

THE INFLUENCE OF OAK MAST ON EUROPEAN WILD HOG REPRODUCTION

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ABSTRACT

An acorn shortage during 1960 and 1961, on the Tellico Wildlife Management Area, Tennessee, was probably caused by the elm spanworm (*Ennomos subsignarius* [Hbn.]). Subsequently the European wild hog subsisted on an energy deficient ration which produced an anestrus condition in the sows. Reproductive tracts of sows killed in the fall of 1960 and 1961 were examined for fetuses and follicular development. Only three out of 54 uteri examined contained fetuses, and eighteen out of 36 pair of ovaries examined contained corpus lutea. Trapping and kill data further substantiate that a reproductive failure occurred. When oak mast was again available in the fall of 1963, the ovaries of the sows examined were in an estrus condition.

Surveys which detect periodic fluctuations of the acorn crop might provide a basis for predicting fluctuations in hog productivity and for setting hunting regulations.

INTRODUCTION

The European wild hog (*Sus scrofa* L.) has been hunted as a big game animal since 1936 in the Tellico Wildlife Management Area of the Cherokee National Forest in Tennessee. Because of the paucity of data for management a full time research project was begun in 1959 on the hog's life history, population dynamics and ecology.

The specific objective of this paper is to show that the productivity of European wild hogs in the fall months is dependent upon the availability of acorns.

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PROCEDURE

Reproductive tracts were obtained from sows killed on managed hunts. These hunts were held in October and November, 1959 to 1963. No reproductive tracts were obtained from the three sows killed in 1962. The ovaries were examined macroscopically for corpus lutea and ovarian follicles. When corpus lutea were found the uterus was examined for fetuses. The age of the fetuses was determined by comparing them with known age domestic fetuses. Tissue sections of ovaries collected in 1961 were prepared for histological study. Stomach contents were also examined. All material collected was preserved and catalogued.

The records include weight, fat deposit and age for hogs killed in 1960, 1961, and 1963, and weight and age for hogs trapped from December, 1960, to October, 1963.

The potential mast crop of 1960-1961 was determined by surveying, with binoculars, the oak trees along the road system of the management area, during early August.

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RESULTS

Reproductive Tracts Examined

Sixty-nine sows were killed on the Tellico Wildlife Management Area during the 1960 hunting season. Forty-five sows were gutted in the field by hunters and only three were reported pregnant. These three sows were killed on the same day in an area that contained acorns. The estimated breeding date for the three pregnant sows, determined by aging the collected fetuses, was August 31, 1960.

None of the 24 sows gutted at the checking stations was visibly pregnant. Two pairs of ovaries were from immature females, and no follicles were present. The presence of corpora lutea indicated ovulation had occurred in 11 pairs of ovaries. Another 11 pairs of ovaries contained small follicles but not corpora lutea.

Thirty-nine sows were killed in the 1961 hunting season. Twelve were gutted in the field. None of these were reported pregnant. Twenty-seven reproductive tracts were examined at the checking stations; none contained fetuses. Ovulation had occurred in only four pairs of ovaries and the remaining 23 pairs showed no cyclic activity.

Six of the 27 pairs of ovaries were properly fixed for histological study. Three pairs of ovaries contained primary follicles, two pairs contained secondary follicles, none contained Graafian follicles and one contained a single corpus luteum.

During the mast years of 1959 and 1963, 28 out of 32 reproductive tracts examined contained fetuses (Table 1).

Trapping Data

None of the 81 wild hogs trapped from December, 1960, to October, 1963, were born during the winter of 1960-61 or the winter of

Table 1. Comparison of the pregnancy rate between mast and non-mast years, Tellico Wildlife Management Area, 1959-1963*

| Year | Reproductive Tracts Examined | Pregnant Sows Number | Percent | Mast Estimate | Average Dressed Weight of Adult Sow (Pound) |
|------|------------------------------|----------------------|---------|---------------|---|
| 1959 | 19 | 16 | 84 | Acorn year | ** |
| 1960 | 27 | 3 | 11 | Acorn failure | 102 |
| 1961 | 27 | 0 | 0 | Acorn failure | 91 |
| 1963 | 13 | 12 | 92 | Acorn year | 139 |

*None examined in 1962.

**The animals were not aged; therefore, the body weight was not computed.

1961-62 as contrasted to previous years when juvenile hogs born in the winter comprised 21 to 53 per cent of the total number of hogs trapped.

Harvest Data

The hogs killed in 1961 were aged according to tooth eruption patterns. None of the 57 hogs killed were born in the winter of 1960-61. In 1962 only four hogs were killed; none were born in the winter of 1961-62. In 1963 none of the 70 hogs killed were born during the winter

of 1961-62. If any were born in the winter of 1960-61, they would have been too old to age by tooth eruption patterns in the fall of 1963.

Physical Condition

The physical condition of the hogs killed in 1960-61 was very poor. Fat deposits were absent in almost every hog examined.

The average dressed weight of 23 adult sows (two years or older) killed in 1960, was 102 pounds and the average dressed weight of 25 adult sows killed in 1961 was 91 pounds.

In 1963, a good mast year, the average dressed weight of 28 adult sows was 139 pounds. The hogs were in fine physical condition. Most of the animals had fat deposited in the mesenteries, heart, diaphragm, abdominal wall, and kidneys.

Food Habits

Stomachs were collected from hogs brought to checking stations in 1959-61 and 1963. A detailed food habits study of these stomachs has not been completed; however, gross examination of stomachs shows that the hogs had been foraging on grasses and other vegetative material during the mast failure years of 1960 and 1961. The animals killed in 1959 and 1963 were feeding almost entirely on acorns.

DISCUSSION

The data presented indicates that a reproductive failure occurred in the hog population in the fall of 1960 and 1961.

The anestrus condition of the ovaries and the poor physical condition of the hogs indicate an environmental factor caused a failure in reproduction.

Other possible causes would be anatomical defects, mechanical injury of the genitalia, gametic incompatibility, low vitality, or failure to mate during the estrus period. If these latter factors had been the cause of failure, they would not have produced the condition exhibited by the collected ovaries.

The possibility that disease caused the reproductive failure can be eliminated because swine diseases affecting reproduction, with the exception of brucellosis, affect the pigs in utero. Brucellosis produces a cystic uterus (Hafez, 1962) and none of the uteri examined were cystic.

The only major environmental change that occurred during these two years was the almost complete mast failure on the Tellico Wildlife Management Area, probably caused by the invasion of the elm spanworm into the area. The larval defoliation of upland hardwoods during the early summer has resulted in tree mortality and stand deterioration. The hickories and the white and red oak groups have been most heavily attacked, although practically all hardwood trees are susceptible to some damage (Fedde, 1964).

Malnutrition caused by a lack of oak mast was the probable cause of reproductive failure. This condition in domestic hogs causes a decline in ovarian activity as evidenced by a reduction in follicle size and ovulation rate (Hafez, 1962). The ovaries collected from European wild hogs exhibited these characteristics of malnutrition. Although ovarian activity is controlled primarily by pituitary gonadotropins, pituitary secretion is decreased by very low levels of nutrition (*op. cit.*).

Acorns have no digestible protein and are high in fat (Morrison, 1957) (Table 2). Therefore, an acorn shortage would produce an energy deficiency in the hogs' diet, if other fatty foods were not available. Inadequate energy in a diet would have an effect similar to a protein deficient diet (Hafez, 1962). The addition of energy to a energy deficient diet will restore normal ovarian activity (*op. cit.*).

Table 2. Average composition of white and red oak acorns (Morrison, 1957)

| Whole Acorns | Total Dry Matter | Total Digestive Nutrients | Fat | Fiber | Average Total Composition In Per Cent | | | | Digestible Protein |
|--------------|------------------|---------------------------|------|-------|---------------------------------------|----------------|---------|---|--------------------|
| | | | | | N. Free Extract | Mineral Matter | Protein | | |
| Red Oak | 50 | 32.4 | 10.7 | 9.9 | 25.0 | 1.2 | 3.2 | 0 | |
| White Oak | 50 | 23.4 | 3.0 | 9.3 | 33.7 | 1.3 | 2.7 | 0 | |

Acorn production began again in 1962 with a bumper crop following in 1963. Ovarian activity was reported by hunters in 1962 and was present in the ovaries examined at the checking station in the fall of 1963.

A sudden increase in the plane of nutrition for domestic hogs is called flushing. When the technique of flushing is applied prior to the breeding season, there is a stimulation of the endocrine and reproductive system, which results in an increase in the number of eggs at breeding time and in litter size (Ensminger, 1961). Acorns, when first available, probably cause a similar response in wild hogs. Conception dates for the fall breeding period occur soon after the mast begins falling to the ground.

During the fall months of 1960-1961 pen raised wild sows, fed a balanced commercial ration, were bred in October and farrowed in February.

Surveys which detect periodic fluctuations of the acorn crop might provide a basis for predicting fluctuations in hog productivity and for setting hunting regulations.

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Effect of Site Preparation on Wildlife and Vegetation in the Sandhills of Central Florida

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INTRODUCTION

A project designed to evaluate the effect of mechanical land clearing and planting slash pine (*Pinus elliottii*) on the ecology of animals and plants in a Longleaf Pine (*Pinus palustris*)—Turkey Oak (*Quercus laevis*) Association of central Florida was initiated in 1959. This was a cooperative venture between the Florida Forest Service, the Florida Game and Fresh Water Fish Commission, and the University of Florida Agricultural Experiment Station. Primary attention has been directed toward white-tailed deer (*Dama virginianus*), since this is the chief game species involved, but mourning doves (*Zenaidura macroura*), bobwhite quail (*Colinus virginianus*), and fox squirrels (*Sciurus niger*) have also been considered. Rodent populations have been analyzed in detail. Plant studies have been concerned with changes in the vegetation