Proceedings 4th World Rabbit Congress, 10-14 October 1988, Budapest Hungary, Vol. 2, 129-136

CONSERVATION OF GLOBAL RABBIT GERMPLASM RESOURCES

S. D. Lukefahr

International Small Livestock Research Center
P.O. Box 264
Alabama A&M University
Normal, AL 35762 U.S.A.

INTRODUCTION

"The steadily increasing need for a centre, or centres, which would function as 'gene conservatories' (Gruneberg, 1942) for the preservation of mutant alleles ... can scarcely be denied. Such a centre, once it has been set up, would conceivably operate on an international scale, drawing its material from world-wide sources" (Robinson, 1958).

Several decades later, the need to classify the world's rabbit genetic resources was resounded at the predecessor of the present congress in Rome, being recommended from the Prospects on Rabbit Genetics roundtable session. This recommendation was in response to the surmounting global concern to the survival of rabbit breeds/strains, at the gain of relatively few, highly selected breeds from developed countries (Matheron and Poujardieu, 1984), which are annually exported by the thousands into the Third World. An apparent lack of economic incentives by governments and the private sector to preserve local genotypes may well provoke the negative impact of a loss of valuable genetic variability, potentially affecting rabbit enterprise profitability and future food security.

There are over 100 breeds and varieties of rabbit (Oryctolagus cuniculus) in the U.S. Numerous breeds/strains of rabbit can be found throughout the world, as well. To illustrate: The Baladi and Giza White of the Near East/Africa; the Sichuan White and Japanese Large White from Asia; the Criollo of Latin America, and the so-called improved breeds from Europe and North America, e.g. Californian and New Zealand White, serve as examples of local genetic stock representation. A global estimate of 708 million rabbits has been documented by Lukefahr (1985).

In the scientific literature there are limited available evaluation reports on local rabbit breed characterizations, rates of exotic breed adaptation, crossbred performances and environmental production variables, especially from the developing countries. Reports on topics and issues related to genetic conservation and preservation are even more rare, and have primarily been confined to groups of European rabbit geneticists, most notably in France, Italy, and Spain, as well as in Egypt (Poujardieu, 1987, personal communication). Such pertinent production systems and inventory data are needed to facilitate more successful planning and implementation of rabbit breeding programs. Data bank methodologies for animal genetic resources have been developed by the F.A.O. (1986), and could be modified to include rabbits, as proposed by Maijala and Simon (1987). Of course, one priority consideration of such a global endeavor is the immediate preservation of rabbit breeds/strains in danger of extinction.

The purpose of this paper is to: 1) report on vital statistics of U.S. rabbit breed populations; 2) present a model of descriptive variables for rabbit genetic resources data bank inclusion, and 3) briefly recommend procedures for the importation, sampling, testing and conservation of discrete rabbit populations.

MATERIALS AND METHODS

Population figures on rabbit breeds currently found in the U.S. are not available in the scientific literature. Most breeds represented, however, have been officially accepted by the American Rabbit Breeders Association (A.R.B.A., 1986). To date, 38 breeds of rabbit, not including the many varieties thereof, are actively promoted by the A.R.B.A.

Reports on commercial breeding aspects of U.S. meat rabbit production, likewise, are limited. This may be explained, in part, on the basis that domestic producers traditionally maintain purebred New Zealand White (NZW) stock in commercial meat operations. Lukefahr (1983) conducted evaluation studies involving four breeds and 11 two- or three-breed crosses for important economic production traits. Earlier studies reported by Castle (1931) and Gregory (1932) are in good agreement with the above cited source with regard to the potential of the Flemish Giant as a terminal sire breed based upon superior growth gene transmission. Moreover, these reports do tend to confirm major European findings involving crossbred advantages of hybrid doe utilization, e.g., Californian paternity and NZW maternity, in terms of high annual production (Masoero, 1982).

Information is available from the A.R.B.A. on registration figures, according to breed. Such figures may be used as a relative indicator of breed popularity, at least within show circles, and serve as a minimum estimate of the breed population. Presentation of collected registration figures, ideal mature weights, breed origin and domestic usage information are compiled in Table 1, and will be discussed in the next section.

With respect to objectives 2 and 3, resource information included a review of the international literature on conservation of animal genetic resources, with emphasis on rabbits, and personal observation and experience with rabbit breeding programs in Africa, Asia, the Caribbean, the Near East, and Latin and North America.

RESULTS AND DISCUSSION

A.R.B.A. registration figures (1986 and 1987), ideal mature weights, origin and domestic use of recognized breed populations in the U.S. are highlighted in Table 1. Based upon breed registration entries, it would appear that some breeds may be in threat of extinction as "country populations." This may have already occurred to the Blue Vienna, a breed with similar standards to the NZW, which was recently dropped by the A.R.B.A. Standards Committee due to insufficient interest among breeders, via less than 25 animals shown at National Conventions during a 5-year period. According to Maijala (1984), criterion for an endangered breed (swine) consists of less than 200 breeding females and less than 20 breeding males.

Proceedings 4th World Rabbit Congress, 10-14 October 1988, Budapest Hungary, Vol. 2, 129-136

While the tabulated registration data may serve as a warning signal, these figures, undoubtedly, are underestimates of actual breed population numbers. Nonetheless, certain breeds: American, Britannia Petite, Chinchilla (Giant), Cinammon, Hotot, Lilac and Sable (mostly meat breeds), should be immediately investigated by the Commercial Committee of the A.R.B.A., as recommended in the conclusion of this paper.

The World Rabbit Science Association should pursue the ambitious goal of administrating a universally complete inventory of indigenous and exotic breeds/strains and crosses within defined environments. A questionnaire form has already been circulated by a W.R.S.A. executive committee to develop a standardized format of suitable descriptors for breed characterizations of rabbits (Poujardieu, 1987, personal communication). A proposed model of descriptors for rabbit genetic resources data bank inclusion is presented in Table 2. This condensed documentation format corresponds to the F.A.O. data bank methodology (F.A.O., 1986) used for swine, although suitable modifications were made to reflect the unique biology of rabbits. Alternatively, Maijala and Simon (1987) have reported on a data bank system which is being applied to European livestock banks. The rabbit data bank should be compiled by a competent geneticist, involving successful as well as unsuccessful research data entries of breed/strain relative adaptation. Documentation of the degree of genetic relationship among rabbit populations should also be considered, e.g. blood group tests. The rabbit data bank would disclose breeds/strains threatened by extinction. Ideally, W.R.S.A. policy decisions would be mandated with respect to which genotypes and/or country populations to save from possible extinction, and who would finance this expense. The W.R.S.A. should attempt to conduct regional pilot trials through international collaborative efforts in Africa, Asia, the Near East and Latin America/ Caribbean with the F.A.O., or other liaison agencies, to test the adequacy of the rabbit data bank system. Once developed, the comprehensive rabbit data repository should be made accessible to all potential users, e.g. rabbit scientists, agencies which export/import stock, governments, educators, students, extension personnel and project planners. Finally, data bank summary reports should be published for broad readership, via F.A.O. Animal Descriptor Handbook and the Journal of Applied Rabbit Research.

Rabbit importations are costly. Shipment planning requires some balance between cost and broad genetic sampling, as well as knowledge of the environmental suitability of the breed, among other considerations. Of related concern, transmission of highly contagious diseases, e.g. pasteurellosis, has far too often accompanied rabbit stock importations. Prior to shipment, stock should be cultured and certified for health status. Too, the shipment should consist of at least 10 bucks and 20 does per breed (approximately 2% rate of inbreeding per generation), and with pedigrees, in cases where a one-time introduction is involved, especially in developing countries. Moreover, the exotic stock should be quarantined and then experimentally evaluated at a breeding station and/or multiplication center for relative aggregate genetic merit concurrently with the local genotype(s), as well as crosses thereof (Pilandon et al., 1986). The local stock may represent a "reference population" as used among countries of the same region. Further, a composite gene pool population consisting of within region sub-groups may be desirable as the reference population, e.g. Baladi and Criollo strains, from a cost-effective standpoint. The station geneticist should decide for which primary traits to base evaluations. On-farm research trials should be conducted to complement the genetic results obtained from the breeding station. Following favorable test results, exotic purebred (specialized line) or crossbred stock may be appropriately distributed for commercial utilization. In many observed cases, this process has not been used on the unfounded premise that local stocks are genetically inferior, inadvertently resulting in displacement and/or genetic dilution of local stock populations. This indiscriminate practice is not amenable to the long-term development of national livestock gene bank resources. The cost of conservation relative to potential benefits (particularly with regard to the reproductive efficiency levels of the rabbit) should be of minor relevance, in so far as government policy is concerned. In addition, more research is needed on cryogenic storage techniques of rabbit semen and embryos as a means of conservation.

F.A.O. (1981) predicted by the turn of the millenium that one-third of the human population will have its dietary protein needs met by the consumption of pork, poultry and rabbit meat. In light of the F.A.O.'s forecast for the futuristic role of the rabbit as a food source, it is ironic that more global attention and resources are not invested in the extensive development of rabbit projects, especially in the developing countries.

In the U.S., the Council for Agricultural Science and Technology (C.A.S.T.), the National Research Council's Committee on Managing Global Genetic Resources and the American Minor Breeds Conservacy have made or are making contributions to lay the developmental framework for ensuing program involvements in animal genetic resource conservation (C.A.S.T., 1984; Ballachey, 1988, personal communcation). The traditional focus is on beef and dairy cattle, goats, sheep, swine and poultry as livestock species which are most vital to the U.S. economy, although some groups (N.R.C. and A.M.B.C.) are committed to the review and consideration of all agriculturally important species.

It is recommended to the A.R.B.A. that the existing Commercial Committee be assigned the responsibility of developing and promoting proper conservation and management policies for rabbit breed populations, as well as the duty to safeguard valuable breeds in the U.S. which are in danger of extinction. In certain cases the A.R.B.A. could likely subsidize producers which maintain endangered breed populations. Similarly, W.R.S.A. should rigorously pursue ongoing efforts to align its mission closely with the F.A.O., and other key agencies, to delegate and publicize regional data bank centers of rabbit germ plasm conservation, and to encourage rabbit geneticists/scientists in each country to join the National Committee to the institute for Animal Genetic Resources Regional Data Banks systems network.

ACKNOWLEDGMENTS

This investigation was supported through the generous provision of rabbit breed registration data by Dr. T. E. Reed, President, American Rabbit Breeders Association (Bloomington, IL), and by resource literature made available from Dr. B. Poujardieu (I.N.R.A. - Toulouse, France) and Dr. B. Ballachey (Committee on Managing Global Genetic Resources, Board on Agriculture, N.R.C. - Wash., D.C.), the latter of whom kindly reviewed the manuscript.

REFERENCES

A.R.B.A. 1986. Standard of Perfection. The American Rabbit Breeders Assoc., Inc., Bloomington, IL.

C.A.S.T. 1984. Animal Germplasm Preservation and Utilization in Agriculture. Report No. 101. Council for Agricultural Science and Technology. Ames, IA.

Castle, W. E. 1931. Size inheritance in rabbits; the backcross to the large parent race. J. Exp. Zool. 60:325.

F.A.O. 1981. F.A.O. Expert Consultation on Rural Poultry and Rabbit Production. November 30 - December 3, 1981. Rome, Italy.

F.A.O. 1986. Animal genetic resources data banks. 2. Descriptor lists for cattle, buffalo, pigs, sheep and goats. F.A.O. Animal Production and Health Paper. 59/2: 150pp.

Gregory, P. W. 1932. The potential and actual fecundity of some breeds of rabbits. J. Exp. Zool. 62:271.

Gruneberg, H. 1942. The need for gene conservatories. J. Hered. 33:291.

Lukefahr, S. D. 1983. Evaluation of rabbit breeds and crosses for overall commercial productivity. Ph.D. Dissertation. Oregon State Univ., Corvallis.

Lukefahr, S. D. 1985. A note on an estimate of the world's domestic rabbit population. J. Appl. Rabbit Res. 8:157.

Maijala, K. 1984. Conservation of animal genetic resources in Europe. Livest. Prod. Sci. 11:3.

Maijala, K. and D. Simon 1987. Plans for European data banks on animal genetic resources. In: Proc. 38th Annual Meeting of the European Association of Animal Production. September 28 - October 1, 1987. Lisbon, Portugal.

Masoero, G. 1982. Breeding and crossbreeding to improve growth rate, feed efficiency and carcass characters in rabbit meat production. In: Proc. 2nd World Congress on Genetics Applied to Livestock Production, October 4-8, 1982. Madrid, Spain.

Matheron, G. and B. Poujardieu. 1984. La genetique du lapin: Le point, les perspectives. In: Proc. III World Rabbit Congress, April 4-8, 1984. Rome, Italy.

Pilandon, M. T., R. Henaff and J. F. Ponsot. 1986. Potentialites zootechniques d'une souche de lapins "Gris du Bourbonnais" - Bilan de 5 annees d'observation. In: 4'emes Journees de la Recherche Cunicole, Communcation No. 25. December 10-11, 1986. Paris, France.

Robinson, R. 1958. Genetics studies of the rabbit. Bibliogr. Genet. 17:229.

Table 1. Statistics on rabbit breed registration figures, ideal mature weights, origin and domestic usage in the United States.

Breed	Registrations 1986	Registrations 1987	Ideal mature weights, kg Bucks	Ideal mature weights, kg Does	Origin	Domestic use
American	6	1	4.54	4.99	U.S.A.	Meat
Angora (Fr. & Eng.)	508	1,154	**	**	Turkey	Wool
Belgian Hare	18	31	3.63	3.63	Belgium	Fancy
Beveren	35	29	4.09	4.54	Belgium	Meat
Britannia Petite	0	0	1.02	1.02	Britain	Fancy
Californian	1,217	1,268	4.09	4.31	U.S.A.	Meat
Champagne d'Argent	138	152	4.54	4.77	France	Meat
Checkered Giant	107	85	4.99	5.45	Germany	Meat
Chinchilla (American)	54	34	4.54	4.99	U.S.A.	Meat
Chinchilla (Giant)		19	6.13	6.58	U.S.A.	Meat
Chinchilla (Standard)	20	13	2.95	3.18	France	Fancy
Cinnamon	2	1	4.31	4.54	U.S.A.	Meat
Creme d'Argent	15	26	4.09	4.54	France	Meat
Dutch	507	422	2.04	2.04	Holland	Fancy
Dwarf Hotot	146	157	1.02	1.02	Germany	Fancy
English Spot	227	231	2.72	3.18	*	Fancy
Flemish Giant	443	241	5.45	5.90	Flanders	Meat
Florida White	243	261	2.27	2.27	U.S.A.	Meat
Harlequin	63	39	3.41	3.63	France	Fancy
Havana	93	116	2.44	2.44	Holland	Meat
Himalayan	116	146	1.59	1.59	*	Fancy
Hotot	9	2	4.09	4.54	France	Meat
Lilac	4	18	2.95	3.18	Britain	Meat
Lop (Fr. & Eng.)	1,212	1,047	**	**	France/*	Fancy
Lop (Holland)	1,172	1,221	1.36	1.36	Holland	Fancy
Lop (Mini)	1,627	1,463	2.50	2.72	Germany	Fancy
Netherland Dwarf	2,087	2,187	0.91	0.91	Holland	Fancy
New Zealand	1,608	1,350	4.54	4.99	U.S.A.	Meat
Palomino	73	161	4.09	4.54	U.S.A.	Meat
Polish	123	171	1.14	1.14	*	Fancy
Rex	1,311	1,269	3.63	4.09	France	Fur
Rhinelander	14	37	3.63	3.86	Germany	Fancy
Sable	6	6	3.63	4.09	*	Fancy
Satin	1,025	1,001	4.31	4.54	U.S.A.	Meat
Silver	14	18	2.72	2.72	India	Fancy
Silver Fox	30	38	4.31	4.77	U.S.A.	Meat
Silver Marten	175	127	3.41	3.86	U.S.A.	Meat
Tan	203	223	2.04	2.27	Britain	Fancy

*Precise origin is unknown.

**Ideal mature weights (bucks and does) are given for French Angoras (3.63 and 3.63), English Angoras (2.50 and 2.95), French Lop (4.99 and 5.45) and English Lop(4.54 and 4.99), respectively.

Table 2. Rabbit Descriptors: Model for rabbit genetic resources data bank entry.*

SLAVE RECORD**

1. Breed name of MASTER record:
   New Zealand White (NZW)
2. Breed/strain type of SLAVE record:
   100% NZW
3. Strain (or distinct within-breed type):
   N/A
4. Period of data:

	year	month	day
From	1980	November	5
To	1982	February	6

5. Data form prepared by:
   5.1 Name: S. D. Lukefahr
   5.2 Title: Dr.
   5.3 Address: ISLRC, P.O. Box 264, Huntsville, AL 35762
   5.4 Affiliation: Alabama A&M University
   5.5 Date of preparation: 1988:03:30
6. Bibliographical reference of source document:
   Lukefahr, S. D. 1983. (See References section)
7. Data type and analysis:
   7.1 Data:
   7.1.2 data adjusted for environmental or other factors
   7.2 Treatment of data:
   7.2.2 analytical
8. Reliability code:
   1 = highly reliable
9. Country: U.S.A.
   9.1 Country subdivision: Oregon, Benton county
10. Terrestrial environment:
   10.7 Middle latitude grassland (44 N, 123 W)
11. Elevation and topography: 68.3m, Valley, gentle slope, seasonally wet
12. Climate: (data not available)
13. Socio-management system:
   13.3 Intensive
14. Type of farm:
   14.4 Experiment station
15. Degree of management supervision
   15.3 Supervision by scientific staff of investigation project
16. Mating method:
   16.1 Natural (hand mating)
17. Herd size:

	Total
17.1 number of breeding does	35
17.2 number of replacement does	35
17.3 number of breeding bucks	15
17.4 number of kits birth to weaning (28-d)	167
17.5 number of kits weaning to market (56-d)	105

18. Nutrition:
   18.4 Concentrates (refer to Lukefahr, 1983)
19. Housing:
   19.1 Wire cages, indoors
   19.2 16:8 Light-dark constant photoperiod
20. Diseases and parasites:
   20.1 Pasteurellosis, mastitis, pododermititis, ear mites, intestinal and reproductive diseases
21. Measures against diseases and parasites:
   21.1 Strict culling, sanitation, selection of healthy stock
22. Performance:

22.1 Body weight (N=litters)	Age	N	Mean,g	SD
22.1.1 Birth	1	30	51.8	-
22.1.2 Weaning	28	21	496	-
22.1.3 Postweaning	56	19	1,600	-
22.1.4 Maturity				
Males	277	10	3.86	0.213
Females	154	35	3.83	0.355
22.1.5 Other body weights (free format field)				
22.2 Average daily gain (litters)				
22.2.1 Preweaning 1-28		21	15.8	-
22.2.2 Postweaning 28-56		19	35.6	-
22.2.3 Feed conversion 28-56		19	4.14	0.37

22.3 Body measurements (data not available)
   22.3.1 Chest circumference
   22.3.2 Body length
   22.3.3 Loin width
   22.3.4 Rump ½ circumference
   22.3.5 Other body measurements (free format field)

22.4 Carcass characters:	Age	N	Mean,g	SD
22.4.1 Weight				
22.4.1.1 Hot	66	18	1,877	229
22.4.2 Dressing percent	66	18	52.7	1.61
22.4.3 Abdominal fat, %	66	18	0.91	0.30
22.4.4 Forequarter (%)	66	18	42.1	2.16
22.4.5 Loin (%)	66	18	19.3	1.78
22.4.6 Hindquarter (%)	66	18	40.1	1.27
22.4.7 Meat:bone ratio	66	18	3.76	0.42
22.4.8 Lean percentage	66	18	69.6	3.05
22.4.9 Bone percentage	66	18	18.6	1.85
22.4.10 Cooking loss (%)	66	18	12.9	3.31
22.4.11 Other carcass characters (free format field)				

22.5 Reproduction:
   22.5.1 Sexual maturity of males (data not available)
   22.5.1.1 Standard age at 1st mating - 183 days
   22.5.2 Sexual maturity of females (data not available)
   22.5.2.1 Standard age at 1st mating - 154 days
   22.5.3 Breeding cycle - 45 days (8 litters/annum)
   22.5.3.1 Gestation length - 31 days
   22.5.3.2 Remating schedule - 14 days
   22.5.3.3 Pregnancy detection (abdominal palpation) 10 days post-mating
   22.5.3.4 Number of teats (data not available)

22.5.4 Fertility	N	Mean	SD
22.5.4.1 Conception rate (%)	136	84.1	78.8
22.5.4.2 Number of services per conception	136	1.27	-
22.5.4.3 Number of services per kindling	136	1.53	-
22.5.4.4 Interval from kindling to conception	136	-	-
22.5.4.5 Kindling interval	136	-	-
22.5.4.6 Kindling percentage	136	65.4	-

22.5.5 Fecundity (litters)

22.5.5.1 Litter size (adjusted for parity)	N	Mean	SD
Birth (total)	30	8.97	4.29
Weaning (28d)	21	7.90	3.95
Postweaning (56d)	19	5.42	2.48
22.5.5.2 Milk yield, 1-21d,kg	68	3.97	1.32
22.5.5.3 Maternal behavior (data not available)			
22.5.5.4 Nest quality (data not available)			
22.5.6 Semen (data not available)			
22.5.7 Prenatal mortality (litters)			
22.5.7.1 Stillbirths (%)	30	19.2	-
22.5.8 Reproductive disorders - Mastitis metritis, misconceptions, toxemia			
22.6 Postnatal mortality (litters)			
22.6.1 Preweaning (%) 1-28d	23	21.9	-
22.6.2 Postweaning (%) 28-56d	19	12.8	16.6
22.6.3 Doe longevity 154-365d,d	33	166	138

23. Physiology: (data not available)
24. Genetic parameters:

24.1 Repeatability	Value	Se
24.1.1 Fertility (%)	0.09	0.06
24.1.2 Number born	0.26	0.07
24.1.3 Early survival (%)	0.16	0.08
24.1.4 Litter birth wt,g	0.33	0.07
24.1.5 Number weaned, 28d	0.23	0.08
24.1.6 Late survival (%)	0.22	0.08
24.1.7 Litter weaning wt,kg	0.07	0.08
24.1.8 Doe & litter feed intake,kg	0.19	0.08
24.1.9 Doe & litter feed efficiency	0.05	0.08
24.1.10 Milk production,kg	-0.02	0.08
24.1.11 Litter 21d wt,kg	-0.03	0.08
24.1.12 Doe wt at kindling,kg	0.72	0.04
24.1.13 Doe feed intake,kg	0.27	0.08
24.1.14 Doe feed efficiency	0.17	0.09

24.2 Other quantitative genetic parameters (free format field)

25. Cytogenetics: (data not available)
26. Inherited abnormalities:
   26.1 Malocclusion (mp), hydrocephalus (hy), woolly (l), spina bifida (sb). (gene frequencies not available)
27. Resistance to infectious diseases:

	N	Mean	SD
27.1 Diarrheal-related mortality (%) (28-56d)	19	10.8	15.3

28. Color type:
   28.1 Albino (cc)

*Adapted from FAO, 1986.
**Data from Lukefahr, 1983.

Proceedings 4th World Rabbit Congress, 10-14 October 1988, Budapest Hungary, Vol. 2, 129-136

CONSERVATION OF GLOBAL RABBIT GERMPLASM RESOURCES

S. D. Lukefahr

International Small Livestock Research Center, P.O. Box 264
Alabama A&M University, Normal, AL 35762, U.S.A.

Summary

Tremendous genetic diversity among rabbit breeds/strains is represented in the world. A conscientious effort to maintain such an ample global gene pool base will best ensure that increased improvements in economic trait performances will continue to be achieved through wise genetic resource utilization. In recent decades the widespread use of limited popular commercial breeds has oftentimes resulted in the displacement and consequent reduction of a number of local rabbit stocks. Immediate crossbreeding following importation has been observed in numerous cases before either local or exotic genotypes have been properly evaluated under similar environmental conditions. Another issue is disease transmission problems commonly associated with stock importations. There is a great need to identify, sample, test, classify and conserve the world's resources of rabbit germ plasm for the purposes of productivity enhancement and future food security. This objective should be reviewed as government policy among and within nations. This paper will provide further information on establishing genetic performance criteria and resource data banks for rabbits to augment the exchange and preservation of rabbit genetic stocks.

Resume

Une énorme diversité génétique existe dans le monde entre les races ou souches de lapins. Un effort consciencieux pour maintenir une base si vaste de source globale de gênes assurera mieux que les améliorations accrues dans les fonctionnements des caractères d'intérêt économique s'obtiennent continuellement au moyeu d'utilisation sage des resources génétiques. Durant les recents décades l'usage étendu des races commerciales populaires limitées a souvent résulté au deplacement et à la conséquente réduction du nombre de populations locale des lapins. Le croisement interracial immédiatement après l'importation a été observé dans nombre de cas avant même que les génotypes locaux ou exotiques aient été proprement évalués dans des conditions ambiantiales identiques. Un autre cas est celui des problèmes de transmission des maladies communement associée aux importations des lapins. Il est necessaire d'identifier, prélever des échantillons, tester, classifier et de conserver les resources mondiales des souches de lapin aux fins de stimuler la productivité et la future sécurité alimentaire. Cet objectif doit être considéré comme la policie des gouvernements parmi et dans les nations. Cet article fournira des informations additionelles sur l'établissement des critères de fonctionnement génétique et des repertoires des données de resource pour lapins pour augmenter l'échange et la préservation des réserves génétiques de lapin.