost is based on personnel and benefits, animal food and bedding, supplies and materials, and other related costs for maintaining, servicing, and producing nearly 150 strains or stocks of rodents.

Another example of the inequity of cost is the many strains or stocks, previously mentioned, that are little used or not used at all by investigators in the intramural program yet are supported by them. Similarly, animals produced by SAS, but not used (nonreimbursables) by the scientists, must be paid for by the intramural program. All of which results from the Repository being operated under a revolving fund to retrieve their expenditures.

Many unused animals are sent free of charge to such institutions as the Smithsonian National Zoo, U.S. Fish and Wildlife Service, and Howard University. In addition and by virtue of the fact that the Repository is a national and international resource, breeding nuclei are regularly sent at request and free of charge to locations within and outside this country. Again, the NIH intramural program is required to fund this part of the Repository. Obviously this situation should not exist, and steps should be taken to correct the many inequities.

A prime example of the problems existing with the funding mechanism is the intramural program of the National Institute of Allergy and Infectious Diseases (NIAID). Although one of the smaller institutes of NIH and one with a comparatively small budget, it is the second largest user of small research animals. Of a total $1,572,898 spent in fiscal year 1974 by all NIH institutes for small research animals from DRS, NIAID contributed approximately $425,000. This poses a serious problem for the laboratories of this institute and those concerned with the budget of its intramural program.

The major cost of the Repository stems from the salaries paid to personnel. (See Appendix C.) As previously shown, the Repository comprises 30 percent of the entire Small Animal Section operation in VRB. In view of this, we felt that the percentage of time each employee devoted to the Repository should be determined. It turned out that in the Office of the Section Chief, three of the employees devoted

30 percent of their time to the Repository; the fourth, a secretary who services activities of the entire barrier and gnotobiotic facilities, devoted 70 percent. Of the professional services staff, the two geneticists devote 100 percent of their time to the Repository; the remaining personnel, 30 percent. The 10 employees of the gnotobiotic facility in wing G devote 60 percent of their time to the Repository, and the one technician in the quarantine facility 100 percent. The one animal husbandman who supervises both the barrier facility and production wing F devotes 50 percent to the Repository, while the remaining nine technicians behind the barrier devote 100 percent. In the conventional facility, where part of the NIH Rodent Repository is located, it was determined that the animal husbandman spent 15 percent of his supervisory time on Repository activities (9 percent in wing B and 6 percent in wing C). No supervisory time is listed for the wing F room since this was accounted for in the 50 percent supervisory time in the barrier facility. It is a full-time job for each animal caretaker to service animals in one entire room; as such, all six caretakers devote 100 percent of their time to the Repository. The gnotobiotic and quarantine facilities do not use the cage wash facilities since their employees clean their own isolators, jars, and cages. Taking this into account, the Repository costs are reduced from 30 percent to 23 percent of the salaries of cage-washing personnel.

As shown in Appendix C, Repository salaries amount to $399,404. However, as noted, some of the employees' salaries are at present

supported by the management fund of NIH. Subtracting those salaries ($96,345) from the total ($399,404) yields a true total of $303,059, which represents the amount of the salaries supported by the revolving fund. It is this last figure that is used to calculate the operating expenses of the Repository.

During the latter part of fiscal year 1974, premium pay for employees increased somewhat so the 15 percent figure is the rate taken from the last quarter of the year. Since the government's contributions to health benefits has increased, the rate of 10.5 percent of base pay was used in the present calculations. Because the NIH Rodent Repository comprises 30 percent of the entire Small Animal Section operation, that percent of FY 1974 SAS expenditures was used to calculate Repository costs for data processing (such as printouts on animal usage, trend reports), charges made by NIH Office of Financial Management (bookkeeping, cost accounting, etc.), other charges such as for training and check charges, supplies and materials, and animal food and bedding. The travel expenses for Repository personnel to scientific meetings is self-explanatory. Travel costs of advisory counselors to Bethesda are included. Although the cost of inflation for FY 1975 was estimated to be somewhere between 12 and 15 percent, the 12 percent figure was used in calculating Repository costs.

The cost for the NIH Rodent Repository as herein calculated comes to a total of $550,497 for FY 1975. In FY 1974 the NIH intramural program reimbursed the Small Animal Section in the amount of $1,572,898.

Projecting SAS income, as based on actual figures for the first 6 months of the present year ($813,684), the intramural program in FY 1975 will contribute approximately $1,627,368 toward SAS operating expenses.

VI. CONTRACT CHARGES AND RECOMMENDATIONS

The ILAR Committee on Maintenance of Genetic Stocks considered the charges listed and made certain specific recommendations:

1. *Identify and list those strains and stocks maintained within the genetic repository in relation to their importance or potential importance to biomedical research.*

Appendix A, a complete list of all strains and stocks of animals contained within the NIH Rodent Repository, was compiled by the committee in January 1975. To compute average annual usage, the committee reviewed computer printouts over a 2-year period, from November 1972 to October 1973, and from November 1973 to October 1974. The first pair of figures after each strain represents the average number of animals of a strain produced per month, over a 12-month period, by SAS for use by intramural scientists. The second set of figures, under the heading *"nonreimbursable,"* represents the average number per month of the strain that was not used by the intramural program. Principally production animals, the nonreimbursables are sent free of charge to zoos and other government organizations; those nonreimbursables that are breeding nuclei are given free of charge to well-renowned laboratories, universities, and commercial establishments in the United States and elsewhere.

The importance or potential importance to biomedical research of all 149 strains or stocks of the Repository was evaluated. To do this

the committee divided them into three categories: Most important (designated "+"), strains or stocks that should be maintained and retained in the Repository; intermediate importance (designated "?"), strains or stocks that are questionable as to retention in the Repository; and least important (designated "-"), strains or stocks that should be eliminated from the Repository.

Congenic strains of mice with the nude gene were recognized by the committee for their importance. However, it was noted that most were in an early stage of development and eventually some would probably be lost. The hybrid mice should continue to be produced only as long as they are being used.

The status of the strains and stocks of rats in the Repository is essentially satisfactory. It is probably recognized as the best genetic collection of rats in the world, and, as such, the committee felt that this species should be emphasized in the NIH Rodent Repository.

2. *Develop guidelines to be used in determining if a strain or stock should be added to, maintained in, or eliminated from the Repository.*

To comply with this second charge, the committee recommends:

(a) That an advisory council, made up of four to six members from outside NIH and one from the NIH intramural research program, be appointed to advise DRS on their international

genetic repository and related matters. The members of this committee, designated by DRS in cooperation with ILAR, should particularly include experts in mouse and rat genetics.

(b) Good characterization is essential for strains and stocks added to the Repository, as well as for those already maintained.

(c) Use of any rodent strain or stock should be reviewed on a regular basis; a determination of its use should be made over 2 or more years. In line with this, SAS should assign a computer code number to each strain or stock and issue it to intramuralists under this number. This will ensure that the numbers of animals of each and every strain produced and used can be accurately determined at monthly intervals over a given year from the computer printout *trend reports*.

(d) Research literature accumulated on a strain or stock under consideration should be reviewed when additions are planned for the Repository.

(e) Before adding or eliminating a strain or stock from the Repository, consideration should be given to its unique status and to differences or similarities with other lines or sublines.

(f) When adding a new strain to the Repository, the committee suggests that the initial advice should be provided by an

appointed advisory council so that complete responsibility will not rest with any one person or group within the Veterinary Resources Branch of DRS.

(g) Similarly, before a strain or stock is eliminated from the Repository, a careful investigation should be undertaken to determine whether it is duplicated in one or more laboratories; this will help prevent strain or stock losses to the biomedical research community.

(h) If a strain or stock has not been used or there have been no requests for it within 2 years, serious consideration should be given to its elimination. This would be appropriate after attempts had been made to publicize its availability.

(i) The NIH Rodent Repository probably should not exceed a total of 150 strains or stocks at any one time, given limitations imposed by available personnel and facilities.

3. *Approximate the costs for maintaining the repository over and above those costs necessary for the support of NIH intramural research.*

The costs of maintaining the NIH Rodent Repository have been summarized above; similarly, the definition and composition of and space devoted to the Repository have been outlined.

Given the national and international importance of the NIH Rodent Repository as an invaluable resource of genetic material, we recommend that the NIH provide for 1975 and subsequent years funds adequate to compensate for the costs of the Repository, *per se*, as reflected in the calculations shown in Appendix C.

VII. ANCILLARY OBSERVATIONS

In addition to the requested recommendations certain ancillary but pertinent observations were made by the committee. The committee feels that these observations, although not requested, should be brought to the attention of the Director of DRS and to the attention of VRB personnel.

During the course of the present study, the committee conducted a site visit at the NIH. Discussions were held with the Director of the Division of Research Services, the chiefs of the Veterinary Resources Branch and Small Animal Section, professional personnel concerned with the Rodent Repository, and NIH intramural scientists. These discussions brought to light certain interesting functions and roles of the NIH Rodent Repository.

In the late 1950s and early 1960s, the Division of Research Resources of the NIH extramural program recognized the need for genetic centers throughout the United States and attempted to set up animal repositories with selected investigators in universities. When these scientists retired or left, those left behind, in many cases, were not interested in maintaining the animal strains and stocks. As a result, the repositories were often discontinued. It became evident that a critical mass with continuing responsibility to execute this role was needed. Large organizations such as NIH can maintain mammalian genetic repositories and, in many respects, are ideal given their extensive and varied programs in biomedical research.

The feasibility of freezing mouse embryos for the maintenance of potentially useful strains and stocks was discussed on several occasions. In general, the committee felt that cryobiology may be useful for the maintenance and holding of genetic stocks *when* techniques have been established. Although freezing embryos is intriguing and has potential, the view was expressed that it amounts to a sizable research project and should not be undertaken by VRB at present.

At one stage of the visit to NIH, discussions centered around communications between VRB personnel and scientists in the intramural program. It became clear that many intramuralists were largely unaware of the many unique strains or stocks available to them from this Repository. It was suggested that perhaps VRB personnel could institute a series of seminars or themselves attend scheduled scientific meetings through which they could inform investigators of these animals. If the part-time geneticist in VRB should find it possible to work full-time in the future, she might play a more important role in communications. The committee felt that more scientific collaboration should be effected between VRB and NIH intramural scientists. Such increased collaboration would also result in better characterization of the strains and stocks of the Repository.

In general, the intramuralists were appreciative of the good research animals provided by VRB and the cooperation, such as willingness to produce hybrids upon request. However, several intramural scientists expressed concern about the VRB decision, made several years ago, to

put all mice behind the barrier without prior consultation with large intramural users. In one case, this nullified the scientist's research for 1½ years because he had to determine new standards for his reaction curves. Another problem that has resulted from this change is the phenomenon of *"too clean"* mice. They are too delicate and, as a result, do not fare well when placed in the conventional animal facilities of intramural laboratories. In many respects, this is paradoxical since the ideal would seem to be the production of really *"clean"* animals. It was the opinion of some intramuralists interviewed that VRB should not make changes of this nature without first communicating with intramural users.

These observations point toward a recommendation that, although the NIH Rodent Repository is a national and international resource, it should also strengthen its communication links with the intramural scientists.

VIII. Conclusion

The NIH Rodent Repository has been defined as a national and international resource of genetically characterized animals. Its 149 strains and stocks have been evaluated in considerable detail and recommendations have been made for each as to maintenance or elimination. The committee has recommended that an advisory council be appointed to review the holdings of the Repository at regular intervals, to advise on future additions and eliminations, and to encourage more complete characterizations of the strains. Nine guidelines are recommended, mostly related to the proposed advisory council. The cost of the Repository, as separated from production, has been estimated on the bases of space, special facilities, and work loads and responsibility of personnel. The decision was reached that 30 percent of the operation of Small Animal Section should be attributed to the Rodent Repository. On that basis and as described in detail in Appendix C, a cost of $550,497 was determined, i.e., approximately $550,000 for the FY 1975 maintenance of the NIH Rodent Repository as a national resource of genetic stocks for biomedical research.

APPENDIX A: Strains and Stocks

	I. Mice (*Mus musculus*) (85) Strains and Stocks[b]	12-Month Average[c] Nov. 72-Oct. 73	12-Month Average[c] Nov. 73-Oct. 74	Usage	Nonreimbursable Nov. 72-Oct. 73	Nonreimbursable Nov. 73-Oct. 74
	A. Inbred strains (37)					
+	1. A/HeN	292	322		36(12.3%)	32(9.9%)
+	2. AKR/N	762	524		74(9.7%)	151(28.8%)
+	3. AL/N	391	201		131(33.5%)	62(30.8%)
+	4. BALB/cAnN	6,819	5,894		370(5.4%)	171(2.9%)
?*	5. BALB/cCrN	--[d]	--		--	--
+*	6. BcfC3/N	--	--		--	--
?	7. BRSUNT/N	6	10		5(83.3%)	8(80.0%)
+	8. CBA/CaHN	NIR[e]	--		NIR	--
+	9. CBA/CaHN-T6**	2	433		0(0%)	38(8.7%)
+	10. CBA/N	236	272		32(13.6%)	90(33.0%)
-	11. CBAfb/LwN	102	67		9(8.8%)	43(64.1%)
?	12. C3Hf/HeN	314	302		83(26.4%)	60(19.8%)
+	13. C3H/HeN MTV+	3,369	2,713		427(12.7%)	832(30.6%)
	C3H/HeN MTV- (4-mo. av.)	NIR	34		NIR	4(11.7%)
+	14. C57BL./KaLwN	63	55		7(11.1%)	1(1.8%)
+	15. C57BL/6N	3,148	2,962		150(4.8%)	157(5.3%)
+	16. C57BL/10ScN	23	40		11(47.8%)	37(92.5%)
+	17. C57L/N	9	10		6(66.7%)	1(10.0%)
+	18. C58/LwN	7	12		2(28.6%)	10(83.3%)
+	19. DBA/1JN	131	26		64(48.9%)	18(69.2%)
+	20. DBA/2N	1,836	1,447		382(20.8%)	196(13.5%)
+	21. GR/N (4-mo. av.)	NIR	38		NIR	1(2.6%)
+	22. HSFR/N	169	195		81(47.9%)	76(38.9%)
+	23. HSFS/N	182	173		99(54.4%)	76(43.9%)
-	24. I/AnN	6	5		4(66.7%)	5(100%)
-	25. I/StN	42	23		42(100%)	23(100%)

APPENDIX A: (Continued)

-	26.	NBL/N	14	14	6(42.9%)	13(92.8%)
+	27.	NGP/N	106	65	7(6.6%)	8(12.3%)
+	28.	NH/LwN	12	7	12(100%)	7(100%)
+	29.	NZB/N	270	335	37(13.7%)	38(11.3%)
+	30.	NZW/N	67	146	25(37.3%)	66(45.2%)
+	31.	P/JN	10	8	10(100%)	8(100%)
-	32.	RIII/AnN	23	20	23(100%)	20(100%)
+	33.	SJL/N	151	82	17(11.3%)	26(31.7%)
?	34.	ST/N	7	11	7(100%)	7(63.6%)
+	35.	STAR/N (3-mo. av.)	NIR	36	NIR	26(72.2%)
+	36.	STR/N	22	16	12(54.5%)	16(100%)
?	37.	STR/1N	5	3	4(80.0%)	3(100%)
	No.	170459: total mice other inbred	324	2,152	88(27.2%)	488(22.6%)
	No.	110502: germfree mice NIH	74	43	4(5.4%)	0(0%)
	No.	110604: germfree mice, BALB/cAnN	56	18	0(0%)	0(0%)
B.	Congenic strains (26)					
+*	1.	A/HeN-nu	--	--	--	--
+*	2.	AKR/N-nu	--	--	--	--
+*	3.	AL/N-nu	--	--	--	--
+*	4.	AO.AKR	--	--	--	--
+*	5.	BALB/cAnN-nu	--	--	--	--
+*	6.	BDL/N-ky	--	--	--	--
+	7.	B10.D2/nSnN (4-mo. av.)	NIR	109	NIR	21(19.2%)
+	8.	B10 D2/oSnN (4-mo. av.)	NIR	163	NIR	47(28.8%)
+*	9.	CBA/CaHN-nu	--	--	--	--
+*	10.	CBA/CaHN-T6T6-nu	--	--	--	--
+*	11.	CBA/N-nu	--	--	--	--
+*	12.	C3H/HeN-nu	--	--	--	--
+*	13.	C57BL/6N-nu	--	--	--	--
+*	14.	C57BL/10ScN-nu	--	--	--	--

APPENDIX A: (Continued)

?*	15.	C57L/N-nu	--	--	--	--
+*	16.	C58/LwN-nu	--	--	--	--
+*	17.	DBA/2W^{v}	--	--	--	--
+*	18.	DBA/2N-nu	--	--	--	--
?*	19.	D2.ZB/N	--	--	--	--
+*	20.	HSFR/N-nu	--	--	--	--
+*	21.	HSFS/N-nu	--	--	--	--
+*	22.	NZB/N-nu	--	--	--	--
+*	23.	NZW/N-nu	--	--	--	--
+*	24.	P/JN-nu	--	--	--	--
+*	25.	SJL/N-nu	--	--	--	--
+*	26.	ZB.D2/N	--	--	--	--

C. Mutant stocks (20)

+	1.	Beige (C57BL/6N-bg)	132	146	6(4.5%)	16(10.9%)
+	2.	Blotchy (C3H/HeN-Mo^{bio})	--	--	--	--
-	3.	Brachypodism (BALB/cAnN-bp)	--	--	--	--
+	4.	Brindle (C3H/HeN-Mo^{br})	--	--	--	--
+	5.	Dapple (C3H/HeN-Mo^{dp})	--	--	--	--
+*	6.	Dwarf (dw)	--	--	--	--
?	7.	Hairless (C3H/HeN-hr)	7	7	0(0%)	1(14.2%)
-	8.	Lens Rupture (lr)	--	--	--	--
+	9.	Nude (nu) (4-mo. av.)	--	759	--	64(8.4%)
+	10.	Obese (C57BL/6N-ob)	1	--	--	--
-	11.	Piebald (C3H/HeN-s)	18 (3-mo.av)	11	0(0%)(3-mo.av.)	4(36.3%)
+	12.	Pink-eyed dilution (C3H/HeN-p)	--	--	--	--
?	13.	Rhino (C3H/HeN-hr^{rh})	--	--	--	--
+	14.	Ruby-eye (ru)	--	--	--	--
+	15.	Sex-linked anemia (sla)	--	--	--	--
		(C57BL/6N-sla)	--	--	--	--
-	16.	Syndactylism (BALB/cAnN-sm)	--	--	--	--
-	17.	Tailless (BALB/cAnN-t^{n})	--	--	--	--

APPENDIX A: (Continued)

+	18.	Tortoise (C3H/HeN-Mo^{to})	--	--	--	--
+	19.	Viable dominant spotting (C3H/HeN-W^{w})	--	--	--	--
-	20.	Yellow (A^{y})	0(7-mo.av.)	--	0(0%)(7-mo.av.)	--
	No. 170489:	total mice, other mutant	160	381	76(47.5%)	282(74.0%)
	D.	Outbred stocks (2)				
+	1.	N:GP(S) general purpose	5,253	6,140	1,330(25.3%)	2,193(35.7%)
+	2.	N:NIH(S) NIH	9,623	8,872	1,138(11.8%)	1,737(19.5%)
	E.	Hybrids				
+	1.	No. 170460 - AAF1	194	108	81(41.8%)	57(52.7%)
+	2.	No. 170464 - BLCF1	315(4-mo.av.)	331	18(5.7%)(4-mo. av.)	63(19.0%)
+	3.	No. 170461 - CALF1 <CAF1>	355	283	150(42.2%)	83(29.3%)
+	4.	No. 170462 - CDF1	1,973	1,028	295(15.0%)	20(1.9%)
+	5.	No. 170463 - ZBWF1	572	419	52(9.1%)	70(16.7%)
+	6.	No. 170469 - other hybrids	330(3-mo. av.)	286	44(13.3%)(3-mo. av.)	87(30.4%)
	II.	Rats (Rattus rattus norvegicus) (45)				
	A.	Inbred strains (24)				
+	1.	ACI/N	19	30	11(57.9%)	27(90.0%)
+	2.	ALB/N	31	46	23(74.2%)	41(89.1%)
+	3.	BN/S_SN (8-mo. av.)	NIR	16	NIR	12(75.0%)
+	4.	BUF/N	84	61	29(34.5%)	16(26.2%)
+	5.	CAR/N	22	31	19(86.4%)	30(96.7%)

APPENDIX A: (Continued)

+	6.	CAS/N	20	21	17(85.0%)	20(95.2%)
+	7.	F344/N	661	705	160(24.2%)	209(29.6%)
+	8.	LA/N (10-mo. av.)	NIR	20	NIR	19(95.0%)
+	9.	LEW/S_SN (10-mo. av.)	NIR	47	NIR	10(21.2%)
+*	10.	LOU/CW_S1N	NIR	--	NIR	--
+*	11.	LOU/MW_S1N	NIR	--	NIR	--
+	12.	MNR/N	20	36	7(35.0%)	36(100%)
+	13.	MR/N	16	43	15(93.8%)	39(90.6%)
+	14.	M520/N	26	34	20(76.9%)	34(100%)
+	15.	NSD/N	12	24	5(41.7%)	20(83.3%)
+	16.	OM/N	33	56	22(66.6%)	55(98.2%)
+	17.	PETH/N	26	49	22(84.6%)	47(95.9%)
+	18.	RHA/N	73	65	38(52.1%)	38(58.4%)
+	19.	RLA/N	49	39	25(51.0%)	18(46.1%)
+	20.	SHR/N	73	69	33(45.2%)	57(82.6%)
+*	21.	SHRSP/N	NIR	--	NIR	--
+*	22.	WFU/CrN	NIR	--	NIR	--
+	23.	WKY/N (11-mo. av.)	NIR	28	NIR	9(32.1%)
+	24.	WN/N	95	63	39(41.1%)	41(65.0%)
	No.	181459: total rats other inbred	390	226	195(50.0%)	194(85.8%)

B. Mutants (15)

+	1.	Chubby (cb)	--	--	--	--
+	2.	Crawler (cr)	--	--	--	--
+	3.	Diabetes insipidus (di) (Brattleboro) (2-mo. av.)	NIR	10	NIR	10(100%)
+	4.	Jaundice (j) (Gunn rat)	29	25	12(41.4%)	19(76.0%)
+	5.	Masked (mk)	--	--	--	--
+*	6.	Pop eye (pe)	--	--	--	--
+*	7.	Paralyzed (pz)	--	--	--	--
+	8.	Recessive cataract (rc)	--	--	--	--

APPENDIX A: (Continued)

+*	9.	SHR-obese	--	--	--	--
+	10.	Skinny (sk)	--	--	--	--
+	11.	Spastic (sp)	--	--	--	--
+*	12.	Spinner (sp)	--	--	--	--
+*	13.	Toothless (tl)	--	--	--	--
+	14.	Trembler (tr)	--	--	--	--
+	15.	Vibrissaeless (vb)	--	--	--	--
	No.	181489: total rats, other mutants	5	296	2(40.0%)	295(99.6%)
C.	Outbred stocks (4)					
+	1.	N:SD(SD), Sprague-Dawley	596	782	262(44.0%)	236(30.1%)
+	2.	N:OM(OM), Osborne-Mendel	1,905	1,736	471(24.7%)	258(14.8%)
-	3.	N:BLK, NIH black	2	36	1(50.0%)	36(100%)
-	4.	N:JPN, Japanese rat	2	24	2(100%)	24(100%)
	No.	111501: germfree rats, Sprague-Dawley	48	42	0(0%)	0(0%)
III.	Other Rats (2)					
?	1.	Cotton rat (Sigmodon hispidus hispidus) (1-mo. av.)	NIR	52	NIR	52(100%)
-	2.	Rice rat (Oryzomous palustris)	NIR	--	NIR	--

APPENDIX A: (Continued)

IV. Guinea Pigs (Cavia porcellus) (11)						
A. Inbred strains (7)						
+	1.	2/N (strain 2)	608	701	11(1.8%)	10(1.4%)
+	2.	13/N (strain 13)	727	586	5(0.7%)	10(1.7%)
+*	3.	B	NIR	--	NIR	--
+	4.	C4D/N (5-mo. av.)	NIR	20	NIR	7(35.0%)
+*	5.	OM-3	NIR	--	NIR	--
+*	6.	PCA/N	NIR	--	NIR	--
+*	7.	R9	NIR	--	NIR	--
B. Mutants (2)						
+	1.	Complement 4 deficient (c4d)	NIR	30	NIR	5(16.6%)
+	2.	Waltzer (WA)	--	--	--	--
C. Outbred stocks (2)						
+	1.	Hartley	348	520	15(4.3%)	3(0.5%)
+	2.	NIH	334	410	6(1.8%)	3(0.7%)
No. 112269: guinea pigs, other hybrid (strain #2 crossed with strain #13) (4-mo. av.)			NIR	12	NIR	0(0.0%)
V. Rabbits (Oryctolagus cuniculus) (4)						
+	1.	New Zealand White	613	222	25(4.1%)	21(9.4%)
+	2.	Allotype rabbits (5-mo. av.)	NIR	9	NIR	0(0%)

APPENDIX A: (Continued)

+	3. Complement 6 deficient (c6d)	NIR	--	NIR	--
+	4. Netherlands dwarf	NIR	--	NIR	--
VI. Hamsters (3)					
-	1. Albino (Mesocricetus auratus)	40	44	40(100%)	44(100%)
-	2. Syrian (Mesocricetus auratus)	686	441	455(66.3%)	273(61.9%)
+*	3. Giant European (Cricetus circetus)	NIR	--	NIR	--
VII.Other Species (1)					
+	1. Mastomys (Praomys [Mastomy] natalensis)	38	63	0(0%)	25(39.6%)

[a] As of January 1975, the number of strains totaled 149.

[b] Key: + maintain; ? questionable retention; - eliminate; * new strains added to repository since publication of catalog of NIH Rodents (1973); ** nude mouse coded with this strain until 7/1/74.

[c] Average number of rodents produced per month and nonreimbursables over two 12-month periods: Nov. 1972-Oct. 1973 and Nov. 1973-Oct. 1974.

[d] No code numbers assigned to strains showing a dash under usage heading. These strains classified in *other* categories.

[e] NIR: not in repository.

APPENDIX B: Composition of Repository

	Space Devoted (rooms)
BARRIER FACILITY All animals contained in the colonies behind the barrier are considered to be 100 percent Repository. This includes the following rodents in wing G:	
Mice	
inbred strains congenic strains outbred stocks	
Rats	
inbred strains outbred stocks mutant stocks	10
GNOTOBIOTIC FACILITY It has been determined that 60 percent of this facility in wing G is concerned with Repository and 40 percent with animal production. The quarantine facility at the NIH Poolesville Farm is 100 percent Repository.	
Various species of rodents: wing G (60 percent) 5 rooms x 60 percent =	3
Various species of rodents: quarantine facility (100 percent)	2
	5

CONVENTIONAL FACILITY
For the purpose of defining the NIH Rodent Repository, the animals listed below in this facility are only those contained in colonies that are essential for maintaining the strain or stock and for supplying breeders for eventual production. In several cases,

APPENDIX B: (Continued)

a certain strain or stock actually may occupy several rooms but the listed space is only the equivalent space devoted to the Repository. The space listed below, therefore, is 100 percent Repository.

Mice		
mutant stocks:	wing F	1
Guinea pigs		
inbred strains:	wing B	1
outbred stocks mutant stocks	wing B	1
Hamsters and mastomys:	wing B	1
Rabbits		
outbred stocks:	wing C	2
		6

Number devoted to Repository	21
Number devoted to production	50
Total number devoted to both Repository and production	71*

* The NIH Rodent Repository, therefore, comprises 30 percent and production 70 percent of the entire facility of the Small Animal Section of the Veterinary Resources Branch, Division of Research Services, NIH.

APPENDIX C: Repository Costs

	Percentage of Time Devoted to Repository	GS Level	Salary	Management (M) or Revolving (R) Fund Supported
Personal Services[a]				
Office of section chief				
1 Supv. vet. med. officer	30	14	$ 8,698	M
1 Administrative assistant	30	7	3,893	R
1 Secretary	70	5	7,139	R
1 Secretary	30	5	3,314	M
		SUBTOTAL	$ 23,044	
Professional services staff				
1 Nutritionist	30	13	6,763	M
1 Geneticist	100	13	23,997	M
1 Geneticist	100	11	17,029	M
1 Bio. lab tech.	30	5	3,059	M
1 Bio. lab. tech.	30	6	3,316	M
1 Animal dis. invest.	30	CO- 5	7,660	M
		SUBTOTAL	$ 61,824	
Gnotobiotics facility				
(wing G, 3 rooms)				
1 Supv. microbiologist	60	11	11,456	M

APPENDIX C: (Continued)

1 Supv. bio. lab. tech.	60	9	8,475	R
7 Bio. lab. tech.	60	6	47,750	R
1 Equip. maint. mechanic	60	WG-10	8,087	R
		SUBTOTAL	$ 75,768	

Quarantine facility

NIH Poolesville Farm (2 rooms)

1 Bio. lab. tech.	100	6	11,053	M
		SUBTOTAL	$ 11,053	

Barrier facility

(wing G, 10 rooms)

1 Animal husbandman	50	11	9,289	R
1 Supv. bio. lab. tech.	100	7	12,977	R
8 Bio. lab. tech.	100	6	83,684	R
		SUBTOTAL	$105,950	

Conventional facility

(wing B, 3 rooms)

1 Animal husbandman	9	11	1,440	R
3 Animal caretakers	100	WG-5	31,887	R

APPENDIX C: (Continued)

(wing C, 2 rooms)				
1 Animal husbandman	6	11	960	R
2 Animal caretakers	100	WG-5	21,258	R
(wing F, 1 room)				
1 Animal caretaker	100	WG-5	10,629	R
		SUBTOTAL	$ 66,174	
Cage wash facility				
25 Wage board employees	23[b]	WG-01-WS-03	55,591	R
		SUBTOTAL	$ 55,591	
		TOTAL SALARIES	$399,404	
Less salaries of employees now supported by the management fund			-96,345	
TOTAL SALARIES (revolving fund)			$303,059	

APPENDIX C: (Continued)

Operating Expenses

Base pay (total salaries, revolving fund)		$303,059
Premium pay (OT, HP, LSP) at 15 percent (FY 1974 rate for last quarter)		45,459
Benefits at 10.5 percent (0.5 percent increase over FY 74 rate)		31,821
OFM (30 percent of FY 74 SAS expenditures)		2,650
Travel (Repository personnel), 12 trips @ $200		2,400
Other (30 percent of FY 74 SAS expenditures)		2,920
Data processing (30 percent of FY 74 SAS expenditures)		1,843
Supplies and materials[c] (30 percent of FY 74 SAS expenditures)		29,083
Animal food and bedding[c] (30 percent of FY 74 SAS expenditures)		69,880
Advisory counselors' travel, 12 trips @ $200		2,400
	TOTAL	$491,515
Cost of inflation for FY 75 estimated at 12 percent		58,982
	GRAND TOTAL	$550,497

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[a] Salaries as of December 31, 1974.

[b] The gnotobiotics unit does not use the cage wash facility so the repository cost is 23 percent instead of 30 percent.

[c] In the FY 1974 statement of income and expense prepared by the NIH Office of Financial Management for Small Research Animals, VRB, $60,000 was inadvertently charged to supplies and materials that should have been charged to animal food and bedding. The FY 74 figures for supplies and materials, therefore, should be $96,942 and for animal food and bedding, $232,934. The above calculations for Repository costs, therefore, account for 30 percent of these two corrected figures.