

# GERMPLASM CONSERVATION IN COTURNIX QUAIL

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## SUMMARY

Many genetic resources in plants and animals have been lost through mismanagement or lack of support. The erosion of poultry genetic resources in Canada has been extreme and industrial stocks are dangerously close to being monotypic. The Quail Genetic Stock Center at the University of British Columbia, mainly supported by an infrastructure grant from the Natural Sciences and Engineering Research Council of Canada, is maintaining a large colony of coturnix quail. The collection includes lines carrying various mutations, as well as large randombred populations. Because of their adaptability to breeding cages, their prolificity, and their accelerated growth and reproductive cycle, the quail is widely used in research and teaching. By promoting wider usage of the stocks, it is hoped that continue support can be maintained for managing such a collection.

## INTRODUCTION

By the end of this century, up to a million species of plants and animals will disappear from the face of the earth. The threat to wild plants and animals has received greater publicity, but conservation action is also badly needed for livestock (Maijala, 1970; Crawford, 1984). In poultry, the erosion of genetic resources has been extreme. Industrial stocks are dangerously close to being monotypic, middle-level stocks have nearly disappeared, and genetic variation within fancy breeds is not being adequately conserved by hobbyists. If conservation of animal genetic resources is to be carried out adequately, it must be concluded that the responsibility belongs with public agencies such as government research organizations and universities. Only they can provide the long-term continuity and assured continuance of a conservation scheme. Unfortunately, in public policy term, the problem of genetic vulnerability and germplasm preservation seems to be a backburner issue unless a crisis occurs (Walsh, 1981). "Immediate economy" dictates that many funding sources demand predictable returns in the form of concrete results and provide grants for specific research projects but not for the maintenance of the genetic stocks. In the past four years, the Quail Genetic Stock Center in the Department of Poultry Science, The University of British Columbia, has been successful in obtaining partial funding for such a purpose. The quail colony represents one of three conservation collections of poultry that exist at public institutions in Canada. The other two collections consist mostly of chicken stocks (Crawford, 1984).

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## THE QUAIL GENETIC STOCK CENTER

The interests in maintaining coturnix quail (*Coturnix coturnix japonica*) populations at The University of British Columbia started in the late sixties, but it was not until 1976 when concentrated efforts were made by the late Dr. C. W. Roberts to acquire genetic lines and to develop mutant strains. After his untimely death in 1980, these responsibilities were carried on by the author. In 1982, the project received support from the Natural Sciences and Engineering Research Council of Canada (NSERCC) in the form of an infrastructure grant, and a formal Quail Genetic Stock Center was established.

### The Gene Pool

At present, the Center maintains three randombred wildtype populations from different origins. A captive wild population is being established with feral birds trapped in Hawaii. The Center also maintains two commercial lines, four plumage color lines, and ten other lines carrying various types of mutations. Some of the mutations are unique and not found elsewhere. A population of Chinese painted quail (*Excalfactoria chinensis*) with three plumage color variants is also being maintained. With a total of approximately 4,000 birds, the Center's collection may be the largest in North America in terms of mutations harbored.

### Management of Genetic Stocks

Eggs for hatching are gathered daily, pedigreed and stored for one to two weeks in a cool room (13°C, 65% humidity). During storage, the eggs are turned daily. Eggs are set for incubation in either Petersime SP6 or Robins IHA incubators and hatchers. Those eggs that are not hatched are broken out and inspected macroscopically to determine infertility or embryonic deaths (Kosin, 1944). The hatched chicks are individually wing-banded and brooded (60 per brooder) in commercial game chick brooders until 6 weeks of age when they are transferred to breeding cages. Breeding birds are exposed to a 14L:10D lighting scheme. Birds of all ages are fed a crumbled commercial turkey starter diet (26% protein, fortified with 1.25% calcium).

Established lines are maintained by random mating of 50 males to 100 females per line to avoid inbreeding depression (Sittmann et al, 1966). Lines being developed are either propagated by matings of 50 males to 100 females (i.e. lines involving mutations that caused poor reproduction) or pedigreed matings of 12 males to 24 females (i.e. lines that can be backcrossed to one of the main populations). Generation interval of quail is short and the lines have to be reproduced every 4 months (3 generations a year) because reproduction in older females is poor in terms of egg numbers and hatchability (Woodard & Alplanalp, 1967).

### Functions of Genetic Stocks

1. Research:

Descriptions of most of the genetic lines can be found in the 'International Registry of Poultry Genetic Stocks' (4th ed.; Somes, 1984), and in the 'CCAC Catalog of Research Animals in Canada' (Canadian Council on Animal Care, 1983).

Eggs and birds from the Center are being utilized for research purposes at The University of British Columbia as well as five other universities across Canada. Areas of research include genetics (Fulton et al, 1982a, 1982b, 1983), developmental biology (Cheng & Brush, 1984; Shah et al, 1985), cancer, animal behavior, and avian ecology. In the past year, the Center assisted in 17 research projects.

## 2. Teaching:

At the University of British Columbia, quail from the Center has been used in nine courses in the Departments of Biology, Zoology, Poultry Science, and Animal Science. In BIOL 101, 102 (Introduction to Biology), matings involving birds carrying various mutations were set up and carried to the F<sub>2</sub> generation for a laboratory exercise to demonstrate simple Mendelian genetics. Adult birds (one between every 2 students) were also used for dissection. The enrolment for these two courses averaged 1,400 students and a large number of birds was utilized. Experience from past years indicated that quail was more satisfactory than laboratory mouse in the genetics exercise and was also more cost efficient.

In other courses, quail is used in laboratory projects. In POUL 258 (Introduction to animal production system), students spend a 2-hour laboratory session in the Center touring the facilities and attending a lecture on quail breeding and management.

Two community colleges in the province utilize quail from the Center in their biology and animal behavior courses. In addition, students from local secondary schools regularly obtained quail for their senior science projects.

The Center supplies fertile quail eggs to eight local secondary and elementary schools for demonstration of the incubation and hatching process.

## 3. Consultation and extension:

Each year, staff at the Center helped set up quail exhibits at the Pacific National Exhibition and the Royal Manitoba Winter Fair. As well, staff also provide consultation for researchers and teachers on managing quail as a laboratory animal, and consultation for local producers on management and marketing. In the latter case, birds from the Center were sometimes provided as breeding stocks.

## Support For the Center

Funds from the NSERCC infrastructure grant provided the salary for a full-time technician and a part-time animal caretaker, and also covered a small portion of the operating costs. The remaining labor requirement is fulfilled by student work-study programs as well as occasional help from graduate

students. The major proportion of operating costs can be recovered from users fee and sales of surplus birds and eggs. In 1984, the University allotted a \$300,000 fund for a 130' by 60' building to house the quail collection. The new building includes a hatchery, three pedigree cage rooms with capacity for 3,000 adult birds, two brooding rooms with capacity for 4,800 chicks, a floor-pen room, an office, a display area and an equipment cleaning room. The building is also equipped with automatic manure disposal and a feed silo.

#### GENERAL DISCUSSION

The costs of maintaining gene pools can be lowered by finding various economic uses for the population (Maijala, 1974). Because of their small body size, ease of maintenance, fast reproduction rate, and availability in large numbers, the coturnix quail has fast become very useful in scientific research and a suitable avian model to be used in teaching biology. There is also a strong demand for quail and quail eggs, especially in metropolitan areas, as specialty food items. Quail meat is highly sort after by falconers and raptor rehabilitation centers as food source for their birds. Although funds recover from users fee and sales are not sufficient for maintaining the quail collection at the Center, the increasing use of quail in various ways provided more justification for requesting support.

#### CONCLUSION

By promoting the use of Coturnix quail as a research, teaching, and production animal, and by providing stocks relevant to the needs of the research community interested in this important species, as well as stocks for other usage, we hope to be able to provide justification to continue acquiring and maintaining genetic stocks of quail for germplasm conservation.

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