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FLUCTUATIONS IN TESTICULAR CONDITION OF COTTONTAIL RABBITS IN GEORGIA[1]

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ABSTRACT

A total of 500 male cottontail rabbits were collected over a two year period from the Coastal Plain, Piedmont, and Mountain physiographic regions of Georgia. Adult testes weight, volume, length, and diameter were recorded, epididymides checked for convolutions and presence of viable sperm, and relative condition of the testes noted as to flaccidity or turgidity and ascended or descended. Regression analysis was performed on young of the year testes growth (volume and weight) and increasing age (eye lens weight).

The data revealed that weight and volume were more sensitive indicators of testes condition than length and diameter. No significant seasonal differences were noted in weight and volume between regions and between Georgia and northern states. A close correlation existed between testes volume and percentage of females pregnant. Males in the Coastal Plain and Piedmont regions were apparently capable of breeding by January of 1966 and 1967. A notable decline in testicular activity was observed the last of June and first of July in 1966 and 1967. No significant relationship was found between increasing age of young of the year and increasing testes weight and volume.

INTRODUCTION

With the exception of the work by Heard (1962) and Hill (1965) in Mississippi and Alabama respectively, information is scarce concerning cottontail rabbit

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(Sylvilagus floridanus) reproduction in the Gulf states and a review of the literature revealed no data from this area dealing with the reproductive biology of the male cottontail. Few studies on this animal have been based on collections made throughout the breeding season, thus leaving notable gaps in the knowledge of the cottontail's breeding characteristics. A detailed analysis of the reproduction of a game animal is a prerequisite to understanding the complete ecology of a species and in providing data on which to base future research on that species. Determination of the fluctuations in testicular condition of Georgia cottontails would contribute to the basic reproductive biology of the species and aid biologists in more accurately defining the breeding status of a population.

METHODS

From October, 1965 until April, 1968, 1158 cottontail rabbits were collected on a monthly basis from the Mountain, Piedmont, and Coastal Plain physiographic regions of Georgia. Males made up approximately 50 percent of the total sample.

Testes condition was defined by determining their position (ascended or descended), their flaccidity or turgidity, the presence or absence of viable sperm, the presence or absence of visible convolutions in the tail of the epididymides, and upon removal of the epididymides, testes length and diameter with vernier calipers, volume by water displacement, and weight on a Mettler electronic balance. Both testes and epididymides were then fixed in Mossman's AFA (50 percent distilled water, 30 percent 95 percent ethyl alcohol, 10 percent formalin, and 10 percent glacial acetic acid) for further possible examination. Regression analysis was performed on young male testes growth using eye lens weight as the aging criterion.

RESULTS

Figures 1 and 2 illustrate the changes occurring in weight, diameter, length, and volume of adult testes on a year-round basis. Most dramatic changes are noted in testes volume and weight with length and diameter showing only a slight seasonal fluctuation. Greatest fluctuation occurred in testes volume. After a relatively stable peak period of weight and volume from January through May, 1966 (3.5 – 4.0 gms.

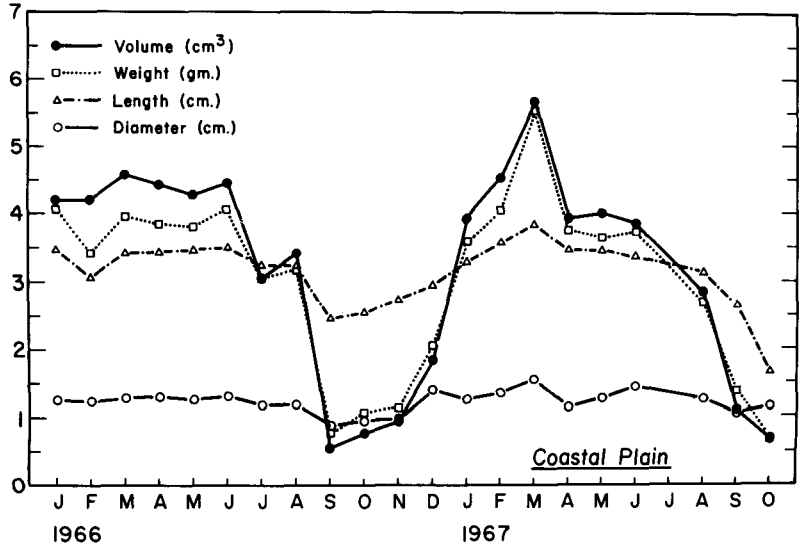

Figure 1. Fluctuations in weight, volume, length, and diameter of adult Coastal Plain testes.

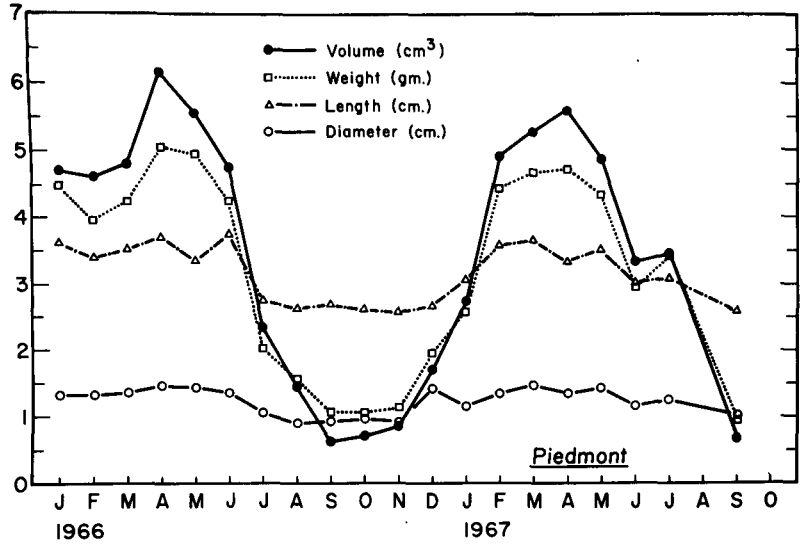

Figure 2. Fluctuations in weight, volume, length, and diameter of adult Piedmont cottontail testes

and 4.0 – 4.5 mls., respectively), Coastal Plain animals exhibited a downward trend beginning in June to a low in September, 1966 (0.8 gms. and 0.6 mls., respectively). From the September low through March of 1967 a notable increase occurred in both weight and volume to a peak of 5.5 gms. and 5.2 mls., respectively and back again to a low in October, 1967 of 0.6 gms. and 0.7 mls., respectively.

In general, Piedmont weight and volume data exhibited a similar seasonal trend with lows in September and October of 1966 and 1967 (1.8 and 0.6 gms. and 1.0 and 0.7 mls., respectively). Piedmont weight and volume peaks occurred in April of 1966 and 1967 (5.2 and 4.7 gms. and 6.2 and 5.6 mls., respectively).

A comparison of Figures 1 and 2 shows some indication that Piedmont weight and volume values declined faster into the nonbreeding season and increased less rapidly into the breeding season than did the Coastal Plain values.

Figure 3 illustrates the close relationship between adult testes volume and percentage of females pregnant. Increase in testes volume took place prior to peaks attained in female pregnancies and began to decline long before the end of the breeding season.

Gross observations revealed a close correlation between convolutions in the tail of the epididymides and the presence of viable sperm. Only in two instances were viable sperm present when convolutions were not obvious. In both the Piedmont and Coastal Plain, the earliest date of occurrence of viable sperm was late December. With the exception of eight adult rabbits in early January of 1966 and 1967 and five others collected during the breeding season, all individuals checked before September first contained viable sperm. Two of the five individuals collected during the breeding season with no viable sperm were infested with the bot fly larvae *(Cuterebra* sp.) around the testicular region. No viable sperm were apparent in adult Piedmont rabbits collected after September first. With the exception of one individual collected in February and one in late August, all Coastal Plain males collected between January first and September first of 1966 and 1967 were found to contain viable sperm. Some Coastal Plain adults collected in September also contained viable sperm. The latest of these was collected on September 25, 1967. October and November were the only two months in which viable sperm were not found in Georgia cottontails. Only one Coastal Plain young of the year collected on August 25, 1967 (approximate age of 6 months) was found to contain viable sperm.

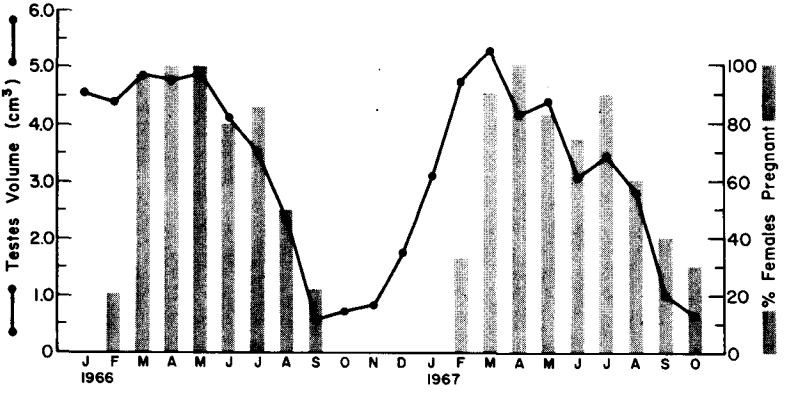

Figure 3. The relationship between adult cottontail testes volume and percentage of females pregnant.

Descent of the testes into the scrotal sac, a condition characteristic of the breeding season, and increased testicular turgidity were noted in mid-December in both regions. First signs of flaccidity of testes and their ascent into the body cavity occurred in August in both regions. However, numerous individuals with testes either partially or fully ascended were encountered during the breeding period.

Regression analysis of testes length and volume versus increasing age of young of the year (based on eye lens weight) revealed no meaningful correlation between increasing age and increasing testicular size.

DISCUSSION

Earliest reports concerning the seasonal fluctuations in cottontail testes dimensions came from Michigan, New York, and New England and all noted that testes dimensions increased before breeding season and decreased as the breeding season drew to a close (Dalke, 1937; Hamilton, 1940; Trippensee, 1933; and Trippensee, 1936). Since that time quantified testes measurements have been reported by Bigham (1966) in Oklahoma, Ecke (1955) and Lord (1961) in Illinois, Negus (1956) in Ohio, and Schwartz (1942) in Missouri. Few of these authors considered more than one or two gonadal parameters and many times did not remove the epididymides before measurements were taken, thus making precise comparisons difficult.

The peaks in testes size in March and April for the Coastal Plain and Piedmont regions of Georgia correspond to peaks reported by the above authors from other states. Small samples from the Mountain region indicated a similar peak. No significant variations in breeding season length based on testicular measurements were noted between regions in Georgia and between the present study and the studies of earlier, more northern workers.

The difference in seasonal fluctuations of testes weight and volume between the Coastal Plain and Piedmont of Georgia is believed to be a result of variations in sample size and timing of monthly collections, and not differences in actual breeding potential.

The presence of obvious convolutions in the tail of the epididymides, presence of viable sperm, and descended testes all generally followed the cyclic pattern of testicular size changes which in turn correlate very closely with percentage of pregnant females. However, in order to obtain a more accurate picture of the male breeding cycle, a larger sample of adult males must be collected at the beginning and end of the breeding season.

The lack of correlation between increasing eye (eye lens weight) and increasing testicular weight and volume of young of the year may be attributed to the variability in growth of testes of young cottontails born at different times during the breeding season.

From other date gathered during the study it was found that the general onset of breeding was initiated by the females in February or March. The timing of this onset was highly variable, depending on temperature and other concomitant factors at that time of year. The similar onset of testicular activity in late December, 1965 and 1966 opens the question as to the importance of environmental factors (other than photoperiodicity) on male cottontails in Georgia.

In summary these data support the use of several adult testicular parameters in determining the reproductive status of a cottontail population.

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WOOD DUCK PRODUCTION AND TRANSPLANTS ON NATIONAL WILDLIFE REFUGES IN THE SOUTH ATLANTIC STATES

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ABSTRACT

A management investigation was initiated on Savannah National Wildlife Refuge in 1965 to determine the feasibility of producing pen-reared wood ducks, imprinted to artificial nesting structures, for use in starting new nesting colonies. To date 780 young woodies, imprinted to nest in nest boxes, have been produced, transferred, and released on six national wildlife refuges in Georgia, Florida, and South Carolina. Nesting in artificial structures had not previously occurred on three of these refuges. Transplanted birds nested in boxes on four of the release sites the first nesting season after release, including three refuges with no history of nest box use. The second season after release over 50 nesting attempts occurred on one refuge that had no previous use of nest boxes by wood ducks.