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## COTTONTAIL RABBIT PROPAGATION IN SMALL BREEDING PENS

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Most Wildlife Biologists and State Department Administrators realize that cottontail rabbit stocking is not a feasible management tool. Since 1950 the importation of wild rabbits into the State of Maryland has been prohibited, but the demand for cottontails is still present among certain groups. Those desiring cottontails for study purposes, beagle clubs, field trial operators, and unconvinced sportsmen are the mainstays of the above mentioned groups. All of these persons would like to have a few cottontails at specific times throughout the year. Because of this demand an experiment was initiated in 1955 to determine whether the cottontail could be produced in relatively large numbers in small outdoor enclosures. This experiment will continue for a 3-4 year period, at the end of which time it is hoped the numbers of rabbits and sex ratios which seem to be most productive in small pens varying in size from 1/16 to 1/4 acre will be determined. The Maryland Game and Inland Fish Commission does not intend to pen propagate rabbits statewide, but rather to release the best available information as a result of these experiments to individuals and conservation organizations interested in propagating rabbits for their own stocking or study purposes.

The results of the first year's experiments are as follows:

Four (4) open-top pens measuring 50' x 50', or approximately 1/16 acre were erected of 18-gauge, one-inch mesh wire, five feet in height. These pens were situated within a 70-acre enclosure of mesh wire which was encircled by an electric top wire. The large enclosure is also used in a rabbit propagation experiment. An electric top wire is necessary to exclude ground predators from entering the pens. The four (4) pens were located on a contour strip of planted white dutch clover. This contour strip was on a 45% grade affording good drainage. The clover comprised approximately 80% of each pen area with the remaining 20% in wild grasses affording good nesting cover. Three small brush piles of evergreen boughs and a feeding shelter were placed in each pen. The feeding shelter was constructed of sheet-tin covered with grass, supported six inches above the ground. High-protein commercial rabbit pellets and a pan of fresh water were placed under each shelter daily. The breeders were released in the pens in January, 1955, in order to allow them to acclimate themselves to pen existence before the breeding season.

One hundred and sixty-seven (167) young were produced from seven (7) females in the four pens for an average of 23 and 6/7 young per female. The sex ratio used and production per pen were as follows:

Pen	Breeders	Net Production	Losses
1	1 male, 3 females .....	65	13
2	1 male, 2 females .....	24	22
3	1 male, 1 female .....	20	1
4	1 male, 1 female .....	22	0
		131	36

The three (3) females in Pen 1 averaged twenty-six (26) young per female, which was the greatest average per female and largest number of young per unit space.

The one hundred and sixty-seven (167) young were produced in thirty-five (35) litters for a litter size average of 4.77. The numbers and sizes of litters per female were as follows:

Pen 1.....	16 litters.....	78
Pen 2.....	9 litters.....	46
Pen 3.....	5 litters.....	21
Pen 4.....	5 litters.....	22

The high production was probably due to the feeding of high-protein pellets, very little humane and animal disturbance; no nest disturbance and removal of young 7-10 days after leaving the nest. The young were removed by a long handled mesh net with a deep pocket.

Thirty-six (36) of the one hundred and sixty-seven (167) young produced were lost. The losses were attributed to the following causes: One (1) by weasel (*Mustela rixosa allegheniensis*); ten (10) by opossum (*Didelphis virginiana*); sixteen (16) by weather (August hurricane); one (1) by food; one (1) by accident and seven (7) by desertions. It will be noted that twenty-five (25) of the thirty-six (36) losses were due to factors other than predators, which were relatively uncontrollable. The ten (10) losses attributed to an opossum were incurred in two nights to nesting cottontails. The seven (7) nest desertion losses were caused by a single female in Pen 2. She removed two (2) young from a litter of seven (7) and delivered a litter of five (5) at random on the surface of the ground.

The cost of production for Pen 1 included the fencing materials and construction labor costs (which costs it is hoped can ultimately be absorbed over a 3-year period) amounted to \$2.59 per rabbit of those removed from the pens for restocking purposes, or sixty-five (65) young. The breakdown of costs are as follows:

Fencing material .....	\$ 39.37
Construction (labor) .....	22.50
Pellets .....	6.50
Feeding, checking and removal.....	100.00
TOTAL .....	\$168.37

The average time per day spent for checking, removal and feeding for the entire summer was fifteen minutes.

As mentioned earlier, it is hoped to find ways and means of reducing the first year's production costs by successfully producing more young per unit space and by paring down some 1955 costs. Much time was expended obtaining litter size data in 1955 which is not being done this year.

The original pens should serve for three (3) years without moving same to fresh ground or allowing pens to rest for one year. All rabbits were removed by October 5 in 1955 and an earlier removal is planned in 1956.

The pens were heavily limed following removal of the breeders and no evidence of disease was detected in 1956. Following removal of the breeders this fall, one-half of the pens will be just limed as last fall and the other half will be limed, disced and reseeded. A careful check is planned for disease occurrence in 1957.

The first year of experiments fairly well established the fact that rabbits can be raised successfully under the stated conditions. The success or failure of having equal production each year in the individual pens may be influenced by

weather conditions, predation, disease, the ability of females to produce under pen conditions and perhaps other factors not yet determined or recognized.

In the 1956 experiments, one pen of approximately  $\frac{1}{8}$  acre and one pen of approximately  $\frac{1}{4}$  acre are being used in addition to the four  $\frac{1}{16}$  acre pens. Artificial underground burrows were built in each pen this year in hopes of cutting down the excitement caused by human activity in the pen. The artificial burrows are 5' in length with an entrance in each end. The greatest depth in the center is 10 inches. Curved tile or old metal signs were used to prevent collapsing of the burrows. The burrows turned out to be a worthwhile effort since they were used constantly this year by breeders and young alike. The breeders were put into the pens on February 8 this year and our first litter was observed March 24.

The sex ratios used and production per pen in 1956 is as follows:

Pen	Size	Breeders	Production	Losses
1	1/8	2 males, 6 females	36	27
2	1/16	1 male, 2 females	21	21
3	1/16	1 male, 3 females	48	13
4	1/4	2 males, 8 females	85	38
5	1/16	1 male, 3 females	28	20
6	1/16	1 male, 4 females	69	16
TOTALS			287	135

Four questions to be answered in 1956 are:

1. Will one male mate with four females through an entire breeding season?
2. Will two males in one pen cause fighting?
3. Will rabbits produce as well in their second year of breeding?
4. Will the overall production be as high as 1955?

One buck is capable of mating with four females for an entire breeding season as seen in Pen 6, where eighty-five (85) young were produced this year. There has been no observation of any fighting between males or between males and females in the pens where more than one male have existed. This is probably due to mutual existence before the breeding season. Only thirteen (13) young per female were produced in these pens as compared to nineteen (19) per female from the pens of only one (1) buck. This difference may have been brought about by molestation of one female by two males when she was receptive for breeding. It was noticed that in these pens many females would go unbred at times when it is thought they should have had consecutive litters. Two females were carried over from 1955 and are being used in Pen 3. The pen has an average production close to twenty (20) and the females can be considered good breeders in their second year. This may be valuable in selecting heavy producers which are well adapted to pen breeding for a second season rather than chance selection of wild trapped animals.

Production in 1956 is considerably below 1955 but still considered sufficient to warrant this type of rabbit propagation. The overall average production was sixteen (16) per female but in the  $\frac{1}{16}$  acre pens (considered the ideal size) the production per female was twenty (20). In all probability two serious periods of predator mortality affected breeding and production. In the first three months of breeding, the breeders were beset with crow predation on nests along with many losses of nestlings due to extreme weather conditions. Sixty-seven nestlings were lost during one month of predation by crows and twenty-three (23) nestlings died from exposure to wet, cold weather during this same period. A house cat caused six (6) deaths to young off the nest and badly scared all the breeders before being destroyed. Desertion, injury and unknown causes completes the types of mortality. The desertion losses were all from females scattering newborn young on the surface of the ground rather than in a suitable nest. The types of mortality in 1956 were as follows:

Crows	67	Cat	6
Desertion	22	Weather	34
Injury	1	Unknown	7

Five of the seven losses attributed to unknown causes may have been to exposure since they occurred within a day after the young left the nest.

The cost per rabbit over the two (2) year period was estimated from Pen 1 in 1955 and Pen 6 in 1956. These pens had one (1) male and three (3) females, and one (1) male and four (4) females respectively.

<i>1955 Costs</i>	<i>1956 Costs</i>
Fencing .....\$ 39.75	Pellets .....\$ 8.68
Construction ..... 22.50	Removal and feeding.... 50.00
Pellets ..... 6.50	\$58.68
Removal, checking feed 100.00	\$168.73 Young removed 134
<u>          </u>	58.68 Cost per rabbit \$1.70
\$168.73	<u>          </u>
	\$227.41

The 50' x 50' size pen will be used exclusively in 1957 since after two years experiments it is considered the best pen size. The least expense is involved in this size and more rabbits per unit space can be produced. Sex ratios planned are one (1) male to three (3), four (4) and five (5) females. One (1) male was capable of mating four (4) females in 1956, and 1957 will prove if five (5) females can be serviced for an entire season.

If no disease losses occur in 1957 after using a pen for three years, the cost per rabbit should be somewhat less than \$1.00.

## PANEL DISCUSSION—PROBLEMS IN DOVE MANAGEMENT

*Chairman:* HAROLD S. PETERS, *U. S. Fish and Wildlife Service*; ROLLAND HANDLEY, *Mississippi Game and Fish Commission*; JOHN NEWSOM, *Louisiana Wild Life and Fisheries Commission*; SCOTT OVERTON, *Florida Game and Fresh Water Fish Commission*; and LEONARD E. FOOTE, *Wildlife Management Institute*.

The Chairman opened the panel with a general statement of present status of Mourning Dove investigations in the United States and mention of the need for continuation of four major phases of the program: annual call count, random road counts in late summer and fall for production and migrations information, nationwide dove nestling banding program, and hunter bag checks to determine success, percentage of juveniles, and number of adults feeding dependent nestlings. The widespread nestling banding program, combined with other banding, has resulted in the largest number of doves being banded in one year, an expected total of 40,000. Further studies of dove breeding population and production are needed in the important vegetative habitats and land use types throughout the country. These should be tied in with call count stations, as Lowe (*Jour. Wildl. Mgt.*, 20(4) :428-433, 1956) has done in northern Georgia.

Handley reported on the nestling banding programs in Mississippi where 1,493 were banded this summer. An intensive program of banding was conducted in the Parchman area where 745 nestlings were banded on about 160 acres of peach orchards.

Newsom spoke on the expanded banding program of Louisiana during the past three years, and of plans for experimental banding in coastal Louisiana. His State may be leading in total number of doves banded, with Texas and Florida also in the 20,000 to 25,000 class.

Overton spoke on Florida's post-season mail questionnaire on hunter kill and of the possibility of setting up a region-wide program to secure comparable information of the kill in each state.

Foote gave a summary of the Comprehensive Dove Report just completed for the Southeastern directors. It analyzes results of all dove studies from 1948 to 1956, with particular emphasis on the results of the Southeastern Coopera-