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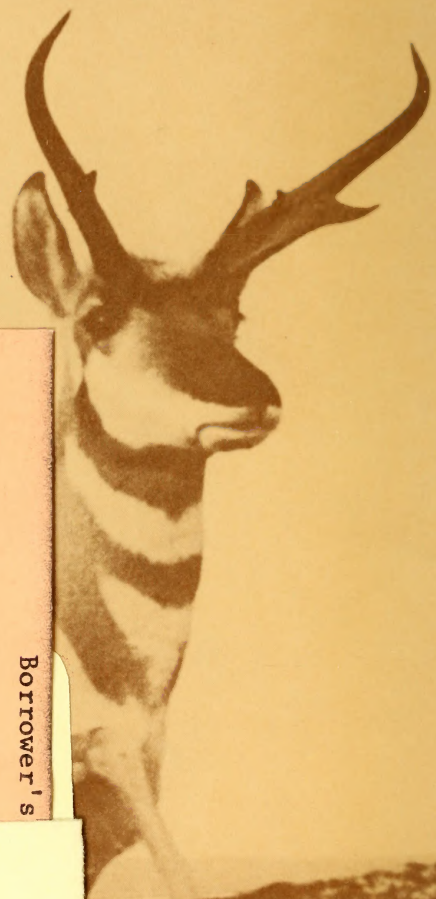


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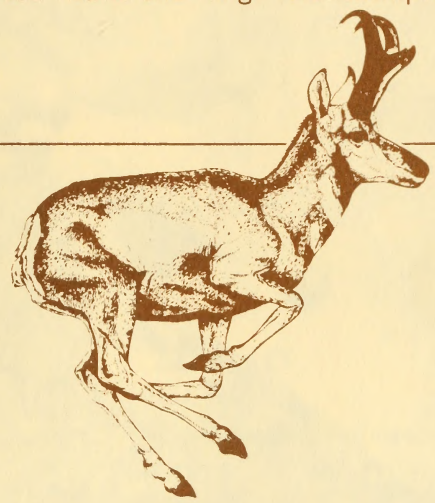


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# LITERATURE of the AMERICAN PRONGHORN ANTELOPE

An annotated bibliography with abstracts emphasizing  
food habits and range relationships.



by  
**JIM YOAKUM**  
Wildlife Management Biologist

U. S. DEPARTMENT OF THE INTERIOR  
Bureau of Land Management, Reno, Nevada  
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Antelope Kid



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Photos by Author

Drawings by Pat Hansen



## ABSTRACT

This annotated bibliography with abstracts brings together 354 references on the taxonomy, life history, and management of the American pronghorn antelope (*Antilocapra americana* Ord). Special emphasis was given to reports pertaining to food habits and range conditions as related to antelope biology and management. Included is literature from the earliest known publication on the pronghorn dated 1723 to documents printed through December, 1966.



Antelope Twins



## INTRODUCTION

Past publications have credited Torquenada (1723) as author of the first report on the American pronghorn antelope. This early document referred to a large hunt of "verrendos" on the plains near Hidalgo, Mexico in 1540. Since then, explorers and historians have written of the pronghorn, calling it various common names as tenthalmacame, cabree, berrendo, goat, and prong-buck. But the scientific world is indebted to Lewis and Clark (Allen 1842) for collecting and preserving a specimen in 1805. Based upon an examination of this adult male specimen, George Ord (1815) imposed the technical nomenclature *Antilope americana*, and later (Ord 1818) bestowed the binominal terminology used today, *Antilocapra americana*. However, detailed scientific reports on the antilocaprids were not accomplished until the mid-nineteenth century when naturalists such as John James Audubon (1851) made trips out West.

Within the past century, there have been hundreds of reports on the antilocapradines in popular and scientific media. The rate at which the number of publications has accelerated within the past two decades is staggering. Bibliographies take on the important role of assisting workers to "know the literature" by providing easy access to pertinent available information. This has been especially true with the pronghorn in recent years due to proliferating studies initiated to better understand the management of the antelope and its habitat. We consequently find the following antelope bibliographies and literature reviews, all accomplished within the last decade:

<i>Author</i>	<i>Approximate Number of References</i>
Doell and Smith (1965) .....	134
Meyers (1963) .....	60
Prenzlow (1965) .....	60
Spillett (1964) .....	110
Walker (1964) .....	200
Yoakum (1957) .....	132

However, most of these reviews tend to specialize in some aspect of biology or management such as Prenzlow's on behaviorism, and Doell and Smith's on range relationships. Still noticeably lacking is a thorough review of pertinent literature on the pronghorn as to historical accounts, taxonomy, biology, management, and habitat relationships. Therefore, the primary objective of this literature review is to relieve that lack. In addition to listing the document's citation, an abstract is provided to state the general content of salient data.

It would be folly to claim absolute completeness for this compilation but there is need for a beginning. This review lists pertinent literature published between 1723 and January 1967. It is hoped that errors and/or omissions will be brought to the author's attention so revised editions can be prepared periodically hereafter.

Commenced in 1954 while the author was with the Oregon Cooperative Wildlife Research Unit,\* this literature review has been a continuum. Acceleration was accomplished in 1964-65 while the author was Big Game guest lecturer at Humboldt State College, Arcata, California. Here, Mrs. Helen Everett, head college librarian, and Jim Good, student assistant, greatly aided the author. In 1966, Dr. Richard Miller graciously provided library facilities at Foresta Institute. Professional library assistance was received from Tom Harris who was on the library staff at the University of California (Berkeley) and University of Nevada. The author is indebted to Dr. Rudolph Becking for translating Ord's original published manuscript in French, and to Dr. Tony Paine for translating documents in Spanish. The Bureau of Land Management's Nevada State Office provided the assistance of Richard Sutton for needed review work and Mary Clark methodically typed the manuscript. Doyle Kline of the BLM New Mexico State Office proofread and edited the manuscript and provided constructive comments.

Jim Yoakum  
February 19, 1967

\*Cooperators: Oregon State Game Commission, U. S. Fish and Wildlife Service, Oregon State College, and Wildlife Management Institute.



**Herd of Antelope**



- Ackerly, W. F. and V. Regier.** 1956. Northeastern California antelope studies. Calif. Depart. Fish and Game, Sacramento, Calif. 44 p.

A study was inaugurated in 1953 to find a method of reversing the downward trend of antelope numbers. Data is provided on the kidding season, tagging program, migration, herd composition, food habits, weather conditions, crop depredations, predation, and annual census methods. There was no significant overall effect of predators on antelope herds. Lassen County winter ranges were heavily grazed by domestic livestock. Poor winter and summer ranges were factors relative to static antelope populations.

- Allen, G. M.** 1942. Extinct and vanishing mammals of the western hemisphere with the marine species of all the oceans. Intelligence Printing Co., Lancaster, Pa. American Comm. Inter. Wild Life Protection. Special Bull. no. 11. 620 p.

A narrative of mammals extinct or vanishing in North America, the West Indies, South America, and oceanic mammals. Pages 322 to 328 refer to the pronghorn. The antelope's historical status was first summarized, then a discussion on Nelson's (1925) important paper, and finally population figures for 1939. The pronghorn was classified as no longer in danger of extinction.

- Allen, J. A.** 1875. Notes on the natural history of portions of Dakota and Montana Territories. Proc. Boston Soc. Nat. Hist. 17:33-85.

In 1873, a fatal epizootic was reported in antelope herds between the Yellowstone and Missouri Rivers. Allen stated three-fourths to nine-tenths of the antelope herds were destroyed. An examination of the carcasses revealed both sexes and all age groups were affected. Ten dead antelope were seen for every live animal on the range.

- Allen, P.** 1842. History of the expedition under the command of Captains Lewis and Clark. Harper and Brothers Publ., N. Y. 2 vol.

Lewis and Clark first saw antelope September 1804 as related in their narratives: "All around, the country had been recently burned, and a young green grass about four inches high covered the ground, which was enlivened by herds of antelopes and buffalo. . . . Of all the animals we had seen, the antelope seems to possess the most wonderful fleetness. Shy and timorous, they generally repose only on the ridges which command a view of all the approaches of an enemy: the acuteness of their sight distinguishes the most distant danger, the delicate sensibility of their smell defeats the precautions of concealment: and, when alarmed, their rapid career seems more like the flight of birds than the movements of a quadruped."

- Allen, R. W.** 1962. Extent and sources of parasitism in pronghorn antelope. Inter. Antelope Conf. Trans. 13:48-51.

The author tabulated a comprehensive listing of internal and external parasites affecting antelope. He discussed their relationship to antelope health conditions and the need for parasite control on ranges inhabited by livestock and antelope.

- Allen, R. W. and K. A. Samson.** 1960. Further observations on *Thysanosome antinioides* in the American pronghorn. J. Parasitology 46(5):671.

Allen and Samson refute former findings that the fringed tapeworm was not as well adapted to pronghorn as it was to domestic sheep.

- ..... 1961. Preliminary report on the immunization of sheep with a relatively non-pathogenic strain of *Haemonchus* from pronghorn antelope. J. Parasitology 47(4-2):22.

The authors recorded exploring the possibility of using *Haemonchus* from antelope to immunize domestic sheep lambs against a domestic strain.

- Allen, R. W., K. S. Samson, and G. A. Schad.** 1959. Cross-transmission of *Haemonchus* from pronghorn antelope to domestic sheep with observations on the pathogenicity of this strain in lambs as compared with that of *Haemonchus* from domestic sheep. *J. Parasitology* 45(4-2):47.

Results of an experiment whereby a strain of *Haemonchus* isolated from pronghorns was maintained in domestic sheep. "These data show that under the conditions of this experiment, the antelope strain was markedly less pathogenic to domestic lambs than was the strain from domestic sheep."

- Allen, R. W. and Patricia M. Kyles.** 1953. The occurrence of the fringed tapeworm *Thysanosoma antinioides*, in the pronghorn antelope. *Proc. Helminthological Soc. Wash.* 20(2):96-97.

Records two occasions whereby this cestode was found in antelope in New Mexico and discusses the relationship of parasites with antelope and domestic sheep. "Thus, in these results, there was no correlation between incidence of the fringed tapeworm in the antelope and the contact these antelope had with domestic sheep . . ."

- Allred, W. J.** 1943. Wyoming antelope — history and wartime management. *North Amer. Wildl. Confer. Trans.* 8:117-122.

White man's occupation of the open range subsequent to 1870 contributed to the depletion of the antelopes' population. By 1904, there were reported to have been 5,000 antelope in Wyoming. Hunting was considered one of the most serious factors decreasing numbers. A closed hunting season was commenced in 1901 and this continued to 1926 when it was estimated the population increased to 21,885. By 1941, reports were of antelope over-populations and special hunts were put into effect. During the Second World War when there was a demand for increased production of livestock to relieve the meat shortage, antelope populations were reduced to a point where there was less competition between livestock and antelope. The first antelope were trapped for restocking in 1941. Trapping techniques were discussed in detail.

- Alvarez, T.** 1963. The recent mammals of Tamaulipas, Mexico. *Kansas Univ. Museum of Natural History Pub.* 14(15):363-473.

Page 467 refers to a skull of an *Antilocapra* from Matamoros. The author is sure that pronghorns are extinct in Tamaulipas now, but their occurrence in the northern part of the state in recent times (more than 100 years ago) seems possible because the habitat is suitable.

- Anderson, H. T., Jr.** 1934. The pronghorn antelope in Los Angeles County, Calif. *Fish and Game* 20(1):91-92.

A total of seven antelope was reported in Los Angeles County, California in July 1932. By December 1933 only four does could be located in the rolling low hills of Antelope Valley. With no males to help propagate the species, it was apparent that antelope were on their way out of inhabiting Los Angeles County, California.

- Anonymous.** 1937. Rescue nine starving antelope near Tatum, New Mexico 15(3):30.

A rancher near Tatum, in eastern New Mexico, built a coyote-proof fence around several sections of range land. Nineteen antelope were inside the fence after it was completed. Due to extreme drought conditions and heavy grazing by livestock, the antelope began to die of starvation. Nine were transported to a small enclosure and artificially fed.



- ..... 1942. Rehabilitating the pronghorn. Wyoming Wildl. 7(6):1-3, 17.

Wyoming had approximately 35,000 antelope in 1942, but with proper distribution, the population could be increased to 60,000. This article described trapping and shipping methods used during trans-location operations.

- ..... 1943. Wyoming has large pronghorn antelope population. Wyoming Wildl. 8(6):1-3, 10-15.

Some 54,000 antelope occupied Wyoming in 1942, averaging about one per square mile. The hunter harvest was assigned a value of \$72,600. Population estimates were tabulated by counties and numbers per square mile on a colored map which also indicated the areas of differential bag limits for the 1943 hunting season.

- ..... 1950. Antelope trapping and transplanting. Outdoor California 11(1):1-2.

Fifty antelope from the Lassen County lava bed plains were translocated to less crowded Benton Meadows, Mono County, California. The report discussed the effects of heavy livestock grazing, agricultural development, and special hunts in relation to antelope populations.

- ..... 1959. Double toothache? Colorado Outdoors 8(6):32.

A short note stated that during the 1957 antelope season, an antelope with two sets of front lower incisors was obtained near Sterling. A picture of the unusual dentition accompanies the narrative.

- ..... 1961. Death struggle. Wyoming Wildlife 25(6):15.

"During their mating season antlered and horned big game animals often engage in combat. Sometimes, but not often, these struggles end in death for one or both of the combatants, especially if their horns or antlers become locked. The locking of horns is particularly infrequent among antelope. Many persons who have observed antelope all their lives have never seen this happen. Even in the above photograph (two bucks) which is certainly an unusual one, the horns are not locked. The horns of one of the antelope have become locked around the other animal's neck. The photograph was taken north of Casper, Wyoming by Henry H. Zietz of Denver in 1952."

- ..... 1964. Wildlife windup. Wyoming Wildlife 28(12):39.

A picture portrays an adult buck antelope with a normal large set of horns, plus an extra horn protruding posteriorly at a 90-degree angle from the left horn. The extra horn is about  $\frac{3}{4}$  the size of the ear. The specimen was collected near Casper, Wyoming during the 1964 hunting season.

- Arizona Game and Fish Department.** 1956. Pronghorn antelope. Ariz. Game & Fish Depart., Phoenix, Ariz. Big Game Bull. no. 3-56. 4 p.

A small brochure written in a popular vein for general public use. The first couple pages delve into the life history of the species. Antelope generally range over a twenty to forty square mile area. The last two pages discuss methods of hunting, care of meat, and the trophy head.

- Arnold, L. W.** 1954. The golden eagle and its economic status. U. S. Fish and Wildl. Service, Wash., D. C. Cir. 27. 35 p.

This brochure depicted the life history of the golden eagle with emphasis on the eagle's good and evil influence on habitat. The chapter on food habits stated antelope were utilized but only as a minor item in the total diet. Pages 15-18 provided a narration on

antelope-eagle relationships with details of actual predation on adult and young pronghorns.

**Arrington, O. N. and A. E. Edwards.** 1951. Predator control as a factor in antelope management. North Amer. Wildl. Confer. Trans. 16:179-193.

For six years predator-antelope relationships were studied. Data from this study indicated antelope fawn crops corresponded closely with amount and type of predator-control work. "To be effective, predator-control operations must cover large blocks of range, preferably 100 townships or more. . . . Increased fawn crops result after predator-control operations using steel traps, strychnine drop baits, cyanide guns, thallium sulphate or compound 1080, but the response is greater following the use of the latter two chemical control methods, and the cost of treating is much less . . . Compound 1080 provides the cheapest effective control."

**Audubon, J. and J. Bachman.** 1851. The viviparious quadrupeds of North America. V. G. Audubon, N. Y. Vol. 11. 334 p.

Audubon described (pages 193-205) the antelope from specimens obtained while on his trip west to Fort Union. He stated the generic name *Antilocapra* is derived from the two genera *Antilope* and *Capra*, goat antelope. Regarding the early controversy of antelope horns, the authors stated: "It was supposed by the hunters at Fort Union, that the prong-horned antelope dropped its horn; but as no person had ever shot or killed one without these ornamental and useful appendages, we managed to prove the contrary to the men at the fort by knocking off the bony part of the horn, and showing the hard, spongy membrane beneath, well attached to the skull and perfectly immoveable." The following notation relative to salt is interesting: "Antelopes are remarkably fond of saline water or salt and know where all the 'salt licks' are found. They return to them daily, if near their grazing grounds, and lay down by them, after licking the salty earth or drinking the salt water."

**Bailey, V.** 1920. Old and new horns of the prong-horned antelope. J. Mammalogy 1(3):128-130.

Bailey recorded notes from two antelope horns found in Wyoming. One was a male reported to have been killed by coyotes. The other was a dropped horn sheath from an adult buck. The author compared growth characteristics of these two specimens, stating that horns of the Antilocapridae are merely a modified form of hair growth. Bailey stated antelope use their horns as weapons to fight for supremacy during the fall mating season.

..... 1926. A biological survey of North Dakota. U. S. Depart. of Agric., Wash., D. C. North Amer. Fauna no. 49. 226 p.

Pages 27 to 31 are devoted to the antelope. Originally pronghorns ranged over nearly all of the open country in North Dakota. However, Nelson (1925) reported only 225 animals remaining in five separate herds. The decreased herds coincided with the early occupation of each range land section by settlers. Bailey recorded various early explorer experiences with antelope in South Dakota as well as accounts of numbers and distribution.

..... 1931. Mammals of New Mexico. U. S. Depart. of Agric., Wash., D. C. North Amer. Fauna no. 53. 412 p.

Pronghorns once ranged throughout New Mexico but by 1931 were in scattered bands in most of the state except the northwest corner. Records are provided of population decreases after the Indians received horses and firearms. Antelope were fond of "salt licks" and visited watering places daily. Both *A. a. americana* and *A. a. mexicana*, with records of their distribution and population numbers, are discussed.



- ..... 1932. The Oregon antelope. Proc. Biol. Soc., Wash., D. C. 45:45-46.

The author described and named the subspecies *Antilocapra americana oregona*, subsp. nov. The type specimen was collected on Hart Mountain, Oregon by Luther J. Goldman, September 22, 1914. It was an adult male, No. 205548, presently in the Biological Survey collection, U. S. National Museum. Characteristics differing from *A. americana* were: it was apparently larger, had larger feet and longer horns, less white on crown and shoulder stripes, and larger skull. Detailed measurements were provided for the body and skull.

- ..... 1936. The mammals and life zones of Oregon. U. S. Depart. of Agric., Wash., D. C. North Amer. Fauna, no. 55. 416 p.

A book describing the mammals of Oregon with pages 70 to 76 devoted to antelope. Contains data on animal description, distribution and habitat, life history, food habits, and economic status. Bailey (1932) provided the subspecies name *oregona* to the Oregon pronghorn.

- Baird, S. F.** 1852. American ruminants, on the ruminating animals of North America and their susceptibility of domestication. p. 104-128. In: U. S. House of Representatives. Report of the Commissioner of Patents for the year 1851. Ex. Doc. no. 102, Part II, Agriculture.

The book presents principle characteristics of North American ruminating animals with reference to their economic employment as beasts of burden, quality for food, and yield of materials for useful arts. Page 121 refers to the pronghorn antelope. "The antelope is highly prized as an article of food. When young, the flesh tastes much like venison, although superior to it in flavor; the old animals, however are frequently very rank." Additional information is provided regarding methods of hunting antelope by Indians.

- ..... 1857. *Antilocapra americana* Ord. p. 666-670. In: U. S. House of Representatives. Reports of explorations and surveys to ascertain the most practicable and economical route for a railroad from the Missouri River to the Pacific Ocean, 1853-6. Ex. Doc. no. 91, Vol. 8.

Baird provided a good review of the many early publications describing and naming the American pronghorn antelope. Baird himself gave one of the earliest detailed scientific descriptions of the species in this report. About 90% of the publication was devoted to a physical description of the species. Very little information is provided for distribution, range, or habits.

- Baker, R. H.** 1956. Mammals of Coahuila, Mexico. Univ. Kansas Publ. Mus. Nat. Hist. 9:125-335.

Antelope were formerly found on suitable habitats in most parts of Coahuila, but now are present on only a few places in the northern and central parts of the state. Herds are most numerous on open grassland plains. Increased poaching by an accelerating mining industry in the early 1950's has taken a heavy toll of the population. Some large land owners are now providing protection on their private lands. The subspecific status of pronghorns in Coahuila has never been established and *mexicana* is used based purely on geographic grounds.

- ..... 1958. The future of wildlife in northern Mexico — a problem in conservation education. North Amer. Wildl. Confer. Trans. 23:567-575.

Although antelope occurred in Mexico as far south as Hidalgo, they are now rare and confined to scattered areas of grasslands in the north. "Nelson (1925) estimated there were 2,395 pronghorn in four states in northern Mexico in 1922-24. Probably much less than half that number occur in the Republic today." Hunters and stockmen

are listed as factors contributing to the decrease of herds. The author states that antelope could increase if given protection on many areas having suitable habitat.

**Baker, T.** 1953a. Antelope movement and migration studies. Wyoming Wildlife 17(10):31-36.

A program of experimental investigations to determine antelope distribution and movement was undertaken in 1952 and 1953. The primary methods of the study included use of oil-soluble dyes and ear-tagging. A total of 106 young fawns were caught soon after birth and ear-tagged. Of this group, 56 were females and 50 were males, giving a 1:0.89 sex ratio. Notes were taken on weights, diseases, growth characteristics, etc. Dye experiments were conducted on three adults; however, an effective dye marking technique was not fully developed.

..... 1953b. Food habit study of game animals (antelope). Wyoming Wildlife 17(11):24-26.

An analysis of 30 summer and fall stomach collections disclosed that antelope utilized browse 86%, forbs 10%, and grass 4%. Samples were taken whenever possible from hunter, illegal, road, and winter kills. The analysis of domestic livestock stomach samples indicated that grasses constituted the major portion of the diet. Since samples were not collected from all seasons of the year or from various vegetative types, it was recommended that this be accomplished in order to obtain a more complete record of food habits.

..... 1954. Pronghorn winter-kill. Wyoming Wildl. 18(1):22-23.

The following mortality percentages were recorded from a study during 1952: 79.5% hunter cripple losses; 10% probably died from starvation and exposure; 7.0% were summer fawn losses; and 3.5% were illegal kills. Actual records of predation were significantly lacking. Winter mortality varied from year to year and from one area to another because of widely varied habitat, weather conditions, and hunting pressure.

**Barbour, F. H. and C. B. Schultz.** 1934. A new antilocaprid and a new cervid from the late tertiary of Nebraska. Amer. Mus. Nat. Hist. 734:1-3.

Describes a new genus and species, *Proantilocapra platycornea*, collected in Cherry County, Nebraska. Its size is about the same as *Antilocapra*. The most typical single structure of this ancestral antelope was the horn-core, which was flattened as in *Antilocapra* but differed from the latter in having a large tuberos tip. The author believes this species provides an important stage in the phylogeny of the Antilocapridae.

**Barker, E. S.** 1948. Antelope comeback. Field and Stream 53(4):26-27, 121-123.

A popular article on the history and techniques of transplanting antelope. This first antelope capture was in New Mexico during 1937. By 1942, 1,605 animals were trapped and released in 50 new ranges. Twenty-four more were traded for elk. Barker credits Paul Russell as the man who developed the technique of trapping antelope. A description is provided of the first trapping ventures in 1937 together with detailed data on trapping methodology.

**Beale, D.** 1963. The desert dwellers. Utah Fish and Game 19(8):3-5.

Antelope populations in relation to range conditions were studied in Utah on a desert shrub type habitat. Forbs were a main food item in spring and summer. Black sagebrush and whitesage, however, were



most frequently taken. As summer advanced and fewer forbs became available, more browse was consumed. Forbs and grass became abundant in the fall diet if summer rains preceded. In winter antelope foraged almost entirely on shrubs. Water developments were installed for and used by antelope. Continued studies will be made on water needs and consumption.

..... 1966. A self-collaring device for pronghorn antelope. *J. Wildl. Managt.* 30(1):209-211.

"A self-collaring device, which uses rubber collars with plastic streamers attached, was developed for marking pronghorn antelope (*Antilocapra americana*). The collar is held in an extended position in a wooden frame over a water trough. When an animal attempts to drink, it puts head through the collar and depresses a 'trip pan' suspended in the water. This releases the collar, and it contacts around the antelope's neck." A detailed drawing is provided to show construction of the self-collaring device.

**Bear, G. D.** 1965. Antelope management and research in Colorado. *Proc. Antelope States Workshop* 1:81-93.

The antelope population in 1860 was estimated to have been 2,000,000. By 1918, fewer than 1,000 remained. Hunting was closed in 1899 and reopened in 1945. The population has increased to 15,000 animals. Antelope density is about 2 per square mile of inhabited range. Some 8,000 acres of suitable habitat is not filled to date; therefore, the population may increase. The number of animals harvested has increased annually for the last four years. Hunter success is between 80% and 95% (female 60 to 70% and male 30 to 40%). Annual censuses are taken similar to other states for buck:doe and kid:doe ratios. Trapping and transplanting has been conducted in the past. Of 21 transplants containing 1,999 animals, 12 have produced to the point where hunting seasons are permitted. A rule of thumb for transplants is: there should be at least one square mile of native grass for each animal, and the number of animals should not be less than 100. Browse and forbs are the major food items eaten. Several research projects are currently under way to study: sex and age composition, census techniques, food habits, and physiology.

**Beer, J.** 1944. Distribution and status of pronghorn antelope in Montana. *J. Mammalogy* 25(1):43-46.

In 1941, there were an estimated 14,233 antelope on four main ranges in Montana. It is believed the early settlers (homesteaders) nearly wiped out the once great herds. Later droughts during the 1920's and 1930's indirectly benefited antelope because millions of acres were abandoned by farmers. By about 1922 only some 3,000 head remained, but they increased to about 10,000 by 1937. "The present habitat is not the fertile plains that there ancestors roamed but the rough breaks and gumbo flats that are not suitable for cultivation. This type of country is also their only protection from man and his automobile."

✓ **Benson, W. A.** 1956. A general view of the antelope in Saskatchewan. *Federal-Provincial Wildl. Confer., Ottawa* 20:23-34.

Antelope are found today on several ranges which together comprise less than one-third of their original range. The main barriers to intermingling of herds from different ranges are railroad fences. The antelope's range has declined considerably with the settlement by white man. The recent trend of agriculture lands returning to range lands has increased antelope habitat and likewise there is an increase in numbers. The advent of water developments appears to be associated with the spread of antelope.

**Bever, W.** 1951. What about South Dakota's sagebrush? South Dakota Cons. Digest 18(1):12-13.

During recent years range management practices have been accomplished to control sagebrush. In South Dakota sagebrush constitutes 83% of the winter diet of antelope. Research has disclosed that a 100 pound antelope may require 4.5 pounds of sagebrush per day. Sagebrush is therefore considered highly important to antelope. Antelope transplant projects under way should aid in proving or disproving the theory that sagebrush is necessary for antelope survival in South Dakota.

..... 1955. The incidence and parasitological load of gastro-intestinal parasites in South Dakota antelope in the fall of 1955. South Dakota Depart. Game, Fish and Parks, Pierre, P-R Pro. 12-R-13. 7 p.

"Although the sample is relatively small, the incidence of parasitism among antelope of South Dakota appears to be related to the type of domestic livestock using the range. On sheep range, 63% of the antelope were infected with one or two species of gastro-intestinal parasites. On cow range 36% were infected and on mixed sheep-cow range 50% were infected."

**Blunt, F. M.** 1950. Wyoming's 1950 antelope census. Wyoming Wildl. 14(4):8-13, 36-37.

More than 75,000 antelope were counted from the air between January and March. There was an over-population in the northeast, and an under-population in the Red Desert range. The author stated that the population should not be increased.

**Boone and Crockett Club.** 1964. Records of North American big game. Holt, Rinehart and Winston, N. Y. 398 p.

This is the fifth volume in the Boone and Crockett series of "Records of North American Big Game." Pages 82 and 83 provide the official scoring system blank for the world's record antelope head which totaled 101-6/8 points. Pages 288-296 list the top 255 record heads in a table providing data for each individual regarding score, various horn measurements, locality killed, date killed, by whom killed, and owner.

**Bridge, M.** 1942. Notes on the pronghorn. Wyoming Wildl. 7(11):20-23. Based upon years of field experience in Wyoming, the author refers to: shedding of horns, vision, speed, rump patch, home range, hardiness, use of succulent foods, water, hazards connected with snow, and the importance of coyotes as enemies.

**Brown, D. L.** 1954. Census and management of central Montana antelope. Proc. West. Assoc. State Game and Fish Comm. 34:211-215.

Montana's antelope populations were divided into units and censused in alternate years by use of an airplane. In this manner the entire population is censused during a five to six year period. Detailed information regarding the aerial census technique was provided. Percent of herd increase was determined by dividing the number of fawns by the number of adults, averaging 49 to 58 percent in one unit. Hunting losses were considered to be equivalent to the number of permits issued. Losses from other causes, averaging 13%, occurred between the summer and spring herd counts.

**Brown, R. O.** 1946. Antelope surveys and investigations. Colo. State Fish and Game Depart., Denver. P-R Quarterly Progress Report 4-R, July 4 p.

In 1941 and 1942, 20 samples of antelope stomachs were gathered and analyzed as follows:



	Grass	Forbs	Browse
December, January, February .....	10%	20%	70%
May, June .....	6	31	63
October .....	4	63	33

All of the samples were collected from a short-grass type range (Blue grama, buffalo grass, rabbit brush, sagebrush). The year-round average diet from the 20 analyses was 7¼% grass, 27½% weeds, and 65¼% browse.

**Bryant, E.** 1848. What I saw in California. D. Appleton and Co., N. Y. 455 p.

In August 1846, Bryant entered Nevada from the northeast and described the antelope herds seen along the Mary's (Humboldt) River as follows: "During the day's march we have seen not less than three or four hundred antelopes, with which the valley seems to teem." This was near Elko. He mentioned antelope almost daily on the trip down the Humboldt, speaking again of "hundreds" in the vicinity of Lovelock.

**Buck, P. D.** 1947. The biology of the antelope (*Antilocapra americana*) in Montana. M. S. thesis, Montana State College, Bozeman, Montana. 70 p.

Buck's thesis contains chapters on: Classification, External Characteristics, Dentition, Horn Development, Body Measurements, Gait, Habits, Numbers and Distribution, Diseases, Foods, Gross Anatomy, Reproductive Systems, and Development of Embryo. Of 47 stomach contents examined, weight averages were 85.2% browse, 6.7% forbs, and 7.4% grass. Volume averages were browse 85.7%, forbs 6.9%, and grass 7.4%. *Artemisia tridentata* was the most common species but other sagebrush species were present. Big sagebrush was the dominant browse in the area. Snowberry was second in "preference." Grass appeared in 25 of the samples, therefore, second in occurrence (*Agropyron*, *Boutelua*, *Bromus*, and *Poa*). The majority of the samples were collected in the fall.

**Buechner, H. K.** 1947. Range use of the pronghorned antelope in western Texas. North Amer. Wildl. Confer. Trans. 12:185-192.

Antelope compete more with sheep than cattle for forage. 9.4 antelope equal 1 AUM, but since antelope consume only about 25% of the forage utilized by cattle, it takes four times as many (or 38 antelope) to consume as much cattle forage as one cow. About ¼ of the buck population can be harvested annually. A reasonable population of antelope per section is about 10. From 38 antelope, 5 bucks can be harvested yielding an income of \$40 per buck or \$200.00. The rancher has no expenses in raising antelope and antelope often eat undesirable weeds.

..... 1948. The antelope situation. Texas Game and Fish 6(5):5, 12, 17-18.

Personnel of the Texas Cooperative Wildlife Unit carried on intensive research between June 1946 and September 1947 relative to antelope-livestock relations. There was little competition between cattle and antelope, since antelope utilized forage generally not consumed by cattle. Pronghorns' principal food was a large variety of forbs and shrubs and only small quantities of grasses. It would be advantageous to both ranchers and sportsmen to increase the population of about 6,000 antelope in west Texas and provide an annual harvest.

..... 1950a. Life history, ecology, and range use of the pronghorn antelope in Trans-Pecos, Texas. Ph.D thesis. Okla. A&M College, Stillwater.

The author studied antelope in the Trans-Pecos, Texas area between June 1946 and September 1947. The main objective was to determine antelope food habits and antelope-livestock competition. Herd increases were associated with abundant rainfall during the prebreeding season and with predator control. The most important limiting factor was intense competition with domestic sheep for forage. Antelope did well on cattle ranges. The income from antelope hunting was about twice that received from cattle grazed on the same ranges.

..... 1950b. Use of the helicopter in wildlife work. *J. Wildl. Manag.* 14(4):472-473.

A helicopter census of antelope was made on the Wichita Mountains National Wildlife Refuge on July 6, 1949. The antelope population consisted of 10 bucks, 17 does, and 22 fawns. Isolated animals did not frighten appreciably by the helicopter although pronghorns in herds ran at top speed to escape the noisy aircraft. A discussion was given on different helicopter models and economics relative to their application in wildlife management work.

✓ ..... 1950c. Life history, ecology and range use of the pronghorn antelope in Trans-Pecos, Texas. *Amer. Midland Naturalist* 43(2):257-354.

A thorough monograph on the life history and management of pronghorns in Trans-Pecos, Texas. Emphasizes the animal in relation to range conditions. One extensive chapter on food habits states that forbs were a major forage item. Much of the food habit data was collected by the observation of forage-minute method. The author provides a great deal of data on antelope-livestock relationships, especially domestic sheep. Some concern was expressed regarding the effect sheep-tight fences have on antelope welfare. A comparison of economic values of antelope to livestock production on private lands was well documented.

..... 1950d. Range ecology of pronghorn on the Wichita Mountains Wildlife Refuge. *North Amer. Wildl. Confer. Trans.* 15:627-644.

Buechner reviews the past and present population of pronghorns on the Wichita Mountains Wildlife Refuge in southwestern Oklahoma. The first three attempts to reintroduce antelope were made with New Mexico animals. These were placed in a large pasture and increased to 71. Disease, predation, habitat, and food habits were discussed. Food habit studies indicate the animals preferred forbs, and grass only constituted 1%. Pronghorns showed a preference for the open grasslands. Competition with elk, deer and bison was discussed.

..... 1960. Regulation of numbers of pronghorn antelope in relation to land use. *Inter. Antelope Confer. Trans.* 11:105-129.

This paper was originally presented at the International Union for Conservation of Nature and Natural Resources, Warsaw-Cracow, June 1960. Management of pronghorns is determined today largely by the degree of presumed conflict with crop cultivation and livestock grazing in many states. Discusses in detail population dynamics and harvest methodology. Antelope can be an economic asset as a range product and should be managed consistent with other land-use objectives.

**Burcham, L. T.** 1957. California range land, an historico-ecological study of the range resources of California. *Dept. of Natural Resources, Sacramento, Calif.* 261 p.

Prior to the advent of Europeans, the range lands of California were used only moderately by antelope, deer and elk. Burcham provides accounts from various early journals referring to antelope distribution in California. "Considered in its entirety, the native animal community



had a relatively small effect on the plant cover. There is no sound basis for presuming that the virgin ranges were generally in an over-grazed condition from the use that game and other wildlife made on them prior to the advent of white man." In parts of California, the antelope was abundant and formed a mainstay of subsistence for Indians. Antelope were most abundant in the San Joaquin Valley where they formed herds numbering up to two or three thousand animals.

**Burroughs, R. D.** 1961. The natural history of the Lewis and Clark expedition. Mich. State Univ. Press, East Lansing. 340 p.

From the Lewis and Clark expedition journals, the author extracted material relating to mammals, birds, reptiles, and fishes. Lewis and Clark were credited for the first technical report of antelope. The terms "goat" and "cabrie" were often used by explorers. George Ord based his scientific description and nomenclature of the pronghorn on a specimen furnished by these explorers. Antelope were seen for the first time by Clark on Sept. 6, 1804, above the mouth of the Niobrara River. The explorers described pronghorns as being more like the antelope or gazellas of Africa than wild sheep or goats of North America. Antelope were often obtained for food on the expedition. Lewis described how the Indians hunted antelope for food and clothing. Antelope skulls and skins were collected and sent to the President of the United States.

**Burt, W. H.** 1938. Faunal relationships and geographic distribution of mammals in Sonora, Mexico. Univ. of Mich. Museum of Zool. Misc. Pub. no. 39.

*Antilocapra americana mexicana* was found on the desert plains of northwestern Sonora, south to Hermosillo. In 1925 Nelson (1925:63) reported four bands of pronghorn antelope in northwestern Sonora with an estimated number of 595 individuals. These ranged south nearly to Hermosillo at that time.

✓ **California Department of Fish and Game.** 1966. California fish and wildlife plan. Sacramento, Calif. Vol. I (110 p.), II (216 p.), III (1051 p., in Parts A, B, C). Hav

The purpose of this plan was to point out, for each of California's fish and wildlife species, how through conservation, enhancement and restoration of fish and wildlife and its habitat, these animals can be maintained for their intrinsic and ecological values as well as for their direct benefits to man. Page 60 of Volume II provides a summary on antelope management. Recommendations are:

1. Antelope hunts will be conducted on a regular basis.
2. Areas where antelope may be seen will be marked and the public will be told how to see them.
3. Antelope herds will be censused annually.
4. The use of antelope tight fences that block migrations will be prevented.

"Range is the key to antelope well being. The optimum plant composition and density must be determined so that ranges can be improved . . . Antelope cause some crop and fence damage, but it seldom reaches serious proportions."

**Caton, J. D.** 1877. The antelope and deer of America. Hurd and Houghton, New York. 426 p.

The chapter on antelope contains the following sections: Classification; Habitat; Size; The Head; The Eye; The Ear; The Horns; The Tail; The Foot; The Glands; The Genitals; The Coat; Color; The Skin; Venison; Habits; Domestication; The Chase; His Place. This is one of the earliest thorough documentations on the American pronghorn's physical features and life history.

- Carr, C. 1927. The speed of pronghorn antelopes. *J. Mammalogy* 8(3):249-250.

The author recorded the running speed of four adult antelope near Rincon, New Mexico in February 1918. "I believe the faster animals traveled the 7 miles at a rate of about 30 miles an hour, while the old buck's best effort appeared not to exceed 29 miles."

- Cary, M. 1911. A biological survey of Colorado. U. S. Depart. of Agric., Wash., D. C. North Amer. Fauna no. 33. 256 p.

By 1911, antelope in North America were scarce compared to the numbers existing when white men first arrived. It was estimated that in 1898 there were 25,000, however by 1909 the population had decreased to 1,200. Most of the pronghorns in eastern Colorado were in the following three areas: on the plains of western Baca and southern Otero, Bent, and Prowers Counties; on the Arkansas Divide; and in the northwestern Logan and northeastern Weld Counties.

- Chapman, J. 1946. Tricky don coyote. *Outdoorsman* 88(6):34-36.

Chapman records an attack of four coyotes on 20 antelope attempting to cross ice on the Saskatchewan River in southern Alberta. The antelope were strung out in single file with the last animal 50 yards off shore when the coyotes broke from the screened brush and ran across the ice. The pronghorns slipped and fell in haste to escape. Two animals were killed on the ice.

- Chattin, J. E. and C. M. Herman. 1944. A parasite from antelope in California. *Amer. Micro. Soc. Trans.* 63(1):27-29.

Blood smears were made from antelope collected in Lassen and Modoc Counties, California, in May and June 1942. Of the 57 animals examined, 20 were infected with a flagellated organism, *Selenomanas ruminantium*. Diagrammatic illustrations are provided of the parasite. "Nothing can be stated as to significance of these organisms at the present time. No previous investigators have attached any pathogenic significance to the infections. This is the first report of these organisms from American ruminants and the first report of the organism in the blood of animals outside of Africa."

- Chattin, J. E. and R. Lassen. 1950. California antelope reproductive potentials. *Calif. Fish and Game* 36(3):328-9.

The authors reported on data from antelope mortalities obtained during the 1949-50 trapping and transplanting operations in Lassen County, California. Findings indicated the sex ratio of male to female embryos was 84:100. Of 18 reproductive tracts examined, 17 had twins and one had a single fetus.

- ✓ Cole, G. F. 1956. The pronghorn antelope, its range use and food habits in central Montana with special reference to alfalfa. *Montana State College Agric. Exp. Station, Bozeman, Montana. Tech. Bull.* 516. 62 p.

The range use and food habits of the pronghorn antelope were investigated on a 62,160 acre study area in Montana. Range lands comprised 95% of area, alfalfa fields 4.3%, and other crop lands 0.7%. Yearlong browse use amounted to 63.0%, forbs 33.9%, and grass 3.1%. Fences with bottom wire 17" from ground allowed antelope passage, but wires 9.5" stopped antelope movements. This study revealed a serious conflict between antelope and alfalfa production. Seven management suggestions are outlined.

- ..... 1957. A preliminary report on antelope range relationships in central Montana. *Montana Depart. Fish and Game, Helena, Mont.* 10 p.



This paper was presented at the Tenth Annual Meeting of the American Society of Range Management held at Great Falls, Montana during January, 1957. Antelope relationships to range lands were reported on two central Montana areas. Vegetation on one area was predominantly a sagebrush-grassland type, while the other was a grassland type. On both areas, the predominant range land types received the greatest total use, but relatively heavy use on minor types during certain seasonal periods suggested that they may be important at these times. Recorded use of plants indicated that antelope used browse and forbs predominantly. Utilization of grass was minor at all times, with the greatest use occurring during spring. Browse was predominantly used in winter.

**Cole, G. F. and B. T. Wilkins.** 1958. The pronghorn antelope, its range use and food habits in central Montana with special reference to wheat. Montana Fish and Game Depart., Bozeman, Montana. Tech. Bull. no. 2. 39 p.

A two year study of antelope habits was conducted on a 184 square mile area in central Montana. Reports of antelope depredations on wheat crops were investigated. Data suggested antelope used range lands more than crop land during all seasons. Food habit studies disclosed 64% browse, 20% forbs, and 16% grass. The critical period for affecting wheat by grazing was from May 15 until harvest time. Antelope commonly bedded in grain fields and caused some detrimental trampling affects.

**Coleman, H. S.** 1947. Administration and results of bisexual antelope hunt in Nevada. Proc. West. Assoc. State Fish and Game Comm. 27:107-109.

Managed antelope hunting seasons were commenced in 1943 in Nevada. The author reported the following in reference to hunts conducted in 1943, 1944, 1945, and 1946: "We conclude that a bi-sexual hunt is acceptable to the public; that the kill of female animals will not be excessive under normal hunting conditions; that a late summer antelope season is preferred to one occurring in the fall; and that antelope can become prized for its meat as well as its trophies."

**Compton, H. O.** 1958. The effects of predation on pronghorn antelope numbers in south central Oregon. M. S. thesis, Oregon State College, Corvallis, Ore. 71 p.

A field study was conducted to determine predatory activities of coyotes, bobcats, and golden eagles on antelope. It was concluded that predation was not the major factor limiting antelope populations during this study. Bobcat and coyote stomach and scat analysis disclosed that antelope did not constitute an important part of the predators' diet. Eagle predation was rated as not apparently important.

**Cook, Bessie B., et al.** 1949. The influence of seasonal and other factors on the acceptability and food values of the meat of two subspecies of California deer and of antelope. *Hilgardia* 19(8):265-284.

Five antelope were killed in Lassen County, California in 1945 for studies of palatability and food values. Variance in palatability was great. Off flavors and odors were reported in all animals. Antelope meat was more tender than deer venison. The thiamine content of the muscle meats equaled that of the liver, being highest in May and lowest during the rut.

**Coues, E.** 1893. History of the expedition under the command of Lewis and Clark. F. P. Harper, N. Y. 4 vol.

Coues pointed out that the zoologist, George Ord, based his classification on the antelope on a specimen furnished by the Lewis and Clark expedition. He stated that the explorers were neither the discoverer nor the first describer of the American pronghorn. Early Spaniards were

the first to see antelope and Ord applied the antelope's scientific names in 1815 and 1818.

**Couey, F. M.** 1946. Antelope foods in southeastern Montana. *J. Wildl. Managt.* 10(4):367.

Stomach samples from 24 pronghorns in Carter County, Montana were collected from September to December in 1944-45. The most "preferred" food was sagebrush (*Artemisia tridentata* and *A. cana*), snowberry (*Symphoricarpos* sp.), next snakeweed (*Gutierrezia* sp.) followed, and grass was fourth in volume but second in occurrence. None of the samples contained much grass and several included only trace amounts. The grass was mostly wheat grass (*Agropyron*), grama grass (*Bouteloua*), and some cheat grass (*Bromus tectorum*). Cactus was noted in seven samples.

**Craig, V. E.** 1963. Antelope change mating habits under spell of islands. *Montana Wildlife*, April:32.

In 1959, 38 Montana antelope were released on the island of Lanai in the Hawaiian Islands. The objective was to start a new population — the first outside of the continental United States. The does fawned eight kids during June 1960. In 1961, the first antelope birth of the year was recorded on May 17 and by the end of the kidding season, 15 new-born were known to have survived. By 1962 there were 26 does, 31 kids, and 13 bucks. "A sure sign that the animals have acclimated to the year-round balminess of the south seas was birth of a fawn in December 1962." Animals changing from seasonal breeders to ones that may mate at any time of year are not new in Hawaii, for this has occurred in other introduced ungulates.

**Crump, W. I.** 1961. Aerial marking of antelope for migration and distribution studies. *Proc. West. Assoc. State Game and Fish Comm.* 41:93-98.

"Experimental studies on aerial application of hair dyes have been conducted in Wyoming. A commercial dye, Nyanzol 'D' black powder, was used to mark antelope. This dye marked the hair of animals with a black coloration that could be identified by aerial or ground observations. Techniques were devised for the aerial application of the dye solution which have proven satisfactory. Several significant herd movements and seasonal distribution patterns have been determined utilizing this technique. It is suggested that aerial spraying of antelope offers a more practical and economical method of marking animals for antelope movement studies than live-trapping for marking of fawn marking operations."

**Dalquest, W. W.** 1953. Mammals of the Mexican state of San Luis Potosí. *Louisiana State Univ. Studies, Biol. Ser.* no. 1:1-229, 1 fig.

"Antelope once ranged over the northern parts of San Luis Potosí southward almost to Matehuala and may once have occurred on the Plano Salado. The animals have been heavily hunted in recent years and perhaps they have been completely exterminated in the state. There have been no reports of them in the San Luis Potosí in recent years. Antelope are possibly still to be found in some of the more remote areas or they may possibly still occasionally wander into San Luis Potosí from elsewhere."

**Dasmann, W. P.** 1952. Antelope planting investigations. *Calif. Depart. Fish and Game, Sacramento, Calif.* 6 p.

A report on the investigation of possible antelope transplants in California prepared as an agenda item for the California Fish and Game Commission. Extensive agriculture and human development of ancestral antelope ranges leaves few if any areas that would be recommended for the re-establishment of pronghorns. Sportsmen often



make requests for such transplants but do not understand how the animals relate to all other uses of the range lands.

**Davila, C., J. A.** 1960. Sheep and antelope in Mexico. Desert Bighorn Council Trans. 4:104-106.

Antelope hunting in Mexico was first prohibited by the President in 1922 and has been renewed in 1933, 1944, 1951, 1954, and 1955. However, the ability to administer protection has not been strict and many hunters have obtained animals. In 1959, a study was instigated to see if it would be possible to lift this ban on hunting and try and substitute controlled hunting, predator animal control, and construction of watering places.

**Davis, W. and D. Putman.** 1951. An aerial coyote-antelope observation. J. Wildl. Managt. 15(3):330.

During flight, the authors recorded observing a coyote chase a doe and kid antelope. For fifteen minutes approximately five miles the chase took place. The doe would criss-cross between the kid and coyote and three times bodily upset the coyote. Yet the coyote continued the chase until a second doe entered the race. Finally the kid separated from the doe and the coyote continued after the doe while the kid ran free.

**DeArment, R.** 1965 Antelope in the Texas Panhandle. Proc. Antelope States Workshop 1:54-60.

Antelope populations were higher in the past than at present because there was more grassland. Approximately 75% of the former high plains antelope range is now under cultivation. High density resident populations probably did not exist, however, due to limited water availability. Some successful transplants have been made since 1946. No brucellosis was found in over 600 blood samples collected. There seems to be a correlation between fawn production and rainfall (chart provided). Average doe:fawn production is 100.43.

**Deming, O. V.** 1959. Climate, range and antelope. Inter. Antelope Confer. Trans. 10:37-64.

A detailed article with an objective of discussing climate and range conditions in relation to antelope numbers. These factors are possible reasons for marginal ranges which may be a key factor affecting antelope populations.

..... 1960. Antelope "cycles". Inter. Antelope Confer. Trans. 11:131-136.

Deming researched many publications on "cycles" or population fluctuations and compared his findings with antelope census data. He concluded no correlation was evident. The subject of "sun spots" was reviewed in detail. In conclusion, the author stated there was sufficient indication that changes in antelope populations do occur, but that it was not well understood as to just what was causing these changes.

..... 1963. Antelope and sagebrush. Inter. Antelope Confer. Trans. 14:55-60.

Sagebrush is increasing on antelope ranges in the west. It is an important browse in the antelope's food habits, appearing in the diet at all seasons of the year in many localities. However, a question remains as to whether this is a result of palatability or availability. Many researchers are cited stating that antelope need mixtures of browse, grass, and forbs. Consequently, it appears as though the control (not eradication) of sagebrush by such practices as burning, plowing, and then planting to grasses and forbs warrants further investigation and evaluation.

- ✓ **Denny, D.** 1964. Fences and big game. *Colorado Outdoors* 13(2):3-6.

A questionnaire was sent to the 48 continental states regarding fences and their effect on wildlife. Resumes are provided on the answers given. The Colorado Department of Game, Fish, and Parks drew up a set of nine fence construction recommendations. State and Federal agencies are encouraged to follow these specifications.

- Dikmans, G.** 1933. *Onchocerca flexuosa* from subcutaneous tissues of an antelope and from subcutaneous abscesses of a deer. *J. Parasitology* 19:246.

The author reported obtaining *Onchocerca flexuosa* from the subcutaneous tissues of an antelope that had been collected in the Salmon River area of Idaho.

- Dinges, W. R.** 1958. Techniques in marking pronghorn antelope for field identification. M. S. thesis, Oregon State College, Corvallis, Ore. 74 p.

This investigation concerned the testing of liquid compounds that might be used for field identification of antelope. 44 dyes and pigments were tested. Captive and wild antelope were sprayed for observations. "Nyanzol D" was rated the best for required specifications to dye antelope. Herds of antelope in the wild were sprayed by airplane, but no follow up studies were conducted. Late August or early September would be the most opportune time for marking and obtaining the longest duration of dye value. It was believed the short hair regions have the longest mark retention qualities.

- Dirschl, H. J.** 1960. The pronghorn antelope range in Saskatchewan. Depart. Natural Resources, Regina, Saskatchewan. 28 p.

Dirschl's study provides data on major antelope range units, food habits, forage production and importance of free water. Hunting license sales increased from 432 in 1940 to 4,275 in 1958. Average precipitation is 11 to 14 inches. Antelope densities varied with range units from 1.80 to 0.37 animals per square mile (average one animal to 400 acres). The writer believes that water cannot be a limiting factor. Complaints of crop depredations were investigated and were recorded as not a serious problem. Forbs were an important factor in rating the value of a range land as pronghorn habitat. Sagebrush was a key food plant because of its high nutritive value.

- ..... 1962. Sieve mesh analysis of antelope rumen contents. *J. Wildl. Managt.* 26(3):327-328.

"The present tests were attempted to determine whether the percentage composition of food species in antelope rumen contents differs significantly for fractions with different minimum particle sizes. Use of the 5.66 mm mesh size, results in considerable saving of time. On the average, manual separation of identifiable plant material remaining on the 2.83 mm screen required more than twice as much time as separation of the material on the 5.66 mm mesh. Therefore, since no loss of accuracy occurs, the 5.66 mm mesh size is the most efficient of the three sizes tested in this study."

- ..... 1963. Food habits of pronghorn in Saskatchewan. *J. Wildl. Managt.* 27(1):81-93.

The author records data from food habit studies on the pronghorn in the Matador and Cyprus Hills' region of Saskatchewan, Canada. Forty-nine stomach samples from hunter kills were analyzed. Food habits information was correlated with seasons of year and range conditions. Data on chemical analyses of species utilized was also recorded.



**Doell, D. D. and A. D. Smith.** 1965. A selected bibliography of literature applicable to big game range research. Utah State Depart. Fish and Game, Salt Lake City, Utah 93 p.

Here is a compilation of topics relating to range livestock and big game subjects in North America. Antelope is broken down into sub-topics with the number of citations as follows:

Antelope .....	43	Food Habits .....	6
Productivity .....	2	Preferences .....	10
Natality factors .....	6	Forage consumption	
Mortality factors .....	2	and nutrition .....	2
Hunting losses .....	2	Management .....	27
Predation .....	9	Movements, migration	
Numbers .....	1	and behavior .....	6
Populations .....	12		
Herd composition .....	6	Total .....	134

**Douglas, G. A.** 1953. Antelope restoration. Colorado Depart. Game and Fish, Denver. In: Quarterly Progress Report, Federal Aid Div., April 99 p.

Pages 35 to 57 were devoted to a study of antelope in Colorado. The amount of competition between sheep and antelope was given as 40% or 2.5 antelope would consume as much sheep forage as one sheep. More than 90% of the antelope's diet was browse, weeds, and cactus from April to October. The amount of grass consumed was negligible, ranging from 0.1% to 3% in winter samples, and from 2% to 8.7% in May and September. Antelope were a factor in controlling many noxious weeds and other unpalatable forage species to livestock.

**Dow, S. A., Jr.** 1952a. An evaluation of some criteria for age determination of the pronghorn (*antilocapra americana* Ord). M. S. thesis, Montana State Univ., Missoula, Montana 71 p.

Based upon known aged antelope and jawbones from hunters kills, a study was conducted on mandibular dentition and horn growth. Dentition eruption as a means of ageing antelope was defined as a working field techniques. However, ageing after all permanent teeth were obtained was hard to accomplish, although some guidelines were established.

..... 1952b. Antelope ageing studies in Montana. Proc. West. Assoc. State Game and Fish Comm. 32:220-224.

A study was conducted to try and develop an accurate ageing technique for antelope. Data was collected from tagged and released animals in a large enclosure and specimens collected at harvest stations. Findings pertinent to tooth development were provided. This system can now be used in antelope management to help determine herd reproduction and survival. "Age composition of the Montana antelope indicates that approximately 75 percent are to be expected in the first 4 age classes (fawns to 3½ years). Approximately 1.7 percent remain in the herd at 9½ years of age and older."

**Dow, S. A. and P. L. Wright.** 1962. Changes in mandibular dentition associated with age in pronghorn antelope. J. Wildl. Managt. 26(1):1-18.

Records of antelope dentition were made for penned antelope of known ages on the National Bison Range in Montana. The mandibular dentition of 20 known or established-age animals ranging from 44 days to 6½ years was described. A series of over 1,300 jaws obtained from Montana during the 1951 season supplemented the known-age series.

**Du Mont, P. A.** 1951. National wildlife refuge bibliography. U. S. Fish and Wildl. Serv., Wash., D. C. Wildl. Leaflet 334. 53 p.

Du Mont compiled a listing of titles generally found in good reference libraries. The citations are listed for each individual refuge. The Hart Mountain National Antelope Refuge in Oregon contains seven references and the Sheldon National Antelope Refuge and Game Range in Nevada has another four references.

**Easterla, D. A.** 1965. Evidence of pronghorn in Missouri. *J. Mammalogy* 46(4):675.

"McKinley (*J. Mamm.*, 41:503-505, 1960) concluded that the pronghorn *Antilocapra americana*, did not occur in Missouri within historical time. The excavation by the writer of a first right upper molar from an Indian madden at Dry Branch Cave, Morgan County, Missouri November 1957, seems to offer counter evidence . . . Therefore, this record is sufficiently probable to be noteworthy and suggests the early presence of pronghorn in Missouri."

**Edson, M.** 1960. The pronghorn antelope in Idaho. *Idaho Wildl. Review* 13(2):3-5.

Edson reviewed the history of antelope from 1893, when they were abundant, through to the early 1900's when hunting was discontinued, and to the present day. The highest known numbers existed in 1953 when the population was estimated at 15,000. Since then, the numbers during winter censuses have averaged around 10,000. Changes in land use patterns were stated as becoming increasingly detrimental to pronghorns.

**Edwards, W. C.** 1958a. A study of the productive potential and ovarian structures in the pronghorn antelope, *Antilocapra americana* (Ord) in Wyoming. M. S. thesis, Univ. Wyoming, Laramie. 63 p.

A two year study of antelope reproductive tracts was initiated because of the relative low doe:fawn ratio in the Red Desert area. Preliminary investigations revealed the low ratio was apparently not due to predation or factors affecting does and young up to parturition. Animals were found in a good nutritional condition and had a high pregnancy rate. The finding of a vibrio-like organism in the does and fetuses indicated that this organism might be one of the factors responsible for the low doe:fawn ratio. Many line drawings and photos of the antelope reproductive system are provided.

..... 1958b. Reproduction potential of big game animals. Wyoming Game and Fish Comm., Cheyenne. P-R Project no. FW-3-R-5. 57 p.

Collections of antelope does in Wyoming were made for examinations of genital tracts, rumen, blood, bone, hair, body fat, liver, kidney, and adrenal glands. Fertility of does in the collections amounted to 14 of 14, 13 of 14, and 14 of 15. Fetuses numbered 28 of 14, 25 of 14, and 28 of 15. Corpra lutea counts were 58 of 14, 66 of 13, 71 of 14, 72 of 14, and 79 of 15.

**Einarsen, A. S.** 1938. Life history and management of antelope in Oregon. *North Amer. Wildl. Confer. Trans.* 3:381-387.

Antelope presently inhabit the southern half of their original range in Oregon and have not reoccupied outer limits of available habitat. This was one of the primary problems facing antelope management in Oregon. Although Indians hunted antelope, it was not until white man arrived that hunting became a problem. In Oregon, complete protection was commenced in 1913 when an estimated 2,000 antelope existed. Now there is estimated to be between 15-17,000 antelope. Chapters included are devoted to: Disease, Population, Increases and Ratios, Concentrations, Competition for Food, and Factors Influencing the Season. Einarsen discusses a recommended hunt and methods of awarding merits to hunters for good hunting abilities.



..... 1939. Oregon's open season on antelope in 1938. North Amer. Wildl. Confer. Trans. 4:216-220.

The first controlled hunting season in Oregon since 1913 on pronghorns was conducted in 1938. Pronghorn numbers increased slowly during the 1920's, but in the last ten years they increased rapidly. Hunting was by permit only from October to November. The author recommends controlled unit hunting. An earlier season was suggested for future hunts. Both bucks and does were hunted. Tabular data was presented on number of permits issued, kills, failures, and success ratios.

..... 1947. The interstate aspect of pronghorn census work in management. Proc. West, Assoc. State Fish and Game Comm. 27:127-129.

Einarsen referred to wide variances in antelope population figures for various states. Field studies indicated antelope migrate between various states, therefore, the author advocated a joint conference to develop inventories taken simultaneously. Einarsen also referred to states that were not harvesting antelope and indicated that a revenue was being lost there. Possibly as high as \$25 per antelope trophy could be brought to the State game funds.

..... 1948. The pronghorn antelope and its management. Wildl. Managt. Institute, Wash., D. C. 235 p.

This was the first printed monograph devoted to the life history and management of pronghorn antelope in North America. Chapter headings include: History, Distribution, and Abundance; Characteristics and Life History; Pronghorn Antelope in Relation to Civilization; Management of the Antelope Resources; and How to Hunt Antelope. Recently, this book was published in "paperback" form by the Dover Publishing Company.

**Elliott, C.** 1966. Antelope play in Florida. *Outdoor Life* 137(5):52-55, 130.

A popular winter story regarding the transplanting of antelope from Colorado to south-central Florida. This was the first attempt to stock antelope outside their original range in the continental United States. The animals were placed in individual crates and flown to Florida in five hours. Here they were loaded on trucks and driven about 100 miles. None of the 38 antelope were lost in shipment. Many color pictures accompany this article as well as a drawing of the fence and pens used to trap the animals in Colorado.

**Elliott, R. R.** 1948. Antelope restoration in Colorado. *Colorado Conservation Comments* 10(5):3, 4, 22.

During the summer of 1947, surveys were conducted throughout the state to locate prospective transplant sites for antelope. The primary requisites for each area were that the range had to be public land containing proper vegetative types, topography, protection, etc. Carrying capacities for cattle, sheep and antelope were computed. Details were provided on traps and methods used to capture the animals. 159 were transplanted, some as far as 398 miles.

**Fashingbauer, B. A.** 1965. The pronghorn antelope in Minnesota, p. 177-178. In: Moyle, J. B. (editor). *Big game in Minnesota*. Minn. Depart. Conser., Div. Game and Fish Bull. no. 9. 231 p.

"Of the big game animals that have inhabited Minnesota in historic times, the pronghorn . . . probably was the least abundant . . . The only definite record of antelope in Minnesota is that of a single animal seen wandering across the prairie a short distance west of Lake Sketch in Lake Sarah Township, Murray County, by L. M. Erikprude about

June 1, 1885 . . . other reports concerning antelope in Minnesota are much less definite and even these are few in numbers."

**Ferrel, C. M. and H. R. Leach.** 1950. Food habits of the pronghorn antelope of California. Calif. Fish and Game 36(1):21-6.

Primarily a report on the analysis of 56 stomach samples collected in northeastern California. Concludes that 98% of the total diet was composed of browse and forbs. Big sagebrush (*Artemisia tridentata*) was the most abundant single species. No severe competition was believed to exist between antelope and livestock since livestock forage more on grass. No serious agriculture damage problems were encountered although there were some problems regarding antelope trampling and bedding down in agriculture crop fields.

..... 1952. The pronghorn antelope of California with special reference to food habits. Calif. Fish and Game 38(3):285-93.

Results of 83 stomach analyses taken from hunter kills and trap casualties were used to determine forage preference and seasonal food habits. Also recorded were discussions on early history, efforts to extend range, limited seasons; spring and fall diet, effects of weather; chemical analysis of sagebrush; antelope limitations, and need for open range. The authors conclude that sagebrush is a year-round staple; weather is a factor determining winter range extent and migration time; forbs are high on list of summer range foods; there is no severe competition with livestock, and antelope food habits are in little conflict with agriculture.

**Fichter, E.** 1956. Study of selected antelope herds in southwest Idaho. Idaho Depart. Fish and Game, Boise. P-R Project W85-R-8. 17 p.

Antelope counts involving an estimated 645 animals revealed three fawn:doe ratios of 85:100, 90:100, and 137:100. Fawns comprised 32.5% of the antelope population on the three areas studied. The need for basing doe:fawn ratios on breeding does only was discussed. Incidental information on ear tag observations, carcasses found, stomach contents, predation, and number of bucks was given.

..... 1957. Study of Upper Pahsimeroi Valley antelope herd. Idaho Depart. Fish and Game, Boise. P-R Project W85-R-9. 13 p.

Discussions were presented on tagging of fawns, sightings of tagged fawns, fawn behavior in relation to techniques of capture, the use of aluminum ear tags as markers, and a questionnaire for determining the sex ratio of the antelope kill by non-selective hunters. Briefly stated was incidental information concerning the birth of a fawn, harassing of fawns by a golden eagle, and carcasses found.

..... 1958. Study of antelope population on Upper Pahsimeroi. Idaho Depart. Fish and Game, Boise. P-R Report W85-R-10. 25 p.

"The failure to secure a seemingly reliable approximation of the adult sex ratio, the tagging of young fawns, finding of dead antelope, an eyewitness account of a golden eagle killing feeding on a fawn, and the trapping-tagging-marking operation undertaken in November and December of 1958 are recorded. An analysis of expenses shows that counting of antelope from a helicopter and counting by a ground crew, as organized in August 1958, will cost essentially the same."

..... 1962. Some data on the natality of a pronghorn population and their bearing on future research. Inter. Antelope Confer. Trans. 13:85-95.

A report on antelope reproductive success in parts of northeastern Idaho. Apparently there was a relation between antelope production



and moisture during various years. The author concluded with a hypothesis that antelope populations are fundamentally related to soil fertility.

**Fichter, E. and A. E. Nelson.** 1962. Study of pronghorn population. Idaho Depart. Fish and Game, Boise. P-R Project W85-R-13. 17 p.

Six rumen samples collected on winter range disclosed 85% browse, 10% forbs, and 5% grass. Two uteri taken in March contained two fetuses. 83 pronghorn were trapped, tagged, marked, and released for further studies. Three eagle eyries were examined but no evidence of antelope remains were noted. Results of population trends suggested a correlation between productivity and precipitation during the preceding "ecological year".

..... 1964. Pronghorn antelope study. Idaho Fish and Game Depart., Boise. Job Completion Report W-85-R-14. no. 6. 16 p.

This study on the reproductive success of the pronghorn commenced in 1956. Survival of fawns varied from year to year and from place to place. In some instances, mortality of fawns was considered exorbitant in view of the objectives of wildlife management. It was also noted that there was an apparent correlation between the survival of fawns and the amount of water received on the range during the preceding year. This relationship was effected through forage production.

**Fisher, L. W.** 1942. Live trapping Texas antelopes. *J. Wildl. Managt.* 6(3):231-236.

Fisher credits the first successful live trapping of pronghorn antelope to Elliot S. Barker and Paul Russell of the New Mexico Department of Game and Fish. The first attempt to transplant antelope in Texas was in 1939 when 257 head were trapped and liberated in 21 new localities. Cost of trapping and transporting each antelope was approximately \$4.30. Airplanes replaced horsemen used by New Mexico in rounding the animals to the trap. A detailed map with a list of needed materials is provided. Also a good description of recommended procedures for trapping and transplanting animals.

**Folker, R. V.** 1956. A preliminary study of antelope herd in Owyhee County, Idaho. M. S. thesis, Univ. of Idaho, Moscow. 102 p.

A study of antelope in Owyhee County, Idaho was conducted in 1956. The objective was to determine herd productivity and decimation factors. Average production was 1.54 fawns per doe for 1956. The average doe:kid ratio over a three-year period was 100:100. Such factors as predation, disease, and forage conditions were investigated, however, the author reported no specific reasons for decreased populations even though production was known to have been good.

**Ford, Alice (compiler and editor).** 1951. Audubon's animals, the quadrupeds of North America. The Studio Pub. Inc., N. Y. 222 p.

Page 124 has an oil painting by J. W. Audubon of one female and two males. A herd is seen running off in the distance. Page 196 contains two photographs from the original work (Audubon and Bachman 1854) describing animals seen on the plains with young.

**Foree, W. W.** 1959. Antelope questionnaire. *Inter. Antelope Confer. Trans.* 10:65-75.

The author mailed a questionnaire on antelope to all western states except California, Oregon, Idaho, and Nevada. Fifteen questions were asked relative to range conditions, predation, population numbers, herd status, mortality factors, diseases, and other management problems and needs. Range and habitat problems were listed as the most im-

portant factors affecting populations. Generally predation was not reported as an important factor. Disease was also stated as not significant. Most states experienced declines in populations due to drought, winter kill, and malnutrition.

..... 1960. Nevada antelope studies — progress report. Inter. Antelope Confer. Trans. 11:58-82.

Presents a summary of antelope numbers in Nevada for the last 10 years or longer. Data pertains to populations, range conditions and other factors affecting antelope numbers and management.

**Forsyth, E. S.** 1942. Our stocking experience in the Province of Saskatchewan. North Amer. Wildl. Confer. Trans. 7:152-161.

Although populations have decreased in past years, recent herd increases have culminated in open hunting seasons. Lately herds have increased to the point they were spreading to original ranges where they had not been for 25 or 30 years due to the advent of increased agriculture and overshooting by early settlers.

**Fryxell, F. M.** 1926. A horn of the pronghorn antelope (*Antilocapra americana*) found at Moline, Illinois. J. Mammalogy 7(4):333-334.

During the spring of 1918, the author uncovered an antelope horn near Moline, Illinois. The horn was buried more than a foot under earth in an alluvial bank near a stream. Although this was not conclusive evidence that antelope once ranged as far east as Moline, Illinois, it did pose a possibility. There was no evidence that the horn had been used as an implement by Indians.

**Furlong, E. L.** 1932. Distribution and description of skull remains of the Phocine antelope *Sphenophalos* from the Northern Great Basin Province. Papers Concerning the Palaeontology of Calif., Ore., and the Northern Great Basin Province, Carnegie Institution of Wash. Pub. no. 418. 113p.

A partial skull of a *Sphenophalos* was located in new Phocine faunas of eastern Oregon, thus extending the range of this species. Reviews *Sphenophalos* occurrence and distribution in Nevada as well as Oregon. In Oregon, the animal was found near Harper and Rome in association with a rhinoceros, a camel, proboscidean and canidae. The new specimens shows characters suggesting a close relationship between *Sphenophalos* and *Antilocapra americana*.

**Gabrielson, I. N.** 1935. The antelope situation. American Game 24(4)54, 59.

The author states antelope are not in danger of extinction as they were in the early 1900's. The problem is no longer of too few animals but finding sufficient food and range. The Sheldon Game Range in Nevada furnishes a summer home and fawning grounds for 1,500 to 2,000 antelope, but lacks suitable winter range. Hart Mountain in Oregon summers approximately 3,500. Northeastern California ranges carry about 900 animals. These herds have increased through protection from over-hunting and control of predatory animals. The big problem is now finding sufficient feed.

..... 1943. Wildlife refuges. The MacMillan Co., N. Y. 257 p.

"Hart Mountain National Antelope Refuge in Oregon and Charles Sheldon National Antelope Refuge (and the Charles Sheldon Antelope Range adjacent to it) in Nevada are the only major units devoted especially to the antelope, although a number of waterfowl refuges, such as Lake Bowdoin in Montana and Malheur in Oregon, contain small herds as do also a number of upland refuges."

An estimated herd of 2,000 inhabit the Hart Mountain Refuge which comprises 220,319 acres and was established in 1936. The Charles Sheldon National Antelope Refuge (34,325 acres) was created in 1931 and the



Charles Sheldon Game Range (549,000 acres) was added in 1936. Antelope populations vary from 1,200 in the summer to more than 7,000 in the winter months. From these two areas fawns have been taken to help restore antelope to former ranges.

- Gazin, C. L.** 1935. A new antilocaprid from the Upper Pliocene of Idaho. *J. Paleontology* 9(5):390-393.

Among the fossil vertebrates collected near Hagerman, Idaho was the remains of a four-horned antilocaprid apparently distinct from the previously known members of the family. The specimen was named *Certomeryx prenticei* Gazin, n. sp. *C. prenticei* is clearly an antilocaprid and appears to be more closely related to *Tetrameryx* than to *Antilocapra americana* or species of *Capromeryx*.

- Gilman, J.** 1960. Antelope in California. Inter. Antelope Confer. Trans. 3:48-57.

Presents a summary of antelope numbers in California for the last 10 years or longer. Data pertains to populations, range conditions, and other factors affecting antelope numbers and management.

- Gilmore, R. E. and R. W. Allen.** 1960. Helminth parasites of pronghorn antelope (*Antilocapra americana*) in New Mexico with new host records. *Proc. Helminthological Soc. Wash.* 27(1):69-73.

Eighteen pronghorn antelope from New Mexico were examined for parasites. Nine were examined for ectoparasites. All 18 animals harbored helminths and the numbers of mature worms present ranged from one to 4,740. No ectoparasites were found. Twelve species representing nine genera were recovered. *Cooperia pectinata*, *C. punctata* and *N. lanceolatus* were reported for the first time from the pronghorn antelope. *N. lanceolatus* was reported for the first time in the United States.

- Goldman, E. A.** 1945. A new pronghorn antelope from Sonora. *Proc. Biol. Soc. Wash.* 58:3-4.

The author describes and names the type specimen for *Antilocapra americana sonoriensis*, subsp. nov., commonly called Sonora pronghorn antelope. The type was collected about 40 miles north of Costa Tica, a ranch on the northern side of the Rio de Sonora, southwest of Hermosillo, Sonora, Mexico. It was an adult female; No. 250938, U. S. National Museum (Biological Surveys collection), collected by Vernon Bailey and Frederick Winthrop on December 11, 1932. The Sonoran subspecies was stated to have been smaller than either the American or Mexican.

- Goldsby, Alice I. and D. F. Eveleth.** 1954. Internal parasites in North Dakota antelope. *J. Parasitology* 40(6):637-648.

Ninety-nine percent of 95 southeastern South Dakota antelope were parasitized with helminths as determined by examination of 95 intestines and 59 abomasums. The degree of parasitism ranged from 6 to 6,614 worms. The parasite load seemed to vary with the habitat of the antelope. Those on ranges grazed by sheep had more abomasal parasites while those on ranges grazed by cattle had more intestinal worms. Nine genera and 15 species were represented. Of these, *Ostertagia ostertagi*, *O. bisonis*, *Cooperia oncophora*, *Capillaria brevipes*, *Moniezia expansa*, and *M. benedeni* are reported for the first time from wild pronghorn.

- Gregg, H. A.** 1955 Summer habits of Wyoming antelope. Ph.D. thesis. Cornell Univ. 185 p.

Gregg reported on his findings from an intensive study of pronghorns in Wyoming regarding: composition of groups and their seasonal

changes, group behavior, feeding behavior, responses to weather, nursing, home range, sign-making, communication, leadership, aggressive behavior, and breeding activities. A long abstract of this thesis is in Dissertation Abstracts 15(12).

- Griffith, C.** 1962. Where do the deer and antelope play. South Dakota Conser. Digest. 4(29):22-25.

Discusses how miniaturized radio transmitters on deer have been used for over three years, and how this technique is now being applied to antelope. Cost of the transmitter unit was about \$30.00, but if produced by industry would have run about \$250.00 per unit. The entire transmitter unit weighs 5½ ounces and is fitted with a leather harness. Studies on antelope movements were started during the fall of 1961.

- Griffith, G. K.** 1962. Guidelines for antelope management. Inter. Antelope Confer. Trans. 13:102-114.

Recommended guidelines for antelope management include: winter census; band composition counts; harvests; food habits; livestock use; habitat improvements; range studies; diseases; predator control; kid tagging and adult tagging; antelope population fluctuations; recommended research and management. This set of guidelines was developed over several years of work by various State and Federal agencies representing both wildlife and land management groups.

- Grimm, R. L.** 1939. North Yellowstone winter range studies. J. Wildl. Managt. 3(4):295-306.

A paper on studies on the North Yellowstone winter range from 1934-38. Plots were placed on antelope winter ranges utilized by elk, deer, and bighorn sheep. Utilization studies from 1937-38 revealed 81.3% for sagebrush which was nearly complete consumption of annual growth. The average amount of dead sagebrush was 65%. Forage plant depletion and consequent range deterioration was primarily brought about by use of the range by more than 10,000 elk.

- Grinnell, G. B.** 1921. Shed horns of the American antelope. J. Mammalogy 2(2):116-117.

In the late 1870's, an antelope was killed around December. The horn sheaths dropped off and were left on the range. They were periodically observed during the following year. By summer they began to split and crack and by August or September, they had practically disappeared. Additional notes are recorded on horn development. Grinnell refers to bucks using their horns during the rut but does not believe they are used in actual contact violence as much as some authors have previously reported.

- ..... 1929. Pronghorn antelope. J. Mammalogy 10(2):135-141.

The author believed antelope were once more abundant than the buffalo. Their numbers apparently did not diminish until the buffalo became scarce — then the antelope began to decrease as greater hunting pressure was exerted. He cites cases where antelope were slaughtered in great numbers by Indians and whites during winters of heavy snows. Notes are provided on the abundance and distribution of antelope. Only one definite eye witness record of antelope in Minnesota is provided. Several paragraphs are devoted to some of the first attempts made to capture and transplant antelope to the Wichita Game Preserve, Bison Range, and Wind Cave National Park.

- Grinnell, J.** 1933. Review of the recent mammal fauna of California. Univ. of Calif. Pub. Zool. 40(2):71-234.

Page 209 discusses antelope. The author lists *A. a. americana* as the subspecies inhabiting California. Formerly herds lived throughout the



the state south and east of the humid coast belt and below or east of the main timber belt, however, they were mainly on the interior plains and in the larger valleys. Altitudes of known occurrence extended from slightly below sea level (in Imperial County) up to 5,300 feet (near Poison Lake, Lassen Co.). Life-zones inhabited include the Lower and Upper Sonoran, entering the Transition locally where not densely or continuously forested and where closely adjacent to Upper Sonoran.

- Gullion, G. W.** 1964. Wildlife uses of Nevada plants. Minn. Agric. Exp. Sta., Univ. Minn., St. Paul. Scientific Journal Series, Paper no. 5140. 175 p.

The author has listed the various animals and their use of plants in Nevada. Each plant species was discussed separately and to what extent it was used. Table 2 (pages 137-155) lists plants utilized by Nevada's big game animals. Of a total of 324 browse, grass, and forbs, antelope were noted as using 117 different species. For each species of use, notations were made regarding forage values and season of use.

- Guzman, G., Jr.** 1961. Vegetation zones of the territory of Baja, California in relation to wildlife. Desert Bighorn Council Trans. 5:68-74.

Guzman's study presents the distribution of 24 mammal species in the vegetation zones of lower California. Of the five major biotic zones, antelope are only found in one. This is the Viscaino Desert which is the arid zone of the Pacific in the northern half of the peninsula. The author noted that the distribution of mammals was similar to flora zones. The Viscaino Desert is characterized by sandy plains with plant species of lichens and forbs. It corresponds in habitat type to the Plains of North America. Antelope, although previously numerous, are now becoming extinct due to man's activities.

- Hailey, T.** 1965. Trans-Pecos antelope. Proc. Antelope States Workshop 1:49-53.

The antelope in the Trans-Pecos region has declined sharply since a peak population of 12,107 animals in 1961. The exact cause of this decline was not known but possibly extreme dry weather and poor vegetative conditions were contributive causes. The amount of moisture received during critical winter and spring months appears to affect fawn production and previous years fawn survival. Some antelope mortality was believed due to eating tarbush (*Flourensia cernua*). The average doe:fawn ratio was 100:65.

- Hailey, T., D. De Arment, and P. Evans.** 1964. Pronghorn decline Texas Game and Fish 22(11):22-23.

In 1964, there was a decline of antelope in the Trans-Pecos and Panhandle areas. Extreme dry weather and resultant low forage production during late winter and early spring months contributed to the decline. Other minor factors such as parasites, predation, and excessive hunter-loss animals during past harvest seasons also contributed to the decline. It was estimated that a 30% decrease in numbers was experienced in 1964.

- Hailey, T. L., J. W. Thomas, and R. M. Robinson.** 1966. Pronghorn die-off in Trans-Pecos, Texas. J. Wildl. Managt. 30(3):488-496.

Antelope on the Marfa Flat, Texas declined from 484 in 1964 to 148 in 1965. Nearly 60% died from causes other than hunting. Three years of below-average rainfall, combined with heavy livestock numbers, caused severe forage depletion and forced antelope to rely almost entirely on browse. Lesions of tarbush toxicity were found in 83% of animals examined. Resorbing embryos were found in three of four females

that had conceived. Malnutrition coupled with tarbush toxicity were considered to have been causes of the losses. Antelope on ranches with a variety of more desirable browse suffered only minor losses. Adjustment of stocking rates to forage available, construction of fences allowing pronghorn movement during periods of food shortage, and the possibility of limited, temporary supplemental feeding were management practices suggested to prevent recurrences of such losses.

**Hall, E. R.** 1946. Mammals of Nevada. Univ. Calif. Press, Berkeley, Calif. 710 p.

Originally antelope probably ranged over all parts of Nevada in and below the Transition life-zone. Now they are restricted to several separate areas. Hall states *A. a. americana* appears to be the subspecies in Nevada rather than *A. a. oregona*. Although antelope in Nevada have become greatly reduced in numbers compared in pristine times, they never became extinct. Comparisons are made of antelope population estimates and distribution in 1924 with findings in the 1930's.

**Hall, E. R. (editor).** 1955. Handbook of mammals of Kansas. Univ. Kansas Museum Natural History Misc. Publ. no. 7.

This handbook comprises a listing and narration of all known mammals in Kansas. Pages 239 to 241 refer to the American pronghorn. When white man first arrived in western Kansas, antelope were abundant. A map depicts the eastern boundary of the animals' original distribution. Reports in the early 1930's indicated few if any remained. Since then, many have been translocated into the state.

**Hall, R. C.** 1963. Impact on antelope and deer sagebrush ranges by the sagebrush defoliator — *Aroga websteri*. Inter. Antelope Confer. Trans. 14:40-48.

Extensive antelope ranges in California were treasured by the sagebrush defoliator *Aroga websteri*. This moth consumes sagebrush leaves and through defoliation often kills the plant. This in turn directly affects antelope forage conditions, especially on winter ranges where sagebrush is a key survival forage plant. The author provides data on the life history of the moth and discusses the parasite's effects on range management.

..... 1965. Sagebrush defoliator outbreak in northern California. U. S. Forest Service, Berkeley, California. Pacific Southwest Forest and Range Exp. Station Research Notes PSW-75. 12 p.

The sagebrush defoliator was responsible for varying degrees of sagebrush defoliation and mortality on many antelope ranges of Oregon, California, and Nevada in 1963 and 1964. Severe defoliation sometimes killed sagebrush in a single season. The sagebrush defoliator's scientific name is *Aroga websteri* Clarke. Antelope winter ranges affected by this parasite may lack sagebrush production because of the heavy *Aroga* infestations.

**Halloran, A. F.** 1954. The dwarf antelope of the Yuma flats. Ariz. Wildl. Sportsman 25(4):26-28.

In 1925, it was estimated there were around 600 Sonoran antelope in the world. A map of the distribution is provided. Since then, some herds have been diluted with translocated antelope from northern Arizona and other herds have dwindled in numbers. Although antelope hunting has been restricted by law since 1922, no general increase in numbers has been noticed. The author discusses a proposed adjoining game refuge in Mexico and Arizona which would possibly guarantee needed water and room for these antelope to roam. This is the smallest variety of pronghorn antelope, the last one to be scientifically described, and lowest in numbers today.



- ..... 1956. Wichita antelope on comeback trail. Okla. Game and Fish News 12(12):6-7.

The Wichita Mountains Wildlife Refuge is classified by the author as marginal antelope habitat. He bases this primarily on historical distribution data, which states this was a porifera area, and that the average rainfall is higher than preferred habitat. Well-stocked pronghorn ranges reveal that antelope do well when the annual rainfall averages not more than about 15 inches per year. Transplanted antelope to the Wichita Mountains Wildlife Refuge have not increased greatly and excessive rainfall may be one of the major reasons. Since this is marginal habitat, it is suggested that intensive predator control be conducted in order to decrease one mortality factor in order to manage the herd for public aesthetic values.

- ..... 1957. A note on the Sonoran pronghorn. J. Mammalogy 38(3):423.

The author reports that the only pure strain of *Antilocapra americana sonoriensis* inhabits areas on and adjacent to the Cabeza Prieta Game Range and the Organ Pipe Cactus National Monument in Arizona. This population is estimated at less than 100 and ranges down into Mexico. Other ranges once supporting Sonoran antelope now contain diluted strains since transplants from northern Arizona have been made within the past couple decades.

- Halloran, A. F. and B. P. Glass.** 1959. The carnivores and ungulates of the Wichita Mountains Wildlife Refuge, Oklahoma. J. Mammalogy 40(3):360-370.

Page 368 refers to the past history and present antelope situation. Historically, antelope were here but were merely remnants by 1900 and then extirpated. In 1910 and 1911, 12 pronghorns were introduced from Yellowstone, but none remained by 1921. In 1921 and 1922, 16 more antelope from Alberta, Canada were released and these survived beyond 1931. In 1938 and 1940, 34 animals from Roswell, New Mexico were liberated. These increased to 71 in 1943, but decreased to 35 in 1956. "Some correlation is indicated between annual rainfall and the success of the herd. During dry years, particularly if the normally wet month of May is at or below average, more fawns seem to survive. In years when precipitation in May exceeds the average, fawn survival is poor."

- Hansen, E. L.** 1955. Survival of pronghorn antelope in south central Oregon during 1953 and 1954. M. S. thesis. Oregon State College, Corvallis, Ore. 117 p.

Hansen reports on studies pertaining to antelope production and survival during 1953 and 1954 near Hart Mountain Refuge, Oregon. The original objective of the project was to study kid mortality, consequently, the greatest amount of data pertains to this subject. Loss of kids per square mile on Drakes Flat was 1.1 which was not considered abnormal. Data indicates loss of kids was highest in May and June. Additional findings are provided on: growth of kids, blood and viscera collections, herd composition, annual herd production, antelope tagging, etc.

- ..... 1957. Antelope increase study. Wyoming Fish and Game Comm., Cheyenne. P-R Project no. W-27-R-11. 10 p.

The objectives of this study were: (1) to obtain information concerning the fawn crop throughout the State by means of aerial counts, and (2) to determine the effects of adverse weather on the fawning season. Herd composition counts were taken in late July and early August, which provided data on population increases. 1957 was a year of above average precipitation, however, it was believed not to have

been an adverse factor affecting fawn survival. The wide distribution of water and good forage probably contributed to good survival.

..... 1958. Antelope population trend study. Wyoming Fish and Game Comm., Cheyenne. P-R Project No. W-27-R-11. 10 p.

Aerial antelope trend transects were established in the Red Desert Antelope Management Unit during 1957 on an experimental basis. A total count indicated a density of 1.6 antelope/square mile. The trend transects of 1957 indicated a density of 2.1 antelope/square mile. The relatively small variation between the number of antelope counted along the transects and the higher density figure obtained over the total count, tend to indicate the transect trend method as suitable for management purposes.

**Harlan, R.** 1825. *Fauna Americana: being a description of the mamiferous animals inhabiting North America.* Anthony Finley Pub., Phila. 318 p.

Harlan's book is one of the earliest listing of North American wildlife. Pages 248 to 252 refer to the American antelope. First is listed the taxonomic names with authors. Next is a narrative description regarding dental formula, body dimensions, color, horns, etc.

**Hay, K. G., G. N. Hunter and L. Robbins.** 1961. *Big game management in Colorado 1949-1958.* Colo. State Depart. Game and Fish, Denver. Tech. Bull. no. 8. 112 p.

This is a ten year survey of applied big game management in Colorado. Pages devoted to antelope are: antelope history page 13, life history pages 21 and 22, antelope management pages 28 and 29, economics page 37, and Chapter 8, which is entirely devoted to the pronghorn. Chapter 8 discusses in detail hunting seasons, licenses, location of kills, total harvest, hunter success, ratios, antelope kill by sex and age ratios, and remarks regarding the first day of the season. Over 60% of the total season kill was accomplished the first day of hunting.

**Hay, O. P.** 1914. *The Plietocene mammals of Iowa.* Iowa Geol. Survey, Vol. 23, Annual Report, 1912. 662 p.

Pages 283 to 286 refer to the subfamily Antilocaprinae. The author questioned whether this genus should have been classified as a distinct family (Antilocapridae). The shedding of the horn-sheaths probably represented a physiological feature which was common among the early hollow-horned ruminants. Although antelope were most common during pristine times, "the fact is indicated that this animal once roamed as far east as Mississippi River or beyond it, and that its remains are likely to be found almost anywhere in Iowa. As to the time when this animal occupied the region indicated, we only know that most of the animals found in the lead mines belonged to yet living species. They are, therefore, presumably of post-Wisconsin time."

..... 1927. *The pronghorn in Illinois.* J. Mammalogy 8(1):61-62.

Hay remarks on Fryxell's (1926:332-334) note relative to the discovery of a pronghorn antelope horn found near Moline, Illinois. Fryxell was uncertain as to the origin of the horn, however, Hay stated that probably the horn found at Moline dated back to the late Pleistocene or early Recent.

**Hazzard, L. K.** 1958. *A review of literature on big game census methods.* Colo. Game and Fish Depart., Denver, Colo. PR Project no. W-38-R-11. 76 p.

The purpose of this paper was to describe methods of enumeration or census of big game populations in literature. Pages 2-6 describe aerial techniques as used in various states. Some states, such as



California, try for a total population count annually. Most states run aerial transects for trend counts. On page 22, an account is given of using helicopters to census antelope in Oklahoma. Pronghorns ran at top speed to escape the noisy aircraft.

**Heller, E.** 1930. The American pronghorn antelope. Bull. Wash. Park Zoo. Society Milwaukee 1(4):1-8.

In 1924, two adult antelope were shipped from Alberta, Canada to the Milwaukee Zoo. These animals bred each year and within three years increased to 10. Alfalfa hay was the most desired food with clover next. Oats and fresh grass were also fed. Fright and dysentery were two chief causes of antelope deaths in this and other zoos of the central and western states, but climate appeared to have been the most deadly factor in the eastern states. A species of dysentery kills many half-grown and adult antelope in zoos. The bacterial investigations carried on in the Milwaukee Zoo indicated that the disease was a sort of colitis or intestinal flu. A brief outline of success in raising antelope was presented for the New York Zoo, National Zoo in Wash., D. C., Detroit Zoo, and Cincinnati Zoo. Provides recommendations and techniques for raising antelope in zoos.

✓ **Hepworth, B.** 1965. Investigations of pronghorn antelope in Wyoming. Proc. Antelope States Workshop 1:1-12.

Contains a resumé of data on antelope life history: fawning season, gestation period, fawn weights, breeding age, pregnancy rate, and longevity. Disease (*Vibrio fetus*) and inclement weather were believed primarily responsible for low fawn:doe ratios. Food habit studies have shown antelope to be dependent upon browse, especially during winter. Sagebrush and rabbit brush were the staples. Animals are associated with agricultural areas during spring and summer "green-up". Antelope are marked by dyes or tags. Studies are currently under way regarding fence-antelope relations. This is especially critical in the movement of fawns. Investigations into the basic ecology of antelope are still lacking and coupled with studies of the effect of fencing, sagebrush spraying, livestock grazing practices and changes in land use, they are facts most needed for future antelope management.

**Hepworth, W. G.** 1965. Pronghorn antelope and sheep collection data to aid in determination of grazing capacities and competition of pronghorn antelope and domestic sheep in the Red Desert region of Wyoming. Wyo. Fish and Game Comm., Cheyenne, Wyo. Progress Report no. 1. 3 p.

"Periodic collections of antelope and sheep were made during 1964 to assist in evaluating the competition between pronghorn antelope and domestic sheep confined in BLM experimental pastures north of Wamsutter, Wyoming. Four pastures were 120 acres in size and two were 240 acres in size. The large pastures contained both antelope and sheep. Two small pastures contained only sheep and two contained only antelope. Sheep, as well as antelope, were obtained by shooting with a big game rifle. The following data and samples (where possible) were obtained from each animal shortly after death: sex, age, whole body weight, eviscerated body weight, stomach weight, rumen contents, fetuses, etc. Although forbs and grasses were available in abundance early during this period, gross examination of antelope rumen contents indicated rabbitbrush to be the staple food for this species both winter and summer. The sheep samples, on the other hand, contained primarily grass species from February through December, 1964."

**Herman, C. M.** 1945. Hippoboscid flies as parasites of game animals in California. Calif. Fish and Game 31(1):16-25.

During the 1943 antelope hunting season, a winged specimen of *Neolipiptena ferrisi* was obtained from an antelope, however, this could be considered an accidental occurrence. In 1944, an antelope was observed that had two of these flies firmly attached (wings already broken off), one feeding on the upper lip, the other on the eyelid. In general, antelope in California were relatively free of ectoparasites, and there have been no reports of heavy infestations of flies, ticks, fleas, or lice such as are frequently encountered on deer.

Hesse, C. J. 1935. New evidence on the ancestry of *Antilocapra americana*. *J. Mammalogy* 16(4):307-315.

The writer makes a new suggestion as to the possible line along which the pronghorn might have been derived. The genus *Capromeryx* was the first fossil described that seemed to represent a near ancestor to the living *Antilocapra americana*. The earliest occurrence of the genus *Capromeryx* was probably indicated by the species, *C. texanus*, that lived during the later part of the lower Pliocene. From the middle Pliocene, *C. altidens* was collected. In Pliocene deposits *Capromeryx* has been recorded from a number of collection sites. *Capromeryx texanus*, a new species, was named and described. This was based on the specimen *Merycodus* sp. nov. described in 1932 from Hemphill, Texas.

Hibbard, C. W. and W. W. Dalquest. 1960. A new antilocaprid from the Pleistocene of Knox County, Texas. *J. Mammalogy* 41(1):20-23.

The authors described the holotype *Tetrameryx knoxensis* sp. nov. collected 27 January 1956, now in the Museum of Paleontology, University of Michigan. It was collected 3½ miles east of Gilliland, Texas. Only part of the skull and the left horncores represent the specimen. "The general shape of the base of the horn-cores of *Tetrameryx knoxensis* appears more like that in *Stockoceros* than in *Tetrameryx*, but owing to the unequal length of the horn-cores the specimen is placed unquestionably in the genus *Tetrameryx*."

Hinman, R. A. 1959. Problems in antelope management in Utah. *Proc. West. Asso. State Game and Fish Comm.* 39:201-207.

"It is obvious, considering the similarity of doe:fawn ratios in the spring and fall of 1957, that neither eagle predation nor other forms of mortality were important in the population dynamics of the antelope herd during the period of this study. It should be noted, however, that the study coincided with a period of average or above average precipitation and resulting improved range conditions after about five years of drought. It is believed that the desert areas of Utah are marginal antelope range, especially in their present over-grazed condition, and that forage may be of too poor quality in drought years to support a healthy pronghorn herd, thus limiting fawn survival."

..... 1961. Antelope populations in southwestern Utah, with special preference to golden eagle predation. *Utah State Depart. Fish and Game, Infor. Bull.* 61-7, 61 p.

"The objectives of this study were: (1) to determine the importance of golden eagle predation on antelope fawn survival, and (2) to determine what other factors might be operating to limit antelope increase." The eagles' diet, as revealed by prey remains, was largely black-tailed jack rabbit. Some of the older remains were those of antelope and domestic sheep, but these were probably taken as carrion. One antelope fawn was known to have been taken by eagles. "The key to pronghorn survival probably lies in range condition rather than with predation. Most of the antelope ranges in southeastern Utah are depleted because of more or less severe overgrazing by domestic livestock. If these ranges are allowed to further deteriorate, it is illogical to hope for a sizable increase in antelope."



- Hjersman, H. A. and J. D. Yoakum.** 1959. The pronghorn as a range animal. *Inter. Antelope Confer. Trans.* 10:76-83.

The production and survival of pronghorns was believed to have been influenced the greatest by the vegetative condition of the range. There is a need for more information on the food habits of antelope by seasons of the year and availability of all forage classes. Antelope-livestock relationships are discussed.

- Hlabachik, B. D.** 1965. Antelope prospectus, 1965 *Kansas Fish and Game* 22(2):3-4, 16-17.

Antelope are native to Kansas but by 1960 their numbers were low. Consequently, the Fish and Game Commission instigated a project of procuring animals from other states and releasing in Kansas. Range lands were chosen on the basis of their size (exceeding 10,000 acres), remoteness, available food supply, historic antelope range, and other factors. A recent aerial survey of all the antelope range in northeastern Kansas disclosed a total of 140 animals. Through transplants it is hoped this number will greatly increase.

- Honess, R. F. and K. B. Winter.** 1956. Diseases of wildlife in Wyoming. *Wyo. Game and Fish Comm., Cheyenne, Wyo. Bull.* 9. 279 p.

After many years of working with wild animals, the authors published in this monograph an outstanding documentation of wildlife disease cases. Findings pertain to accidents, infectious and non-infectious diseases (listing each disease separately), parasites and parasite diseases (listed by species) affecting various wildlife species including pronghorn antelope.

- Hoover, R. L., C. E. Till and S. Ogilvie.** 1959. The antelope of Colorado. *Colo. Depart. Fish and Game, Denver, Colo. Tech. Bull.* no. 4. 110 p.

One of the most extensive brochures published to date on pronghorn research and management studies. Part I deals with Natural and Life History. Part II (Research) includes Fawning Studies, Age Determination; Food Studies; Parasite and Disease Investigations. Part III concerns selecting Transplant Sites; Trapping and Transplanting. Part IV deals with Management and Harvest. Pages 108-109 provide a form entitled, "Survey for Selection of Antelope Transplant Sites", which is a good check list.

- Horne, W. R.** 1925. The return of the antelope in Lassen County. *Calif. Fish and Game* 11(2):89.

The writer lived in Lassen County, California since 1890 and closely watched the trend in antelope populations. He stated, "With the coming of the homesteader and the advance of the sheep industry, antelope almost entirely disappeared." By 1900, there were only scattered individuals and small bands on the range. Hunters relentlessly harried the individuals. Observations in the 1920's disclosed herds increasing with some in the 100's. Law enforcement was greatly increased and appears to have been a major direct beneficial factor.

- Howard, V. W.** 1966. An observation of parturition in the pronghorn antelope. *J. Mammalogy* 47(4):708-709.

The author recorded an observation of a doe giving birth to twin kids in 1965 near Capitain, New Mexico. Birth was accomplished in the afternoon from 1:00 p.m. to 1:20. Notes were provided on signs of labor, does licking young, kids ability to run, etc. The author compared his observations with records of other authors referring to birth and behaviorisms of newly born kids.

- Huizinga, H.** 1942. *Eimeria antelocaprae*, a new coccidium from the American antelope. *J. Parasitology* 28(2):167-168.

Oocysts of this parasite were collected from antelope in the Laramie, Wyoming area. A review of literature disclosed no record of coccidia of the species from the American antelope. The oocysts were different from ones reported in cattle and sheep as well as wildlife. These oocysts were, therefore, believed to represent a new coccidium for which the name *Eimeria antelocaprae* was proposed.

**Hunt, F.** 1948. Antelope census techniques in Wyoming. Proc. West. Asso. State Fish and Game Comm. 28:171-173.

Prior to 1939 antelope numbers were compiled from ground counts and general estimates. Aerial censusing of Wyoming antelope was first begun in 1939. The author describes in detail the methods and procedures for these aerial censuses. "The restoration of Wyoming's antelope herds has been brought about chiefly through improvement in the enforcement of game laws. It is generally agreed, however, that the high population levels and judicious distribution of these animals in recent years is in part due to the accurate knowledge of numbers and distribution achieved through improved censusing techniques. Since 1940 the issuance of antelope hunting permits has been based largely on the results of aerial censuses. During the past eight years the Wyoming Game and Fish Commission has allowed the harvest of 76,863 antelope, yet population figures for the state have risen from approximately 35,000 to 65,661 during that period."

**Imler, R. H. and E. R. Kalmbach.** 1955. The bald eagle and its economic status. Fish and Wildl. Service, Wash., D. C. Cir. 30. 51 p.

The bald eagle was not commonly observed in antelope country. One incident was recorded in detail regarding an observation of three bald eagles attacking a three-fourths grown antelope. The eagles kept diving and striking with breast and talons until the antelope went down. Later observation of the antelope disclosed that it was dead.

**Interstate Antelope Conference.** 1958-1966. Interstate Antelope Conference Transactions. Published cooperatively by various State and Federal agencies.

The Interstate Antelope Conference was initiated in 1949. State and Federal agencies in Oregon, California, Nevada, and Idaho were involved. Prior to 1958, annual meetings were held and minutes were produced. Starting in 1958, transactions of the meetings were printed and scientific papers were published. Following are the titles for each year's annual report:

1958 Transactions Interstate Antelope Conference — 63 p.

1959 Transactions Interstate Antelope Conference — 87 p.

1960 Transactions Interstate Antelope Conference — 136 p.

Interstate Antelope Conference 1961 Transactions — 54 p.

Interstate Antelope Conference 1962 Transactions — 114 p.

Interstate Antelope Conference 1963 Transactions — 102 p.

Interstate Antelope Conference 1964 Transactions — Loose leaf n.p.

Interstate Antelope Conference 1965 Transactions — Loose leaf n.p.

..... 1962. Recommended specifications for barbed wire fences (for benefit of livestock and wildlife). Inter. Antelope Confer. Trans. 13:100-101.

Provides a narration on the relationship of range fences to wildlife populations. Two different fence plans were included. Barbed wire fences with the following specifications were recommended: bottom wire 16" to 18" from the ground for antelope to pass under, and top wire not to exceed 42" in order for deer to jump over easily.



- Jackson, H. H. T.** 1944. Big-game resources of the United States 1937-42. U. S. Fish and Wildl. Service, Wash., D. C. Research Report 8. 56 p.

An inventory of 15-big-game animals in the United States for the years 1937, 1938, 1939, and 1940. There is a good historical review of inventory methodology and census techniques for big game management. Data is provided on antelope population trends and hunt kill statistics.

- Jaeger, E. C.** 1956. Last stand of the pronghorn. *Desert Magazine* 19(7):17-18.

The antelope no longer roams over much of its pristine range. References are provided of the last known antelope site observations in the Colorado and Mojave Deserts.

- Jewett, S. G.** 1939. Hart Mountain Antelope Refuge. U. S. Depart. Agric., Wash., D. C. Misc. Pub. no. 355. 24 p.

A booklet on the Hart Mountain Antelope Refuge with the following contents: History; Topography; Life Zones; Mammals of the Refuge; Birds of the Refuge; Tourist Information; Other areas maintained primarily for big-game animals. It is well illustrated with photos. Although the publication mainly describes the Refuges flora and fauna, references are provided on antelope.

- ✓ ..... 1946. Note on the behavior of pronghorn antelope. *J. Mammalogy* 27(1):84.

Jewett recorded an observation of a buck antelope behaviorism relative to shadows. While running along a power line, the antelope jumped each pole shadow encountered. The author stated, "Evidently the shadows were a new kind of obstruction in the mind of this antelope. Many times I have seen startled and frightened antelopes pause to crawl under barbed wire fences."

- Johnson, C. E.** 1930. Recollections of the mammals of northeastern Minnesota. *J. Mammalogy* 11(4):435-452.

Johnson documents a report of "a bunch of antelope" seen July 1881 near the junction of the Red Lake river with the Red. This was apparently in the vicinity of Grand Forks. Since there are few records of pronghorns within the boundaries of Minnesota, the author considered this observation worth publishing.

- Johnson, F. W.** 1931. Antelope on the Shasta National Forest. *Calif. Fish and Game* 17(2):167-168.

Antelope in the Mt. Dome area of California were reported in numbers of 2,000 from 1873 to 1896. In 1931 there were less than 400. The author stated that during years of hard winters, antelope were drastically decreased. In 1924 a very hard winter reduced the herd to some 65 head. In the following eight years, it increased to 500, or an annual increase of around 33%. Mild winters were one of the biggest factors to antelope population increases.

- Jones, F. L.** 1954. Report on resurvey of proposed antelope planting sites. *Calif. Depart. Fish and Game, Sacra., Calif.* 13 p.

Sixteen areas were discussed in detail as potential translocation areas of antelope in California. This was a resurvey of sites reported by Dasmann (1952). Of the sixteen sites only two were considered possible suitable sites. Insufficient forage and water were primarily reasons for classifying areas unsuitable. It is possible that good areas for Sonoran antelope are available, however, little was known regarding the habitat requirements of water and forage for this subspecies.

- Jones, J. K. Jr.** 1964. Distribution and taxonomy of mammals of Nebraska. *Univ. of Kansas Pub., Mus. of Natural History* 16(1):1-356.

Pages 321 to 324 are devoted to the American antelope. Originally these animals inhabited over 95% of the state. The east boundary fringe area was not used by pronghorns. By about 1875, antelope was almost extirpated and around 1900 the species was reduced to a few isolated lands. Herds increased slowly and steadily until the 1930's when they became increasingly common. In 1953 the hunting season was opened for the first time since 1906. During 1958, 1959, and 1960, over 1,000 were transplanted to 20 different locations.

**Jones, P. V.** 1949. Experimental management of antelope. Texas Game, Fish and Oyster Comm., Austin. Federal Aid report, Series no. 3. 31 p.

Jones reports on transplanting and managing antelope with chapters on: Population Abundance; Disease; Relation to Livestock; Predators; Limitations of Transplanting; and Restocking Recommendations. No friction was noted between antelope and cattle. No diseases were reported during the study. Coyote predation on fawns was the chief limiting factor. No evidence of eagles preying on fawns was secured. Illegal killing of antelope was a major factor. Extended droughts brought about a reduction in vitality of antelope which resulted in decreased fertility. Winters were not severe enough to cause significant numbers of antelope to die of freezing or starvation.

**Keiss, R. W. and S. M. Morrison.** 1956. Identification of Colorado big game animals by precipitin reaction. *J. Wildl. Managt.* 20(2):169-172.

This paper presented the precipitin test method used to identify meat or blood stains of antelope and other big game animals. "The precipitin test is based upon the fact that when a foreign protein enters the circulatory system of a living animal, the recipient builds antibody to this foreign protein. Blood serum from the animal thus immunized, in contact with the same protein in a test tube, forms a visible precipitate. This antiserum, therefore, may be used to identify the protein." The author cited various cases in which this method was used to identify antelope as evidence for legal court action.

**Knipe, T.** 1944. The status of antelope herds of northern Arizona. Arizona Game and Fish Comm., Phoenix, Ariz. 40 p.

One of the earliest State Fish and Game publications on antelope with chapter headings on: Environment; Range Conditions; Land Ownership and Rancher-Farmer Attitude; Present Status of Herds; Hunting Season; and Suggestions for Future Management. Pages 33-40 contain discussions and recommendation pertaining to predator control, life history studies, range utilization, diseases, transplanting, law enforcement, refuges, salt distribution, water developments, and hunting.

**Kolenosky, B. and R. S. Miller.** 1962. Growth of the lens of the pronghorn antelope. *J. Wildl. Managt.* 26(1):112-13.

The authors described growth of the pronghorn's eye lens and provided data on an indexing method for aging antelope based on lens growth and size. Studies were conducted in Saskatchewan, Canada with wild animals.

**Lang, E. M.** 1956a. Antelope hunt information. New Mexico Depart. Game and Fish, Santa Fe. Project W-75-R-3. 21 p.

During the 1955 antelope season 890 antelope hunters took 647 animals for a success ratio of 73%. Around 95% of the harvest was made during the first day and a half. Ten percent of the license holders failed to go afield. A total of 27 illegal kills was noted. Public hunters comprised 67% of the licenses sold and the remaining 33% were held by landowners in the hunting areas.

..... 1956b. Antelope surveys. New Mexico Depart. Game and Fish, Santa Fe. Project W-75-R-3. 31 p.



A total of 5,192 antelope was counted during 145 hours of aerial census. The sex and age ratio was 42 bucks and 66 fawns per 100 does. Apparently the herd increased around 46%. Sixty-three fawns were tagged, of which 34 were bucks and 29 were does. Half the fawns captured were sets of twins.

- ✓ **Langdon, M. O.** 1964. Range rehabilitation as it pertains to antelope in the Vale Project. *Inter. Antelope Confer. Trans.* 15:55-57.

Cooperative studies were initiated by the Oregon Game Commission and the Bureau of Land Management regarding habitat manipulation projects and their effect on wildlife populations. Specific projects investigated included sagebrush spraying, plowing, crested wheat seedings, fencing, and water developments. A statistician was consulted to help set up and evaluation program which commenced within the past year.

- Larsen, P.** 1964a. Some basic reproductive characteristics of pronghorn antelope in New Mexico. *Proc. West. Asso. State Fish and Game Comm.* 44:142-145.

This investigation was conducted in southeast New Mexico because of chronic low kid production problems. Forty adult does were collected and studied. Three were barren leaving 37 productive tracts for study purposes. Of the 37, 34 were carrying twin fetuses, the remaining three contained three fetuses each for a ratio of 100:208. This high rate may vary further along in gestation due to fetal mortality. Yearling females and does six years and older apparently had as high a productivity as other does. Findings revealed no abnormalities accountable for a low level kid crop, consequently, future emphasis on studies will be detailed examination of external habitat factors.

- ..... 1964b. Some answers about antelope. *New Mexico Wildlife* 9(5):6-8.

In 1963, a study was initiated regarding low kid production in southwest New Mexico. Data from laboratory examinations disclosed that 93% of the adult does were pregnant. All specimens were examined for diseases, parasites, and nutritional deficiencies, but no problems were noted. From observations during the parturition period, it appeared as though the birth rate was satisfactory. In summary, there were no physiological deficiencies in the females and fawns were born in normal numbers. Heavy mortality was noted between birth and weaning. "It seems quite clear that the answer lies somewhere in the complex of external habitat factors."

- ..... 1965. Precipitation variations and antelope productivity. *Proc. Antelope States Workshop* 1:72-78.

Precipitation data was correlated with antelope production for a 14-year study on one site. The precipitation data was analyzed in four separate graphs: (1) March-May precipitation, (2) January-May precipitation, (3) Ecological Year, and (4) Climatic Year. During the 14-year period there were extremely low antelope production cycles. In every case these were followed by years of dramatic recovery. The improvement was not gradual, but rather a marked increase to well above the average level. Peak periods of productivity did not seem to last more than two years. The author stated that poor kid crops should not be blamed solely on moisture deficiencies. A better understanding of the interplay of other major habitat factors and intrapopulation characteristics should be developed.

- Lay, D. W.** 1946. Controlled antelope hunts and some problems of administering public hunting. *North Amer. Wildl. Confer. Trans.* 11:274-279.

Antelope are now hunted in nine western states. Wyoming started hunting antelope in 1928, New Mexico in 1932, Oregon in 1938, Arizona and Idaho in 1941, California in 1942, Texas in 1944, and Colorado in 1945. Controlled hunts in Texas during 1944 and 1945 were discussed in detail. One of the reasons for the hunt was that sheep were being introduced into antelope range and the antelope were on the decline. Also there was a desire to reduce antelope numbers because of competition for grass.

**Lehti, R. W.** 1947. The golden eagle attacking antelope. *J. Wildl. Managt.* 11(4):348-349.

Lehti reported an observation of five golden eagles around an adult doe antelope carcass. The carcass was examined and found still warm. Apparently the animal had been repeatedly struck in the neck and back by the eagles. There were no death struggle marks in the snow at the carcass, indicating instant death while in running stride. The author estimated it took the eagles  $1\frac{1}{2}$  minutes to kill the antelope.

**Leister, C. W.** 1932. The pronghorn of North America. *Bull. New York Zoo. Soc.* 35(6):182-205.

Leister credited Francisco Casquez de Coronado's written accounts as possibly the first record of pronghorns seen by white man. The article contained a brief discussion of the pronghorns characteristics and the influences of changing environment on its habits and future. Following is a census of antelope in 1932 compared to Nelson (1922-24):

	U.S.	Canada
1922-24 .....	26,604	1,327
1932 .....	68,392	2,400

Leister did not claim complete accuracy in his census but did state that the survey indicated a trend of increased antelope numbers.

**Leopold, A.** 1948. *Game management.* Charles Scribner's Sons, N. Y. 481 p.

"Game Management" is a book on the principles and practices of wildlife management. Although many species of wildlife are considered, a good deal of specific information on the pronghorn is provided such as: breeding potential, census, diseases, mobility, predation, range composition, refuges, transplantation, water, etc. Two references are made regarding antelope-range relationships. Page 133 refers to grasslands being the major composition of optimum range with 10% brushland. Page 295 refers to water, stating antelope drink regularly, when it is available, especially at fawning time, but they can subsist and reproduce on succulent forage alone when circumstances require.

**Leopold, A. S.** 1959a. Big game management (antelope). In: Nevada Legislative Counsel Bureau. Survey of fish and game problems in Nevada. Nev. Legislative Counsel Bureau, Carson City, Nev. Bull. no. 36. 160 p.

Leopold stated it was apparent antelope were abundant and widely distributed in the valleys of central and northern Nevada. He was quite certain that the changes in land use and vegetation after settlement led to the pronghorn's decrease. The most important alterations in range vegetation were the virtual elimination of perennial grasslands by livestock grazing and the development of woody browse types. Future management must take fully into account the transitory nature of these vegetational stages. Antelope restoration should depend largely on a range management program. Large-scale range improvement projects, whereby dense strands of shrubs are being seeded to perennial grasses, should be taken advantage of for antelope population increases. "There will be some conflict of interest if antelope increase of range lands improved especially for livestock, but the overlap of feeding



habits is not severe . . . Antelope prefer forbs and scattered browse plants that grow as weeds in grass lands, instead of the grass species preferred by cows. Competition with sheep is more severe."

..... 1959b. Wildlife of Mexico, the game birds and mammals. Univ. of Calif., Berkeley, Calif. 568 p.

Pages 518 to 523 refer to the pronghorn in Mexico. A map describes the historical and present distribution ranges. Pronghorns were first seen by white man in Mexico. Their numbers have greatly decreased and although they are currently protected by law, enforcement is lacking. Little biological knowledge has been obtained to date on herds in Mexico, consequently, data from the U. S. is referred to for life history and management knowledge.

**Lightfoot, B.** 1958. Airplane dye-marking experiment on pronghorn antelope. Inter. Antelope Confer. Trans. 9:11-13.

On August 12, 1958, 31 antelope were marked with an aerial application of black Nyanzol A and B. From field observations, it was noted that the animals were hit repeatedly by the dye sprays, however, only a slight coloring was detected on the animals. This method was considered not satisfactory as sprayed animals were not easily recognized from animals not sprayed. Suggestions were provided for other means of application, such as herding the animals with an airplane into corrals and then applying the spray under more favorable conditions.

**Ligon, J. S.** 1927. Wild life of New Mexico, its conservation and management. Depart. Game and Fish, Santa Fe. 212 p.

J. Stokley Ligon's book is a report on a game survey of New Mexico during 1926 and 1927. Pages on antelope are 85 to 88 and 181. Antelope were once abundant, but early homesteaders practically exterminated them. "At the present time the antelope population of New Mexico comprises approximately 2,950 animals in 39 bands and groups of bands distributed over 22 of the 31 counties in the State . . . Extreme drought in some localities has at times seriously menaced the existence of antelope, but such danger is usually the result of excessive grazing. Antelope are hardy animals and when they die of starvation, range conditions are serious."

**Long, C. A.** 1965. The mammals of Wyoming. Univ. of Kansas Pub. Mus. of Natural History 14(18):493-758.

Pages 716 and 717 were devoted to the pronghorn antelope. The distribution map depicted antelope throughout the state. In pioneer times, the antelope was almost as abundant as the buffalo. Activities of man reduced the number drastically. During 1922-24, there was recorded approximately 6,977 animals in Wyoming, however, the population has since greatly increased.

**Long, R. C.** 1965. Fire effects upon a mixed-grass prairie in the Black Hills of South Dakota. Humboldt State College, Arcata, Calif. 21 p.

Fire effects on vegetation, soil erosion, and wildlife distribution of a mixed-grass prairie at Wind Cave National Park in the Black Hills of South Dakota was studied during three summer months of 1965. Burning lowered the gross carrying capacity but favored more nutritious forage. Young shoots of little and big bluestem were heavily utilized by both antelope and buffalo following burning. Antelope appeared to concentrate in large numbers along roadsides where both burning and mechanical disturbance increased forb production.

**Longhurst, W. M.** 1957. The effectiveness of hunting in controlling big-game populations in North America. North Amer. Wildl. Confer. Trans. 22:544-569.

Regarding antelope, the author provides the following summary statement: "Ten states and two Canadian provinces permit hunting of both sexes. Only three states hunt males alone. Full control was reported on 66 per cent of the total range area in the states and most of the other important areas were listed as being under partial control. Public opposition to management was given as the primary factors of under-harvest. Illegal kill and a series of natural control factors were listed as being of importance with antelope."

**Lucker, J. T., and G. Dikmans.** 1945. The distribution of *Pseudosteragia bullosa* and some new records of nematodes from pronghorn antelope (*Antilocapra americana*). Proc. Helminthol. Soc., Wash., D. C. 12(2):2-4.

On June 22, 1944, an antelope was killed near Jones Creek, Harding Co., South Dakota which contained *P. bullosa* in its abomasum. About 810 specimens of this parasite were collected. Additional antelope were collected in South Dakota and Montana with this same parasite species. It is suggested that *P. bullosa* may be primarily a parasite of antelope. The following nematodes are reported for the first time from a wild population of *Antilocapra americana*; *Cooperia bisonis*, *Nemadodirus abnormalis*, *Marshallagia marshalli*, *Trichostrongylos colubriformis*, *Nematodirus spathiger*, and *Haemonchus contortus*. Also a single male *Trichuris* tentatively regarded as *T. discolor*.

**Luman, I. D.** 1960. Oregon antelope report Inter. Antelope Confer. Trans. 11:83-91.

Presents a summary of antelope numbers in Oregon for the last 10 years or longer. Data pertains to populations, range conditions, and other factors affecting antelope numbers and management.

**Lumholtz, C.** 1912. New trails in Mexico. C. Scribner's Sons, N. Y. 411 p.

A narrative on travels in the Sonora area of Mexico during the first decade of the 20th century. Page 152 states antelope eat cholla. Pages 284 and 296 refer to populations inhabiting the area west of the Rio de Sonoita.

**Lyon, M. W., Jr.** 1908. Remarks on the horns and on the systematic position of the American antelope. Pro. U. S. National Museum 34(1619):393-401.

The author gave a brief description of the horns of antelope and the manner in which they are annually shed and renewed. Remarks are also provided on abnormal horns of a specimen located in the National Museum and a living animal in the London Zoo. Other literature pertaining to horn development is listed.

**Mace, R. U.** 1949. Oregon's pronghorn antelope. Oregon State Game Comm. Portland, Ore. 25 p.

A booklet with chapters devoted to: Description and Characteristics; History of Antelope in Oregon; Present Distribution and Habitat; Food Habits; Management; Hunting Antelope; Care of Meat; Care of Trophy; Future Antelope in Oregon. Vast areas were available for antelope use and forage was available to support more animals. Much available range remained unoccupied and an increase in antelope was desirable. Present management includes: population censuses to determine trends, habitat improvement for waters, extensive predator control, investigation of diseases, and annual huntings for sportsmen.

..... 1952. Oregon's big game resources. Oregon State Game Comm., Portland, Ore. 31 p.

Pages 15 and 16 discuss the antelopes' life history in Oregon. Other chapters deal with range relationships, future of antelope in Oregon



and necessity of keeping the public informed of the Commission's management program.

**Mankins, J. V.** 1962. Conjunctivitis of a pronghorn antelope (*Antilocapra americana*). *J. Mammalogy* 43(3):415.

An adult female with a case of conjunctivitis was captured alive April 18, 1957, in Lassen County, California. "The doe was approximately seven months pregnant and her age was placed at three years. Gross examination revealed an exudation into the cornea of both eyes as evidenced by corneal ruptures. Severe leucoma was present in the left eye. In the right eye the acrid substance produced by corneal ulcers here deeply penetrated the anterior chamber of the aqueous humor causing some of the latter to escape, resulting in a prolapse of the iris. Corneal ulcers were also evident on the sclerotic near the corneal border. Mucopurulent discharges from the inflamed conjunctiva undoubtedly aided in the superficial spread of the etiological agent over the anterior region of the eye."

**Martinka, C.** 1966a. The international antelope herd. *Montana Wildl. July*:28-30.

Two antelope herds near Malta and Glasgow, Montana spend their summers in Montana and winters in Saskatchewan, Canada. Movements of these animals varied from 88 to 100 miles. During the severe winter of 1964-65, when snow reached 15 to 40 inches many antelope died of malnutrition. Studies indicated browse was the most important forage class during winter. Grass constituted a relatively minor portion of the diet. It was suggested that starvation may have been related to insufficient shrubby sagebrush.

..... 1966b. A differential hunter harvest of pronghorn antelope in Montana. *Proc. West. Asso. State Fish and Game Comm.* 46:116-122.

Differential hunter harvest of pronghorns was studied in Montana by comparing results of summer aerial classifications and hunter check stations from similar areas and years. The average summer population composition was 23% adult males, 41% adult females, and 36% fawns over a six year period. The average compositions of the fall harvest were 51% adult males, 26% adult females, and 23% fawns. The high occurrence of adult males in the harvest indicated hunter selection.

..... 1966c. Winter mortality of pronghorn antelope in northern Montana. Abstracts of papers presented at the NW Sect., The Wildl. Soc., La Grande, Ore. 1:4.

Antelope winter mortality was studied near Glasgow, Montana in April 1965. A minimum loss of 500 antelope was associated with severe weather which occurred primarily on foothill grasslands along the Milk River. An examination of bone marrow indicated that malnutrition was the principal cause of death. Food habit studies were conducted on rumens from 14 carcasses and observations at feeding sites. "Comparison of rumens, characterized by fringed sagewort (*Artemisia frigida*), creeping juniper (*Juniperus horizontalis*), and a variety of forbs, with feeding site examinations suggested that starvation occurred while animals were restricted to the grassland vegetative type . . . losses were minimal and fawn production normal among pronghorns associated with winter ranges where shrubby sagebrush species were abundant and available."

**Mason, E.** 1947. Oregon antelope. *Oregon State Game Comm.* 2(6):1, 4, 7.

An article devoted to life history, habits, and management of antelope in Oregon. "On the basis of recent studies, it appears that weather and predation are the major factors affecting fawn survival." Recognizing the need for coyote control, the Game Commission cooperated with the U. S. Fish and Wildlife Service in an intensive predator control

program on critical antelope ranges. Antelope density and distribution was low throughout the available habitat, consequently, every opportunity should be provided to increase numbers over the vast desert range in southeastern Oregon.

..... 1952a. Food habits of the Hart Mountain antelope herd. Proc. West. Assn. State Game and Fish Comm. 32:95-97.

A total of 26 antelope stomachs was collected in Oregon and Nevada for food habit studies. The collection was made during each month of the year except December and January. Browse was the heaviest used forage class, forb next, and grass the least. Sagebrush represented the most important year-long food item making up 61% of the total diet. Forbs comprised approximately 6% and grass was slightly over one percent. "The total consumption of grass and forbs species preferred by domestic livestock was extremely limited. It is apparent that direct competition with domestic livestock for individual plant species is slight and evidence indicates that substantial increase of antelope numbers can be maintained on the Hart Mountain and similar ranges without conflict."

..... 1952b. Food habits and measurements of Hart Mountain antelope. J. Wildl. Manag. 16(3):387-9.

A report on an antelope collection program on or near Hart Mountain, Oregon. Stomach samples were obtained and analyzed. Sagebrush (*Artemisia tridentata*, variety *arbuscula*) represented the most important yearlong food item making up approximately 61% of the total diet. Sagebrush was contained in each monthly sample and 96% of the stomachs contained some species of sagebrush. Forbs amounted to approximately 6% of the total diet and were found in 19% of the stomachs. Green grass represented slightly over 1% of the total diet while dry grass constituted one-half of one percent. Average antelope weights and measurements were also recorded.

**Mathisen, J.** 1960. How many? Outdoor Nebraska 38(8):18-19.

A pronghorn management program should provide the maximum amount of hunting with the least amount of damage to agriculture crops. Aerial surveys since 1955 indicated that reproduction had steadily declined. In 1948, the total population decreased 45%, consequently, herds were given complete protection. A limited season was held in 1959 and herds have since increased. Pronghorns have been translocated from areas of intensive land use to wilderness areas since 1956.

..... 1962. Antelope trapping and transplanting. Nebraska Game, Forestation, and Parks Comm., Final Report. P-R Project W-31-D-S. 11 p.

"The project was designed to trap antelope from western Nebraska and release them in the 20,000 square mile Sandhill area in north-central Nebraska. The trap was set up 10 times and 1,116 antelope were trapped. Pre-release mortality was 46 antelope, or 4.1 per cent of the total trapped. The total number of antelope released successfully in the Sandhills, including 35 obtained from Colorado, was 1,077. Cost per antelope transplanted in the Sandhills was \$37.54."

**Matthew, W. D.** 1904. A complete skeleton of *Merycodus*. Bull. Amer. Mus. Nat. Hist. 20:101-129.

The author described a complete skeleton found in the Middle Miocene of northeastern Colorado in 1901. "In view of the relationship of *Merycodus* with *Antilocapra*, as shown by Professor Scott in 1890 and abundantly confirmed by the complete skeleton here described, it is necessary to separate *Merycodus* and *Blastomeryx* from the *Cervidae*



and place them as a distinct family or as a subfamily of *Antilocopridae*." *Merycodus* has a curious combination of deer and antelope characteristics. Two explanations were offered: "Either *Merycodus* was a deer which paralleled the antelope in every detail of its skeleton structure, skull, and teeth, or else it was, like *Antilocapra*, an antelope separated from the main line at a date sufficiently early for it to have developed a distinct type of horn structure, mainly, antlers in place of deciduous or permanent horns." Various scientific drawings were provided.

..... 1934. A phylogenetic chart of the Artiodactyla. *J. Mammalogy* 15(2):207-209.

Dr. Matthew presented a graphic and phylogenetic expression of his classification of Artiodactyla. The pronghorn group was illustrated as being from Recent, Pleistocene, Pliocene, and Miocene times, then branching from antelope and cattle in the Oligocene, which originated in the Eocene. Pronghorns were shown as being entirely from the Meartic. The *Merycodus* was listed in the Miocene, the *Tetrameryx* from the Pliocene, and the *Capromeryx* from the Pleistocene.

**McAtee, W. L.** 1939. The electric fence in wildlife management. *J. Wildl. Managt.* 3(1):1-13.

Page 3 contains the statement: "So far as observed in a Yellowstone National Park experiment, a single stand electric fence with the wire 30 inches from the ground, was entirely effective in keeping antelope out of an area where formerly they had fed. They even shunned the tract after removal of the fence."

**McKenzie, J. V.** 1963. Antelope status — 225 to 10,000 in 40 years. *North Dakota Outdoors* 26(2):20-21.

Nelson (1924) reported only five herds, totaling 225 antelope, in North Dakota. By 1950, the population had increased to around 3,800. In 1951 an open season was declared and permits were sold to 955 resident hunters. A harvest of 913 antelope was made by the 955 hunters. In the 11 open seasons since 1951, slightly more than 20,000 hunters killed approximately 19,400 antelope. This was a hunter success of 95%.

**McKinley, D.** 1960. The question of the pronghorn in pioneer Missouri. *J. Mammalogy* 41(4):503-505.

The author conducted an extensive literature review for a chronological bibliography of wildlife in Missouri. He stated he was unable to substantiate any claims that antelope ever inhabited Missouri. In summary he reported, "My belief is that pronghorns were never found within historical times in what is now the State of Missouri."

**McKnight, T.** 1965. Rearranging the ungulates. Univ. Colo. Press. Boulder, Colo. Man and Earth no. 3. p. 91-112.

McKnight presented data on different populations of feral livestock, exotic big game, and native big game released in habitats not used during historic times. Pages 102 and 103 referred to pronghorns. Although antelope could be transplanted fairly easily and inexpensively, there were fewer than a dozen reported instances in which they were translocated from one state to another. In each case a population was established, but in only two or three instances was the subsequent natural increase sufficient to warrant calling the transplant a total success.

**McLean, D. D.** 1944. The pronghorned antelope in California. *Calif. Fish and Game* 30(4):221-241.

Here was one of the first comprehensive articles on antelope in California with emphasis on: Early Records; General Range of Prong-

horned Antelope; Present Range in California; Winter Range; Migration in California; Antelope Highways; Life History; Census Methods; Open Seasons. McLean gave a good account of the antelope's original and present distribution in California. Maps were provided showing winter ranges and major migration routes. Two pages were devoted to a good discussion on early census methods.

**Mearns, E. A.** 1907. Mammals of the Mexican boundary of the United States. National Museum, U. S. Gov't. Printing Office, Wash., D. C. Bull. no. 56, Part 1, 530 p.

Mearns provided comparisons between *A. a. americana* and *A. a. mexicana* which were mainly hair color variations on the head and tail. He discussed cranial characteristics, horns, weights, habits and local distribution. A record was noted of an albino antelope sighted but not collected. Antelope were frequently found in timbered areas. Data was based primarily on observations of antelope in Arizona, New Mexico, and Texas.

**Merriam, C. H.** 1901. Two new bighorns and a new antelope from Mexico and the United States. Proc. Biol. Soc. Wash., D. C. 14:31-32.

The author described and named the subspecies *Antilocapra americana mexicana* subsp. nov. The type specimen (No. 98,742) was collected near Sierra in Media, Chihuahua, Mexico. It was a young male collected by E. W. Nelson and E. A. Goldman, October 4, 1899. Comparisons with *A. americana* disclosed differences in color and cranial characters. Eleven antelope were collected by Nelson and Goldman in the desert region of northwestern Chihuahua, not far from Lake Santa Maria.

**Merriam, J. C.** 1909. The occurrence of strepsicerine antelopes in the tertiary of northwestern Nevada. Univ. Calif. Publ. Depart. Geol. 5(2):319-330.

Twelve antelope specimens of the strepsicerine or twisted-horned type were collected in the Thousand Creek area of northwestern Nevada. No representatives of these forms were heretofore collected from the Western Hemisphere, though they were present in Eurasia in the middle to late Cenozoic time. The species were named *Ilingoceros alexandrae* (a whirlwind horn) and *Sphenophalos nevadanus* (wedge horn on a Homeric helmet), which resembled the tragelaphine division of the antelopes. Specimens were collected from Tertiary beds. Also collected were specimens resembling *Merycodus*.

..... 1911. Tertiary mammal beds of Virgin Valley and Thousand Creek in northwestern Nevada. Univ. Calif. Publ. Bull. Depart. Geol. 6(11):199-304.

The author described the following specimens under Antilocapridae:

*Merycodus*, near *Furcatus* (Leidy)

*Merycodus nevadensis*, n. sp.

*Sphenophalos nevadanus* Merriam

*Ilingoceros schizaceras*, n. sp.

*Ilingoceros alexandrae* Merriam

"On the whole, the writer is inclined to think that the evidence favors recognition of a fairly close relationship of *Ilingoceros* as well as *Sphenophalos* with the Antilocapridae, and that all of these forms may be derived from some member of the *Merycodus* group."

..... 1918. New mammalia from the Idaho formation. Univ. Calif. Publ. Depart. Geol. 10(26):523-530.

The type specimen *Neotragoceros lindgreni* was collected three miles east of Boise, Idaho. Only the horn-core was found. This specimen



represents an antelope of the *Tragocerus* type. It approaches characteristics of the *Neotragocerus improvisus*.

**Meyers, L. H.** 1963. A general history of the pronghorn antelope in California. Inter. Antelope Confer. Trans. 14:81-102.

Meyers provided a literature review of antelope with special emphasis on pronghorns in California. Some 60 references are listed. The narration discussed the antelopes' life history, origin, taxonomy, historical records, and present management practices. Three chapters of the greatest detail were: a historical review of distribution, recent population trends, and harvests during the past decade.

✓ **Milek, B.** 1966. Sheep fences or antelope. *Field and Stream* 71(5):10-15.

A popular article written on the current controversial antelope-fence relationship problem in Wyoming. The author discussed the two antelope-fence studies accomplished to date: the Rouse report conducted in 1954 and the Spillett report written in 1963. Both were stated as inadequate and additional studies of actual range conditions were needed. "Sheep-tight fences undoubtedly contributed to the recent decline in Wyoming's antelope population." The author advocated that consideration should be given to managing large blocks of public land first for antelope, then for domestic livestock.

**Miller, G. S. and R. Kellogg.** 1955. List of North American recent mammals. National Museum, U. S. Gov't. Printing Office, Wash., D. C. Bull. no. 205. 954 p.

This is a summary of available taxonomic knowledge on mammals of North America. All recent mammals up to January 1, 1953 are listed with records of species represented in the U. S. National Museum. Pages 816 and 817 list antelope specimens of which the following five subspecies are provided:

- Antilocapra americana americana* (Ord)
- Antilocapra americana oregona* Bailey
- Antilocapra americana mexicana* Merriam
- Antilocapra americana sonoriensis* Goldman
- Antilocapra americana peninsularis* Nelson

**Mitchell, G. J.** 1965. Nataly, mortality, and related phenomena in two populations of pronghorn antelope in Alberta, Canada. Phd thesis, Wash. State Univ., Pullman. 221 p.

An antelope nataly and mortality study was conducted for 10 years on a hunted (Lake Pakowski) and a non-hunted (Lake Newell) area in Alberta, Canada. The fetal rates were similar suggesting no significant differences in range vegetation quality. The Lake Pakowski population had a lower mean annual adult mortality rate and exhibited a lower nataly rate. The other population had the highest mean annual adult mortality rate and the highest nataly rate. These comparisons suggested that antelope nataly increased as mean annual adult mortality increased.

**Mobley, D.** 1960. Cripple loss is your loss. *Wyoming Wildlife* 24(9):4-6.

A total of nine crippling losses was noted on a square mile test plot during a regular hunting season. This represented 8.6% of the hunter harvest. Two of the nine antelope carcasses had been dressed and abandoned. If these figures were applied statewide for the 26,500 animals harvested, it was possible that more than 2,000 animals were wasted through cripple loss. In some areas crippling loss was higher. It was estimated that a loss of 10% of the annual antelope harvest on a statewide basis was a conservative estimate.

**Mohr, E.** (compiler). 1958. *Saugetiere*. Erich Cramer, Hamburg, Germany. 16 p.

Presented in a portfolio is a collection of 192 mammal painting prints by W. Eigener, F. Murr., K. Grossmann, and H. Vogel. Print No. 162 is the "Gabebock" or "Gabdantiope". Gabebock means "forked buck" and refers to the American pronghorn antelope. On the back of each print is a brief life history. "Saugetiere" means "mammals".

**Morrison, B. G.** 1961. Some aspects of the histology and growth of the horns of *Antilocapra americana*. M. S. thesis, Univ. Wyoming, Laramie, Wyo. 48 p.

The horns of the antelope constitute a major criterion for the classification of this animal. The horn sheath is composed principally of compressed cornified epithelial cells. Hairs do not form a major part of the horn sheaths. Hormonal relationships probably cause the annual growth and shedding of the horn sheaths. Growth apparently begins during the early fall when the male sex hormone is at its height. The sheaths are shed in November and December.

**Murie, A.** 1940. Ecology of the coyote in the Yellowstone. U. S. Printing Office, Wash., D. C. *Fauna of the National Parks Bull.* no. 4. 206 p.

Chapter seven is entitled, "Antelope in Relation to Coyotes". Of a total of 1,657 coyote droppings analyzed, remains of adult antelope appeared in 21 and fawns in 32. The coyote was not adversely affecting the antelope, nor was it preventing them from increasing. Although antelope prospered and increased during recent years, their future has been precarious because of decreased winter forage. The solution of the antelope problem involves more winter range, with perhaps fewer elk. On antelope winter range, considerably more than 75% of the sagebrush was dead as a result of over-browsing. There was direct competition for sagebrush with deer, bighorn and elk.

**Murie, O. J.** 1935. Food habits of the coyote in Jackson Hole, Wyoming. U. S. Depart. Agric., Wash., D. C. *Cir.* no. 362. 24 p.

Of 2,415 individual food items found in 64 stomachs and 714 coyote feces in Jackson Hole, Wyoming, antelope occurred as carrion three times with a frequency percentage of .21. Antelope were not abundant in the collection area.

**Murray, L. T.** 1932. Notes on personal experiences with pronghorn antelope in Texas. *J. Mammalogy* 13(1):41-45.

The author lived in western Texas from 1909 to 1916. He noted that with the coming of railroads and automobiles bringing many people, the antelope numbers decreased greatly. Hunting with rifles was a major factor. He raised a young antelope to maturity, giving it freedom to roam at its leisure. The antelope appeared to enjoy having town dogs chase it as a game, easily outdistancing the canines whenever it desired. Later the doe was sent to a park and successfully mated.

**Nelson, E. W.** 1912. A new subspecies of pronghorn antelope from lower California. *Proc. Biol. Soc., Wash., D. C.* 25:107-108.

"This subspecies is based on a series of twelve specimens, all from the type locality and neighboring district, now in the Biological Survey Collection. Comparisons were made with about an equal series of *mexicana* and even larger number of *americana* from various parts of the western United States." The scientific name listed was *Antilocapra americana peninsularis* subsp. nov., type number 178,445 in the U. S. National Museum, Biological Survey Collection. It was an adult male collected February 4, 1912 by E. W. Funcke about 45 miles south of Calmalli, Lower California, Mexico.



..... 1925. Status of the pronghorned antelope, 1922-24. U. S. Depart. Agric., Wash., D. C. Dept. Bull. no. 1346, 64 p.

Nelson's report is a classic in antelope literature. It provides a good idea on past antelope herds in the West and documents herds existing in 1922-24. Other chapters discuss: Habitat; Proposed Antelope Refuges; Restocking Experiments; Antelope Characteristics, and Management Techniques. Table 1 lists 26,604 antelope in the U. S., 2,395 in Mexico, and 1,327 in Canada. This represented a total of 30,326 pronghorns in the world.

**Newberry, J. S.** 1855. Report upon the zoology of the route. No. 2, Chap. 1. p. 70-71. In: Abbot, H. L. 1857. Reports of exploration and surveys to ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean. U. S. Senate, Wash., D. C. Ex. Doc. no. 78, Vol. VI.

Pages 70 and 71 refer to the American pronghorn's distribution and life history. The following quote relating to distribution and abundance is of interest: "Though found in nearly all parts of the territory of the United States west of the Mississippi, it is probably most numerous in the valley of the San Joaquin, California. There it is found in herds literally of thousands; and though much reduced in numbers by the war which is incessantly and remorselessly waged upon it; it is still so common that its flesh is cheaper and more abundant in the market of the California cities than that of any other animal. On nearly every day's march between the valley of the Sacramento and the Columbia, we saw either the antelope itself or its peculiar track in the sand."

**Nichol, A. A.** 1942. Gathering, transplanting, and care of young antelopes. *J. Wildl. Managt.* 6(4):281-287.

Antelope kids were captured in northern Arizona and transplanted to the southern part of the state. The kids were held for one week then transported in individual crates. The formula for feeding young fawns is provided on page 284. Clean utensils, proper formula temperature, and clean antelope muzzles were important to assuring health of the fawns. The young animals began chewing on things when a week old. Alfalfa hay was provided for roughage, with one part calf meal to seven parts rolled oats for a concentrate. Salt and bone meal were also provided. Of the 11 fawns originally caught, four died of various causes and seven were liberated. Although hand raised, the animals lost their tameness and became wild soon after release.

**Nichols, L.** 1960. The history of the antelope introductions on Lanai Island, Hawaii. *Inter. Antelope Confer. Trans.* 11:101-104.

On November 30, 1959, 56 pronghorns were trapped by the Montana Department of Fish and Game and shipped to Lanai Island in the Hawaiian Islands. The article described the island relocation site and how the animals reacted to the release.

**Nielson, A. E.** 1962. Brief history of antelope in Idaho. *Inter. Antelope Confer. Trans.* 13:64-70.

Nielson reviewed Idaho's antelope populations from 1893 to 1962. Data is provided regarding historical population numbers, recent transplants, tagging, census work, field studies, present antelope trend counts, and harvests.

**Noback, C. V.** 1932. The deciduous horns of the pronghorn antelope. *Bull. New York Zool. Soc.* 35(6):195-207.

This is a well documented thesis on the antelope's horn development. Ectoderm cells form soon after the ovum has been fertilized and these develop into horns. The horns of the antelope differ from the cow family in the following characteristics: the horns are branched; the

horns do not possess annular rings around the base; and the horn sheaths are shed and renewed each year. The first record of antelope shedding horns was written by Bartlett (1855). The bony pedicle or bone core is actually a projection from the frontal bone of the skull, whereas the horn sheath is a keratogenous substance developed from direct contact with a specialized skin which in turn develops or covers the bony core or pedicle. Twelve photos with detailed descriptions illustrate various stages of horn development.

**Norgren, C. A.** 1940. Antelope do shed their horns. *Outdoor life* 111(7):16-17, 97.

The author documented in this article, the story of antelope shedding their horn sheaths and growing a new set. Photos taken on November 2, 1938, show one sheath shed, by November 10th both shed and new ones started; then a continuation of growth until July 1, 1939. This is a well documented story of horn sheath growth by a series of 11 different photos.

**Novak, J. and O. V. Deming.** 1960. Hart Mountain National Antelope Refuge summary. *Inter. Antelope Confer. Trans.* 11:4-17.

Presents a summary of antelope numbers on the Hart Mtn. Antelope Refuge for the last 10 years or longer. Data pertains to populations, range conditions, and other factors affecting antelope numbers and management.

**O'Connor, J. and G. G. Goodwin.** 1961. *The big game of North America.* E. P. Dutton and Co., N. Y. 264 p.

Chapter 4 (pages 67-76) is devoted to the pronghorn. O'Connor provides six pages of information on hunting the American antelope. He states: "The only real antelope predator is man, and an antelope hunt is a poor man's safari, the only chance for a real plains hunt there is in North America these days. And this poor man's safari is something that everyone who likes to hunt should plan on." Goodwin provides an additional four pages on life history and management.

✓ **Ogilvie, S.** 1953. Antelope barriers. *Colo. Depart. Game and Fish, Denver. Quarterly Progress Report*, Oct. p. 27-30.

The objectives of this study were to investigate the types of possible barriers and their influence on antelope. Pronghorns were seen crossing rivers, highways, and several times crossing high mountain ranges. The problem of the antelope barriers appeared to have been of little concern. However, low stranded fences should be considered when selecting transplant sites as these fences can be true barriers.

..... 1955. Chokecherry toxic to an antelope. *J. Mammalogy* 36(1):146.

While studying the food habits of antelope in the Jimmy Camp Creek area, east of Colorado Springs, Colorado, the writer collected a buck antelope that appeared stiff and slow in physical movements and showed evidence of being in a weakened condition. A postmortem examination disclosed nothing to denote poor health. The stomach contained mainly new growth of chokecherry (*Prunus melanocarpa*). It was believed small quantities of cyanide gas released from the chokecherries was toxic to the antelope. It was further postulated that this condition would have been only a temporary ailment, however, it could have caused the animal to have been easy prey for predators.

**Ord, G.** 1815. *North American Zoology.* In: *Guthrie's Geography*, (2nd Ameri. edition). Johnson and Warner, Phila. 2:292, 308.

Ord wrote the chapter in "Guthrie's Geography" on North American zoology, although his name was not listed as the author. Pages 291 and 292 listed all the known mammals, including *Antilope Americanus*.



This was the first scientific binominal name given the American pronghorn. Half of page 308 discussed "The Prong-Horned Antelope", giving credit to Lewis and Clark for the first account of this species.

..... 1818. *Antilocapra* Ord. J. De Physique, De Chimie, D' Histoire Naturelle Et Des Arts. Paris, France. no. 87. p. 149-151.

This was Ord's original published description of the American pronghorn. He named the type specimen *Antilocapra americana* and this has been scientifically accepted to date. The description was based on a single adult male specimen collected by the Lewis and Clark expedition. The author referred to a drawing of the specimen, but none was observed in the publication. The description contained notes on the horns, eyes, ears, hair color, peltage, and various measurements.

**Oregon State Game Commission.** 1961. Pronghorn antelope. Oregon State Game Comm., Portland, Ore. Wildl. Series Leaflet no. 2. 2 p.

The Oregon State Game Commission provided in this leaflet a terse report on antelope life history and management information. One page contains drawings of antelope and habitat. Management information refers to the need for annual censuses and production data. "We do not have enough antelope in Oregon at the present time to use all of the land where they can live. There is enough food for many more antelope but only a few places for them to get a drink in the late summer. Each year the Oregon State Game Commission is building new water holes to allow antelope the chance to move over more land and still find a place to drink."

**Pearl, S.** 1963. Biography of a pronghorn. *Our Public Lands* 13(2):12-15.

A short article on the history, life cycle and present management of the American antelope. The story tells of the pronghorns, abundance during pristine times, to the days of extinction danger in the early 1900's, ending with today's situation where thousands exist. Present day conservation and management were listed as reasons for the antelopes' increased population status.

**Pocock, R. I.** 1905. The effects of castration on the horns of a prongbuck (*Antilocapra americana*). *Proc. Zoo. Soc. London* 1(13):191-197.

The following observations were noted regarding the horns of an adult pronghorn believed to have been castrated: 1. Horn cores: Short and bent forward towards the nose. 2. Horn sheath: shedding did not take place. A composite sheath was therefore made which became increasingly long. There was no prong on the sheath.

**Popowski, B.** 1959. Hunting pronghorn antelope. The Stackpole Co., Harrisburg, Penn. 225 p.

A book containing chapters on: History, Habitat and Antelope Distribution; Pronghorn Hunting Needs; Hunting and Stalking; Hunting by Ambush; Trapping and Transplanting; Predators and Fences; Care of Meat and Heads; Pronghorn Trophies. The book was written for sportsmen with the first part emphasizing life history and the second part mainly devoted to hunting techniques and practices.

**Powell, L. E.** 1954. Northern Arizona antelope survey. Ariz. game surveys and investigation completion reports, 1953-54. Ariz. Fish and Game, Phoenix, Ariz. n. p.

The annual aerial survey of 4,389 antelope resulted in a buck-to-doe ratio of 1:19 and a fawn crop of 46.6%. 35 fawns and 164 adults were tagged. Two outbreaks of hemorrhagic septicemia "shipping fever" were noted. Stomach content analysis of three antelope revealed only a trace of grass. The fawn crop was the lowest in an area of high predator numbers. A formula was developed attempting to determine

the number of antelope to be killed within an area in order to obtain a post-hunt ratio of one buck to three does.

**Prenzlou, E. J.** 1964. Doe-kid behavior of pronghorns in north central Colorado. Colo. Coop. Wildl. Res. Unit, Fort Collins, Colo. 7 p.

Social behavior and activity patterns of pronghorns were studied in north central Colorado from 1963 to 1965. For an eight-square-mile study area, 64 pronghorns were captured, marked, and released to facilitate observation. Detailed data was recorded relative to socialization, kid birth, kid integration, nursing, kid behavior, etc. A total of 453.25 hours were spent on 77 doe-kid observations. It was noted that some abandonment of kids by does was possible when kids were handled too soon after birth. A recommendation, based upon field experience, was made to not touch the young animal until at least six hours after birth.

..... 1965. A literature review on pronghorn behavior. Colo. Depart. Game, Fish and Parks, Denver, Colo. Special Report no. 3. 28 p.

The author reviewed 60 publications as a prelude to original research on the activity patterns and social behavior of pronghorns. He summarized pertinent data into categories of: taxonomy, distribution, history, description and morphology, life history, mortality, and behavior. Behavior data was classified into: mannerisms, habitat preference, activity periods, movements, migrations, effects of barriers, herd composition, kidding behavior, rutting behavior, and inter-specie behavior.

**Price, E. W.** 1927. A new nematode, *Nematodirus antilocaprae* from the pronghorn antelope, with a key to the species of nematodes. Proc. U. S. National Museum 71(22):1-4.

The nematode described in this paper was collected from the small intestine of a pronghorn that died in the National Zoological Park, Washington, D. C. The antelope had been obtained from the west. The nematode belongs to the genus *Nematodirus* but possessed no characteristics similar to existing species; therefore, the name *Nematodirus anticolaprae* was proposed.

✓ **Rand, A. L.** 1947. The 1945 status of the pronghorn antelope, *Antilocapra americana* (Ord) in Canada. National Museum Canada, Ottawa. Bull. no. 106, Biol. Series no. 34. 34 p.

Rand reported on historical numbers and the present status of pronghorns in Canada. Chapters provided data on: Habitat, Weather, Fences, Hunting Pressure, Coyotes, Fires, etc. The appendix contained a breakdown on antelope populations according to areas inhabited. Data was also given on each population as to estimated numbers and status of increasing or decreasing.

**Rhoads, S. N. (editor).** 1849. A reprint of the North American zoology by George Ord. Samuel N. Rhoads, Publisher, Haddonsfield, N. J. 361 p.

Rhoads presented in this publication an exact reproduction of the part originally compiled by George Ord for Johnson and Warner's book, "Guthrie's Geography" second edition 1815. Only one copy of the 1815 "Guthrie's Geography" was known to Rhoads who stated that this was the only edition containing a complete part relating to North American Zoology prepared by George Ord. Page 291 provided a classification list of mammals and listed antelope as *Antilope americanus*. Page 308 contained a brief report on distribution and life history. In addition, one paragraph referred to methods employed by the Mandan Indians to hunt antelope.

**Richards, S. H.** 1964. Epidemic hemorrhagic disease in deer and antelope. North Dakota Outdoors 26(9):18-21.



In 1962 and 1963, an epizootic occurred in western North Dakota affecting deer and antelope. The new malady was called epidemic hemorrhagic disease referred to as EHD. It affected deer and antelope only and was characterized by hemorrhages and inflammation. EHD caused a pneumonia with inflammation and discoloring of the lungs resulting in death due to a severe respiratory infection. Further studies were under way relative to this disease's effect on deer and antelope breeding, gestation periods, and condition of fawns.

- Richardson, J.** 1829. Fauna boreali-americana; or the zoology of the northern parts of British America. John Murray, London. 1:261-268.

This book contains a description of specimens collected in Canada during early exploratory times with pages 261-268 devoted to antelope. The authority provided an extensive list of early published scientific names for the antelope. He discredited some historical reports that antelope inhabited "the bleak regions near the frozen ocean." A lengthy physical description was provided for the antelope, with a few remarks on the antelope's life history and hunting techniques practiced by Indians.

- Roosevelt, O. and J. W. Burden.** 1934. A new species of Antilocaprine, *Tetrameryx onusrosagris*, from a Pleistocene cave deposit in southern Arizona. Amer. Mus. Novitates, Amer. Mus. Nat. History, N. Y. no. 754. 4 p.

Describes a new species *Tetrameryx onusrosagris* n. sp., collected from a Pleistocene cave in southern Arizona and compares this species with *T. conklingi* Stock and *Antilocapra americana* Ord. The outstanding characteristic of this fossil was its symmetrical forked horn-cores. The orbit was as fully prominent as in *Antilocapra*.

- Roosevelt, T., T. S. van Dyke, D. G. Elliot, and A. J. Stone.** 1908. The deer family. Grosset and Dunlap Pub., N. Y. 334 p.

Roosevelt devoted one chapter to the American antelope (pages 98 to 130). About half the chapter was devoted to historical and life history data, with the remaining part referring to Roosevelt's experiences in hunting antelope. The map facing page 100 illustrates the distribution of antelope in 1900. Regarding feeding habits, Roosevelt stated, "They were especially fond of the green, tender blades (grass) that came up where the country had been burned over. If the region had been devastated by prairie fires in the fall, the next spring it was certain to contain hundreds and thousands of prongbucks."

- Rosko, L.** 1948. Preliminary report on the antelope in the Cedar City study area, Iron County, Utah. Utah Coop. Wildl. Research Unit, Logan, Utah. Special report. 16 p.

Antelope observations were recorded during the summer and fall of 1947. There was a 98% fawn crop. Poaching apparently was not a problem. Food and water were sufficient to support a larger herd than present. Competition with domestic animals appeared not to have been serious. The large increase in herd size following an intensive coyote control program seemed to indicate that coyotes may have played an important role in limiting antelope herds.

- Rouse, C. H.** 1941. Notes on winter foraging habits of antelopes in Oklahoma. J. Mammalogy 22(1):57-60.

The author recorded plants consumed by antelope while tracking the animals through snow. Shrublike perennials comprised the greater part of forage utilized. The animals visited one spring during the study period, otherwise they apparently ate snow.

- ✓ ..... 1954. Antelope and sheep fences, preliminary report of study. U. S. Bureau Land Managt., Wash., D. C. 20 p. HA

Recorded here are the results of the first documented studies conducted in Montana and Wyoming on antelope movements as affected by barbed wire and woven wire fences. Recommendations are provided on how fences can be constructed with the least interference to antelope movement.

..... 1959. Antelope-range relationships. Inter. Antelope Confer. Trans. 10:4-9.

Forage is a primary requirement, and for ranges in good condition, must be available in quality and quantity for all seasons of the year. Little is known regarding water requirements. The third requirement is shelter which is especially needed during winter blizzard conditions. Wide open space or good visibility may be considered as another basic requirement for good antelope habitat. On ranges properly stocked with livestock and in good condition, there appears to be little forage competition, however, this may be the opposite on severely grazed ranges occupied by both animals. Adequate winter range in good condition is usually a greater problem than summer range for antelope.

✓ ..... 1962. Antelope and sheep fences. Inter. Antelope Confer. Trans. 13:45-47.

This is a summary of a study conducted in 1952 and 1953 regarding fences on public lands that would be effective livestock control measures but allow antelope movement. The study was conducted in Wyoming and Montana. Recommendations are given for fence specifications most favorable for allowing antelope movements.

**Runkles, W.** 1966. Crazy horn. *Outdoor Life* 138(5):6.

The skull of an antelope found in Garza County, Texas, contained horns protruding posteriorly some 18" slightly above the nose. The author claims the specimen was found this way in the field. Although it would appear the horns interfered with an animal's daily feeding habits, the buck's body condition was reported healthy.

**Rush, W. M.** 1927. Notes on the diseases of wild game mammals. *J. Mammalogy* 8(2):163-165.

"A two-year male antelope died in captivity at Livingston, Montana, on February 28, 1926. Examination showed it to be in very poor physical condition. Lungs were of almost black color and a mass of hard ulcers. Considerable pus was present about the lungs. Lymphatic glands were greatly enlarged and markedly diseased. Liver was covered with ulcers. Stomach, kidneys, and intestines normal. The Montana Livestock Sanitary Board gave a diagnosis of miliary tuberculosis in this case."

..... 1944. American pronghorn. *Natural History* 53(7):321-323.

A popular article in the "Natural History" magazine of the life history of pronghorns. One paragraph described an antelope doe trampling a rattlesnake. Pronghorns increased 600% from 1924 (26,600) to 1939 (165,000) — 15 years. Protection from hunting was cited as one of the main causes for increase. Data is provided on life history and habitat.

**Russell, P.** 1937. Antelope transplanting is success. *New Mexico* 15(6):32-33.

Antelope were first successfully trapped and transplanted in New Mexico during April 1937. Populations decreased to 2,000 in 1916, but by 1937 they increased to around 10,000. The author and State Game Warden Elliot S. Barker developed plans and techniques to trap antelope although such a venture had previously failed in Wyoming. 34 antelope were caught during the first attempt, of which 27 were transplanted. Plans later developed to trap large numbers of antelope for



purposes of restocking former private, State, and Federal ranges. The author believed that the present antelope population could be increased 10 times in New Mexico.

..... 1951. Crisis of antelope management. Proc. West. Assoc. State Game and Fish Comm. 31:112-116.

"The influences of an unregulated ever-increasing human population in New Mexico brought about a downward plunge in antelope population trends that was not checked until about 1920. By 1930 it was probable that a crisis was past." Game management practices such as effective law enforcement, predator animal control, trapping and transplanting, and improved range management practices helped to curb the downward trend. Reference was made to the creeping menace of woven wire fences and their effect on antelope populations. Reports of antelope starving were noted for various pastures enclosed with woven wire fences. The author suggested a four-point policy on woven fences that, if put into effect by ranchers and land managers, would help alleviate many aspects of the problem.

..... 1964. Antelope of New Mexico. New Mexico Depart. Game and Fish, Santa Fe. Bull. no. 12. 103 p.

A monograph on antelope in New Mexico with chapters on Occupation of New Mexico by Antelope, Trapping and Transplanting Antelope, Food Habits, Parasites and Diseases, etc. A good portion of the publication was on trapping and transplanting as this technique was pioneered by the author and the New Mexico Department of Game and Fish. Photos and diagrams were provided on trapping methods.

**Russo, J.** 1965. Arizona antelope. Proc. Antelope States Workshop 1:37-49.

Antelope range in Arizona covers approximately 11,000,000 acres. About 75% of their range is above 5,000 feet. The exception is a small population of Sonoran antelope around Ajo. The demand for antelope hunting permits is great. Most of the antelope range is public land.

**Ruth, Clara.** 1937. Preserves and ranges maintained for buffalo and other big game. Bur. Biol. Survey, Wash., D. C. Wildl. Research and Managt. Leaflet BS-95. 26 p.

The author described 11 big-game preserves and ranges under the jurisdiction of the Biological Survey (now Fish and Wildlife Service) in 1937. Of these, the following maintained antelope herds: Wichita Mountains Wildlife Refuge; National Bison Range; Fort Niobrara Game Preserve; Charles Sheldon Antelope Refuge; Hart Mountain Antelope Refuge; Charles Sheldon Antelope Range; Fort Peck Game Range. The report stated the government authority under which these areas were set aside for wildlife enhancement and the objectives for the preserves and ranges.

**Sampson, A. W.** 1952. Range management, principles and practices. John Wiley and Sons, N. Y. 570 p.

*"Forage Preferences of Antelope.* The food plants selected by pronghorn antelope vary widely. Though they commonly inhabit plains, grasslands, they consume little grass as compared to the amount of forbs that they take."

"On overgrazed range, sheep and antelope compete severely for forage. Since sheep graze closely almost all available vegetation, the antelopes may die of starvation. On overgrazed cattle range antelopes compete little or not at all since they mostly subsist on forbs, which are lightly used by cattle. Buechner (9) concluded that about 9.4 antelopes are equivalent to 1 animal-unit that is 9.4 antelope eat about as much as 1 cow; but since they consume only about 25 percent of the kind of forage taken by cattle, it would take four times as many antelope,

or 38, to consume as much cattle forage as 1 cow. Under western Texas conditions, 10 antelopes per square mile would constitute about proper density without appreciably lowering the carrying capacity for cattle."

**Sather, J. H. and G. Schildman.** 1955. Nebraska pronghorn. Nebraska Game, Forestation, and Parks Comm., Lincoln. P-R Project 15R Pub. 20 p.

A small booklet on the American antelope, giving information on life history, behaviorisms and management. Although pronghorns decreased in the early 1900's, they steadily increased around the 1930's and in 1953 the hunting season was opened again. It appeared as though the population was gradually extending eastward into the Sandhills. Limited studies on food habits indicated 82% of the volume was weeds. Agriculture crops (corn, alfalfa, and barley) comprised 10% and wild grasses were 1.6%.

**Sayana, K.** 1952. Sarcocystis in deer and elk of California. Calif. Fish and Game 38(1):99-104.

Although this paper was mainly concerned with deer and elk, the author did examine 73 antelope samples. Sarcocystis were protozoan parasites, chiefly found in striated muscles and difficult to detect with the unaided eye except in extremely heavy infestations. Muscle samples from the tongue, diaphragm and thigh of the antelope were sectioned and examined; however, not a single cyst was found.

**Scarvie, O., and J. A. Arney.** 1957. Food habits of pronghorn antelope *Antilocapra americana*, in October in northern Colorado. Colorado State Univ., Fort Collins. 7 p.

A total of 25 stomach samples was collected in October 1955, during the hunting season on the Colorado Antelope Refuge near Nunn. Range analysis work by the Parker three-step method was accomplished in the collection area. Browse was present in all 25 samples, giving a frequency of occurrence of 100%. Forbs occurred in 24 of the stomachs with cactus and grass in nine and seven respectively. Percentages for volume weight were: 72.9 browse, 24.0 forbs, 2.3 cactus, and 0.8 grass. Based on a total of 2,000 observations vegetative production cover was 85.5 grass, 4.7 browse, 4.2 forbs, and 1.6 cactus. Preference indices of antelope for the various forage classes were: browse 15.0, forbs 6.0, cactus 1.5, and grass 0.0009.

**Scott, W. B.** 1929. A history of land mammals in the Western Hemisphere. MacMillan Co., N. Y. 693 p.

Two different kinds of antelope exist in North America today — one erroneously named the Rocky Mountain Goat (*Oreamnos montanus*) and the other is pronghorn. *Antilocapra* occurred during the Pleistocene where it was associated with the last of the deer-antelope or Merycodus series (*Capromeryx*) which would seem to connect the two families, though this is doubtful. A middle Miocene genus (*Dromomeryx*) would have been more probably an ancestor of the pronghorn if it were not for the long, unfilled gap of the upper Miocene and the whole Pliocene.

**Seton, E. T.** 1929. Lives of game animals. Doubleday, Doran, N. Y. 3(2):413-780.

An extensive part in this early monographic series is devoted to the pronghorns' physical characteristics, taxonomy, history, distribution, migration, population numbers (past and present), food habits, and predators. Chapter headings include: horns, curiosity, glands, speed, jumping power, etc. This is one of the most frequently cited early references on the pronghorn — many facets of which are not as well accepted today since research has provided a great deal more accurate knowledge.



**Shaw, W. M.** 1960. Notes on Idaho antelope management data. Inter. Antelope Confer. Trans. 11:92-99.

Presents a summary of antelope numbers in Idaho for the last 10 years or longer. Data pertains to populations, range conditions and other factors affecting antelope numbers and management.

**Sheldon, H. H.** 1959. The prong-horned antelope — how many miles an hour? Pacific Discovery 12(3):18-21.

The author related his experiences in recording the speed of antelope during several races in Oregon and California. He discredited reports of antelope traveling at a rate of 60 miles per hour, stating that 42 miles was the fastest he witnessed even after prolonged attempts were made to make the animals go faster.

**Shelford, V. E.** 1954. The antelope population and solar radiation. J. Mammalogy 35:533-538.

"There is evidence of sensitive periods in which the size of population increases may be determined. Light appears to be an effective factor in influencing fecundity in antelope and probably also milk production. Light is apparently paired with moisture so that a large series of combinations can produce the nearly same results while separate linear graphs of the factors indicate little."

✓ **Sill, D.** 1964. Effects of livestock fencing on pronghorn antelope movements. Utah Coop. Wildl. Research Unit, Logan, Utah. 20 p.

"A total of six livestock fences and three antelope fence-crossing devices were tested in the summer and fall of 1964 to determine the ability of antelope to cross or escape from these. Fence crossing devices for antelope included standard cattle guards, horizontal panels and dirt ramps. All three devices permitted a majority of antelope to escape . . . Antelope-sheep fences should be kept to a maximum height of 32 inches and a combination of crossing devices for along such fences might also be installed."

**Simpson, G. G.** 1945. The principles of classification and a classification of mammals. American Museum Natural History, N. Y. Vol. 85. 350 p.

A thesis on the scientific classification of mammals with Artilocaprae on Pages 156-7. The true antelope of Africa are on pages 158-61. Pages 269-70 contain descriptions of fossils and recent antilocaprids in North America. The antilocaprids are represented by only one living specie today, but fossil forms are abundant and varied, showing that the survivor is a relict of a group analogous, on a smaller scale, to the antelope of Africa. Possible antilocaprids have been described from South America, Europe, and Asia, but so far the evidence is so imperfect that it does not merit much consideration.

**Skinner, M. P.** 1922. The pronghorn. J. Mammalogy 3(2):82-105.

This is the longest paper on the pronghorn published in the Journal of Mammalogy, giving details on genus, subspecies, and habits. Antelope herds in the Yellowstone Park are discussed in detail regarding historical numbers and present day distribution. The migration routes from summer to winter ranges averaged 30 miles. Passage generally was accomplished in three days. "In their eating, pronghorns confine themselves largely to various grasses, preferably those like the grama, buffalo, and bunch grasses that cure well on the stalk." Predation, diseases, and parasites also were discussed. "Pronghorns are fond of 'soda licks' and at times take some of the salt put out for the buffaloes . . ."

**Smith, A. D., D. M. Beale, and D. D. Doell.** 1965. Browse preferences of pronghorn antelope in southwestern Utah. North Amer. Wildl. and Nat. Res. Confer. Trans. 30:136-141.

"Six antelope were fed 16 species of browse plants common on desert ranges of Utah for a period of six days. Ample amounts of all species were available so that free choice could be expressed. Three species, big sagebrush, black sagebrush, and juniper provided the major part of the diet. More than half was provided by big sagebrush. Nutrient values of the diet were computed using digestion coefficients determined with mule deer and sheep. The values thus obtained were well in excess of accepted standards for domestic sheep. Unless competition from livestock seriously reduces the volume of sagebrush available to antelope, a low plane of nutrition during winter does not appear to be a factor in the productivity of this species in western Utah."

**Snyder, W. A.** 1965. Antelope management in New Mexico. Proc. Antelope States Workshop 1:65-70.

During the late 1800's antelope numbers were high and distribution was throughout New Mexico in all suitable habitat. Populations began to decline greatly in the early 1900's. In 1912, hunting antelope was prohibited, however, the decline continued until the early 1930's. In 1937, the Department began trapping and transplanting in an attempt to re-establish former ranges. Since the transplanting program's inception, over 4,500 animals have been re-established throughout the state. Legal hunting was resumed in 1932. A large portion of the state is not hunted today. These areas are comprised primarily of private land where the landowner does not allow hunting. Statewide hunter success is around 60% to 70%. Currently research is being conducted on factors limiting antelope production.

**South Dakota Department Game, Fish and Parks.** 1951. Phantoms of the grassland and sagebrush — trapped and transplanted. South Dakota Conser. Digest 18(1):2-5.

A short article describing in detail the techniques of trapping and transplanting antelope in South Dakota. Eighty-three antelope were trapped in one single venture. These animals were transplanted to habitat which historically had maintained herds. A map is provided describing in detail a plan for an antelope trap.

..... 1965. Antelope management in South Dakota. Proc. Antelope States Workshop 1:22-31.

Prior to 1800, it was estimated over 700,000 antelope ranged the prairies of S. D. By 1924 only 680 animals remained. Hunting, disease, and hard winters were believed causes for this decline. It was not until 1937 that better law enforcement and perhaps predator control resulted in the first appreciable increase in numbers. By 1941, a census disclosed approximately 11,000 animals. Present state-wide population is estimated at 29,000. Details are provided on buck:doe and doe:fawn census techniques. State-wide doe:kid ratio is 100:105 for June-July. About three antelope per section is the average density landowners will tolerate for antelope numbers. A harvest of 25% is desired and still herd stabilization is maintained. This 25% includes crippling and winter losses. Some movement of animals exists between Wyoming, Montana, and South Dakota.

**Spencer, C. C.** 1941. Antelope with locked horns. J. Mammalogy 23(1):92.

Antelope with locked horns resulting in death are seldom located in the wild. During the summer of 1940, a stockman found two bucks with their heads firmly locked and both animals were dead. One buck had a freak horn which in all probability enhanced the accident. Evidence disclosed that both animals had struggled over quite an area before death.

**Sperry, C. C.** 1941. Food habits of the coyote. U. S. Fish and Wildlife Service, Wildl. Research Bull. 4. 69 p.



Coyote stomachs were collected in 17 western states in all months of the year over a 5-year period (1931-35), and the contents of 8,339 that contained food were analyzed in the laboratory. Antelope remains amounted to less than a fraction of one percent. References were made to other authors who cited cases of coyote hunting or eating antelope.

**Spillett, J. J.** 1964. A synopsis of the literature and miscellaneous observations on the pronghorn antelope (*Antilocapra americana*). Utah Coop. Wildl. Research Unit, Logan, Utah. Special Report no. 13. 38 p.

The first three pages are devoted to a synopsis of published reports on the antelope's biology, historical background, and present day management. The next 27 pages are devoted to observations of antelope made by Spillett on group activity, fawning, communications, feeding habits, predation, mortality, physiological and notations. The last seven pages contain 110 literature citations.

..... 1965. The effects of livestock fences on pronghorn antelope movements. M. S. thesis, Utah State Univ., Logan, Utah. 138 p.

A cooperative study on the effects of various livestock fences affecting pronghorn movements was conducted in Wyoming in 1963 and 1964. The objectives were (1) to evaluate the capability or willingness of antelope to cross different types of livestock fences, (2) to determine the type or types of fences which will permit movements or migration of antelope and yet satisfactorily hold sheep, and (3) to evaluate the learning ability of antelope to jump or cross different types of livestock fences. Results of the study indicate antelope will jump fences under certain condition. Recommended specifications are made for different livestock fences that may be best for antelope movements, however, these have not as yet been fully tested under range conditions.

**Springer, L. M.** 1950. Aerial census of interstate antelope herds of California, Idaho, Nevada and Oregon. J. Wildl. Managt. 14(3):295-298.

The first interstate antelope census for Oregon, California, Nevada, and Idaho was conducted in 1949. A total of 137-¾ hours or 12,350 miles were flown and 13,879 animals were observed. It was believed that about 5,000 of these animals migrated back and forth across state lines. An analysis of the census disclosed that not as many animals were located on certain winter ranges as believed.

**Stanton, Frank W.** 1962. Relationship of sagebrush spraying to antelope welfare. Inter. Antelope Confer. Trans. 13:71-81.

Frank Stanton presented BLM's program of spraying sagebrush to increase grasslands. Stanton analyzed this range improvement from both the beneficial and/or detrimental standpoints to antelope. A list of five recommendations to be followed prior and during spraying wildlife habitat is provided.

**Starr, F. R.** 1934. Antelope doe covers fawns to conceal them. Calif. Fish and Game 20(3):291.

The author recorded an observation of an "old-time cattleman" reported to have seen two antelope kids under a low pile of sage and bitterbrush. The report states, "After ascertaining that this was no delusion on his part, he gently lifted the brush and found two very young antelope fawns under it that had presumably been cached there by the mother who had gone off to water."

**Stirton, R. A.** 1938. Notes on some late Tertiary and Pleistocene Antilocaprids. J. Mammalogy 19(3):366-370.

The author commented on the possible relationships and systematic status of *Capromeryx*, *Sphenophalos*, and *Proantilocapra*. *Texoceros* may have been a synonym of *Capromeryx* and likewise *Plioceros* to

*Sphenophalos*. Structurally *Proantilocapra* appeared nearer to the ancestral line of *Antilocapra* than any known genus.

**Stock, C. C.** 1930. Quaternary antelope remains from a second cave deposit in the Oregon Mountains, New Mexico. Los Angeles County Museum, Los Angeles, Calif. Paleo. Publ. no. 2, Science Series no. 2. 18 p.

A scientific description is recorded of a *Tetrameryx conkling* skull, giving measurements and descriptions. The skeletal characteristics point strongly to a presence of a family bond to the antilocaprid group.

..... 1932. A further study of the Quaternary antelopes of Shelter Cave, New Mexico. Los Angeles County Museum, Los Angeles, Calif. Paleo. Publ. no. 3, Science Series no. 3. 45 p.

The author described the skeletal characteristics and measurements of *Tetrameryx conkling*, and *Capromeryx* sp. located in New Mexico. He compared these with *Antilocapra americana*.

..... 1956. Rancho La Brea, a record of Pleistocene life in California. Los Angeles County Museum, Los Angeles, Calif. Science Series no. 20, Paleo. no. 11. 83 p.

This booklet contained a listing and narration of the many animals collected from the La Brea tar pits at Los Angeles, California. Page 46 described *Antilocapra americana* and a diminutive antelope *Breameryx minor* (Taylor). The book is illustrated with many drawings of specimens collected from the tar pits.

**Stoddart, L. A. and A. D. Smith.** 1955. Range management McGraw-Hill Book Co., Inc., N. Y. 433 p.

*Foraging Habit of Pronghorn Antelope.* Since antelope were found on open plains and mesas, it was assumed they were grass-eating animals. "Investigations have shown this to be false, grass being of minor importance."

Table 33. Diet of the Pronghorn in Southern and Northern Parts of Its Range, Percent

Forage Class	Southern	Northern
Browse .....	30	74
Forb .....	67	22
Grass and miscellaneous .....	3	4

Most of the browse plants (*Artemisia*) were those low in palatability to livestock. Forbs were found to have been of greater importance than browse in the southern plains. Many of the species most heavily used were not important as livestock forage.

Page 192 provided a table showing forage-consumption equivalents of some important game animals and livestock based on relation of average herd-run at the end of the summer grazing season. Using 1.00 for antelope, following were the comparisons: domestic goat 0.93; domestic sheep 0.83; white-tailed deer 0.80; mountain goat 0.73; mule deer 0.61; bighorn 0.59; elk 0.20; moose 0.12; bison 0.10; and cattle 0.10.

**Stoddart, L. A. and D. I. Rasmussen.** 1945. Big game-range livestock competition on western ranges. North Amer. Wildl. Confer. Trans. 10:251-256.

"Although many factors are involved in determining the quantity of feed eaten by grazing animals, body weight is the most practical basis for comparison. Body surface (weight to 0.734 power) is much used by animal husbandmen for conversion, but it seems to have little to recommend it over body weight for estimating food consumption of grazing animals. Following are calculated average fall weights (herd run) of animals of various kinds on western ranges and their ratio to beef cattle on a weight basis and on a body surface ratio:"



Animal	Live weight pounds	Ratio based on live weight	Ratio based on body surface
Beef cattle .....	800	1.0	1.0
Domestic sheep .....	100	8.0	4.6
Elk .....	425	1.9	1.6
Mule deer .....	140	5.7	3.6
Antelope .....	85	9.4	5.2

**Stokes, J. D.** 1952. Antelope management in California. Proc. West. Assoc. State Game and Fish Comm. 32:99-101.

The author recorded information relative to: historical accounts of market hunting, herds and areas of population, air census methods, food habits, predation, special hunts, trapping, transplanting, competition from wild horses and burros. He concluded that California's antelope herd of 4,000 could be maintained without undue conflict with agriculture.

**Sunderstrom, C.** 1966. Fence designs for livestock and big game. Intermountain Forest and Range Exp. Sta. Range Improvement Notes 11(2):3-11.

Sunderstrom's article referred to range fences designed to control livestock and not interfere with wildlife movements. Each of the following big game was discussed regarding fence construction design and specifications: antelope, deer, elk, moose, and bear. The author stated pronghorns generally go under or through fences however, they would under some conditions, jump over fences to a maximum height of 32 inches. Standard cattleguards can permit movement of adult and yearling antelope. Cattleguards placed at corner locations were more readily found and used. A diagrammatic example of an "antelope crossing cattleguard" was drawn on pages 8 and 9.

**Taylor, W. P.** 1936. The pronghorned antelope in the southwest. North Amer. Wildl. Confer. Trans. 1:652-655.

Antelope populations can be maintained in the southwest under prevailing conditions. In many cases the livestockman is the key to the situation as it is possible to maintain antelope and cattle on the same range. In some instances winter range for antelope is critical. There is a need for setting aside the proposed Cabeza Prieta Wildlife Refuge in southwest Arizona to conserve the Gaillard bighorn and antelope.

**Terwilliger, C.** 1946. Food habits of antelope. Colo. State Univ., Fort Collins, Colo. Game Managt. Problem. 15 p.

The data on antelope feeding habits was the same information reported by Brown (1946). For South Dakota, the author compiled an analysis of 60 samples collected in Harding and Butte counties north of the Black Hills. The year-long average browse, weed, grass ratio of these samples was 66, 23, and 11. Data from both the Colorado and South Dakota studies were quite similar. Farm crop vegetation showed up in the fall samples.

..... 1953. Antelope: a range asset. Colorado Cons. 2(5):24-25.

The author conducted a study of antelope food habits on ranges in Colorado. A major conclusion was that pronghorns were an asset on cattle ranges because antelope largely utilized weeds which were direct competitors of grass for available moisture.

**Thompson, K.** 1947. Air-herding the pronghorn. Amer. Forests 53(8):348-9, 380-1.

A popular article on the first trapping and transplanting of antelope in Montana. Some detail on methodology was provided. The largest

herd captured consisted of 203 animals. Some 1,000 pronghorns were re-established through trapping and transplanting to former inhabited ranges.

**Thompson, W. K.** 1949. Predation on antelope. *J. Wildl. Managt.* 13(3):313-314.

Several observations of predacious activities by golden eagles and coyotes on antelope were cited. Flying eagles preyed on both adult and young antelope by attacking the backs and riding with out-stretched wings until the antelope collapsed. Coyotes were observed to grasp antelope by the throat or hind quarters. Sometimes two coyotes would attack an antelope simultaneously.

**Throckmorton, M.** 1945. The pronghorn. *Texas, Game and Fish* 4(1):14, 23-24.

The author commented on the distinctive characteristics of the pronghorn, especially its horns, for which maximum measurements are listed. Additional notes were provided on: gait, speed, reproduction, young, social habits, and food. Competition with livestock and restoration was also discussed. A total of about 9,000 pronghorns were reported in Texas.

**Tileston, J. V. and L. E. Yeager.** 1962. A resume of Colorado big game research projects 1939-1957. *Colo. Depart. Game and Fish, Denver. Tech. Bull. no. 9.* 81 p.

Pages 5 to 25 are devoted to the antelope with chapters on: range; physical characteristics; reproduction; foods; census and restoration; mortality; predation and parasitism; summary; and bibliography. Antelope surveys were commenced in 1939. Although over 37,960 square miles of habitat existed, only 1/6 was actually occupied. The average antelope density per square mile was 0.62. An analysis of 262 antelope stomachs revealed a high preference for forbs (20%), and browse (47%). Grasses (7%), winter wheat (19%), and cactus (7%) were used in relatively small percentages.

**Till, C. E.** 1956. Antelope management in Colorado: history and techniques. *Proc. West. Asso. State Game and Fish Comm.* 36:153-160.

Data is provided on the history of antelope in Colorado, census methods, and hunting seasons. Also detailed tabular information pertaining to census trends and hunting kills is provided. For the state as a whole, some antelope herds have been deliberately reduced, others allowed to increase, and boundaries of open areas shifted from time to time as occasion demanded.

**Torquemada, J. de.** 1723. *Monarquia indiana.* 2nd edition (facsimili) 1(5):611-612.

Historians credit Torquemada as the author of the first record of pronghorn antelope having been seen by Europeans. This report, written in old Spanish, was in reference to a hunt of 1540 in the extreme southwestern part of the State of Hidalgo, Mexico. "The hunt took the form of a great drive of game by the Indians, during which the author states, 600 deer were killed, among which were large stags 'and those which they call verrendos.' He states that the verrendos did not occur in Spain, and that 'they not only ran but flew,' thus indicating that the remarkable speed of these animals attracted the attention of the first European observers." The name "verrendos" is still used in Mexico to denote antelope.

**Trueblood, M S. and G. Post.** 1959. Vibrosis as a factor in the reproduction of antelope (*Antilocapra americana*). *J. Ameri. Veter. Medical Assn.* 134 (12):562-564.



A low conception rate was not a factor in the low kid production in a herd of Wyoming pronghorns. Vibriosis was incriminated as a possible cause of the low production. Organisms isolated from a female antelope fulfilled all available laboratory and clinical diagnostic tests for *Vibrio* fetus.

**Tryon, C. A., Jr., and P. D. Buck.** 1950. Montana records of antelope embryos and reproductive tracts. *J. Mammalogy* 31(2):192-193.

During the winter of 1946-47, six female antelope reproductive tracts were examined. Twin embryos were present in all cases and the members of each set of twins were of the same sex. The sex ratio 50:50. Weights and various measurements were recorded. Notes were made on the reproductive anatomy which was similar to that of other Ruminata.

**Udy, J. R.** 1953. Effects of predator control on antelope populations. Utah Depart. Fish and Game, Salt Lake City, Utah. Pub. 5. 48 p.

Udy reported on a special study of coyote-antelope relationships in Utah. Areas of extensive coyote control were compared to areas with no control. Following severe over-grazing of desert areas, little increase in remnant herds was noted. A small group of does produced a 170% fawn crop. Coyotes appeared to retard increase in small herds, however, this was less pronounced in larger herds. The severe winter of 1948-49 reduced some herds as much as 60%. Basically, the key to the antelope situation in Utah lies with good land management practices.

✓ **U.S. Bureau of Land Management.** 1965. Position statement on woven wire fencing on the public lands in Wyoming. Bureau Land Mangt., Cheyenne, Wyo. 23 p.

In response to inquiries of antelope-woven wire fence relationships, the BLM made this report. There was a lack of documentary evidence to substantiate the claims that woven wire fencing was seriously detrimental to antelope. Intensive research investigations were conducted in 1963-64 and it was noted that woven wire fences with the following devices provided the best possibilities for antelope movement and sheep control: (1) 32" net, (2) 26" net and one bard 4" above, (3) and standard cattleguards. Devices that indicated good possibilities for antelope movement, but needed further refinement for sheep management, were: (1) dirt ramps, (2) electric fences, and (3) horizontal panels. Standard cattleguards permitted movement of adult and yearling antelope when placed where they were readily located. The study indicated adult antelope possessed an inherent learning ability to cross fences.

**U. S. Bureau Sport Fisheries and Wildlife.** 1937-1966 big game inventories. Washington, D. C.

In 1937, the Fish and Wildlife Service commenced publishing annual inventories of big game in the U. S. Antelope was one of the species included. A tabulation of these reports is as follows:

Year of Census	Date Published	Leaflet Number	Total Number Antelope
1937	Jan. 1939	BS-122	131,555
1938	Aug. 1939	BS-142	186,114
1939	Nov. 1940	BS-175	164,943
1940	Jan. 1942	207	176,613
1941	1944	Res. Report 8	199,385
1942	Not published report		
1943	Feb. 1946	283	246,090
1944	Not published-war years		
1945	Not published-war years		
1946	March 1948	303	233,900

1947	May 1949	321	181,200
1948	March 1950	321	187,900
1949	Oct. 1951	321	207,960
1950	Oct. 1952	342	225,761
1951	Oct. 1952	342	235,973
1952	Aug. 1953	348	248,136
1953	Sept. 1954	364	273,196
1954	March 1956	376	262,262
1955	June 1957	387	284,645
1956	March 1958	397	(Not complete data) *
1957	Sept. 1958	399	(Not complete data) *
1958	Sept. 1959	411	(Not complete data) *
1959	Sept. 1960	425	(Not complete data) *
1960	Sept. 1961	440	(Not complete data) *
1961	Sept. 1962	446	(Not complete data) *
1962	Sept. 1963	454	(Not complete data) *
1963	Aug. 1964	461	(Not complete data) *
1964	Aug. 1965	470	(Not complete data) *
1965	Aug. 1966	473	(Not complete data) *

\*State Fish and Game Departments reported harvest figures, but some did not provide estimated big game populations.

**U. S. Fish and Wildlife Service.** 1962. The pronghorn antelope. Wash., D. C. Conser. Note 11. 6 p.

Published in pamphlet form, this short story tells the past history and the biology of the pronghorn. It is one of the F&W Service's educational media for American wildlife. Page one refers to Nelson's (1922-24) historical census and states that possibly the antelope population in the U. S. was actually closer to 15,000 rather than the 26,000 figure stated. The F&WS created in the 1930's a National Game Range and two National Refuges primarily for the restoration of pronghorns. These areas total over 800,000 acres in Nevada and Oregon.

**U. S. National Park Service.** 1964. 1964-65 pronghorn (antelope) and habitat management plan for Yellowstone National Park. Yellowstone National Park, Wyo. 4 p.

The primary objective of this management plan was to attain a balanced relationship between plants and animals so that park visitors can enjoy healthy animals in an appealing natural environment. The program was two-fold: (1) range restoration through proper animal control, range condition studies and animal food habit studies; and (2) pronghorn management calls for the removal of 150 to 200 animals from the critical winter range. Discussed deer-elk-pronghorn competition for sagebrush on winter ranges where the browse was decreasing due to heavy antelope use.

**Uzzell, P. B.** 1953. Return of the antelope. Texas Game and Fish 11(10):4-6.

Managed antelope hunts were based upon inventories which aided in determining whether herds were maintained or increased in numbers. Hunting was by permit only and the hunter was required to contact the landowner or the landowner's representative and make any required payment, not to exceed \$40.00, prior to hunting. There were far more applications submitted than permits authorized for issuance. Hunting was closely supervised and appeared to have been a factor responsible for antelope populations being maintained in a favorable condition compared to uncontrolled hunting of 30 years ago.

**Van Wormer, J.** 1963. Wild bravery. Big Haul. 12(2):2-3.

The author provided a series of pictures and a short narration on antelope-coyote relations. The major problem was the vulnerability of



antelope kids to preying coyotes. Several photographs depict an adult antelope chasing an adult coyote.

- Villa, B.** 1951. Jabalies y berrendos. Dir. Gen. Forestal y de Caza, Depart. Caza, Bol. 2. 30 p.

This booklet, written in Spanish, referred to both the javelina and antelope in Mexico. For the antelope, a map of past and present distribution was provided. Distribution is now smaller than during pre-Columbian days. It is estimated that some 2,500 antelope inhabit Mexico now, however, they are in a continual decline. In 1922, legislation was passed prohibiting hunting, but some hunting continues. Several pages are devoted to physical characteristics, taxonomy, habitat, and food habits.

..... 1959. Estado que guarda actualmente la poblacion de borregos silvestres en el Territorio de Mexico. Convencion Nacional Forestal p. 422-434.

Antelope were once as numerous as cattle in northern Mexico. Since the early 1900's, pronghorns have declined and the situation continues. The theory of protection did not accomplish positive results and the population has continued toward extinction. The biological reasons for this decline were not well known, but it was known that poaching and competition for food with domestic animals were factors playing a role of major importance.

- Walker, E. P.** 1964. Mammals of the world. John Hopkins Univ. Press, Baltimore, Maryland 2:1411.

One page (1411) gives a good, complete and concise report on the life history, characteristics, and habits of antelope. Regarding the many various reports on the speed of the pronghorn, Walker states, "*Antilocapra* is the swiftest mammal in the New World, able to run as fast as 39 miles per hour, not 57 miles per hour as commonly reported, on hard ground with four to seven yard leaps." He also states the daily feeding range may be as much as three square miles with occasional side trips to obtain water. If water is available they will drink freely, but if necessary they can derive sufficient moisture from plants.

- Wallace, H. S.** 1940. Preliminary antelope survey. Colo. Game and Fish Comm. P-R Project Colo. 4-R. 33 p.

The method of this study was to interview persons familiar with antelope and their ranges and to inspect the various ranges, noting range conditions, abundance of rodents and predators, public opinion concerning antelope, etc. Antelope were found in four distinct plant growth regions, all of which generally received less than 10 inches of precipitation per year. Pronghorn density was about 0.62 per square mile. There were approximately 37,960 square miles of range land suitable for antelope, of which only about one-sixth was populated with Antilocapraeae.

- Wenzel, L. E.** 1955. The anatomy of the pronghorn antelope [*Antilocapra americana americana* (Ord)] 1815, with special reference to the digestive systems. M. S. thesis, Univ. Wyo., Laramie. 102 p.

The objective of this study was to supplement the meager literature available concerning the internal anatomy of the pronghorn antelope. Five antelope collected in Wyoming were dissected and described in detail as follows: the cephalic region; the cervical region; the thoracic region; the abdominal; and the sacral region. Many line drawings and photos were included for illustration purposes.

- Weswig, P. H.** 1956. Vitamin A storage. Oregon State Game Bull. 11(12):7.

The average vitamin A potency of antelope liver during the winter months of December to March was 1024 International Units per gram fresh liver. During late spring and early summer the vitamin A potency

dropped about 20%. In September the average of 25 antelope livers was over 2200 I. U. per gram. By studying the liver, it can be concluded that antelope browse must contain considerable quantities of carotene. The possibility of vitamin A deficiency in antelope causing the herd to remain static in population appeared remote.

**Whitaker, B.** 1966. "Planted" pronghorns again roam "Strip". *Our Public Lands* 15(4):15-16.

Record books state the world's largest antelope buck fell before a hunter's rifle in 1878 in northwestern Arizona. Since then the antelope has become extinct in this area and did not become re-established through natural movement. In 1961, 34 animals were stocked through State and Federal agency cooperation, however, the plant was not successful. Within the past year 54 more antelope were introduced (8B:46D). The animals came from Montana. The Arizona Fish and Game has plans to obtain 45 more antelope from Montana for release on "the Arizona Strip".

**Wilcox, T.** 1963. Prairie dog race. *Outdoor Life* 131(1):40-43, 102.

The Colorado Fish and Game successfully live-trapped antelope over a period of 20 years. During this time, more than 1,000 animals were transplanted. Many pictures were included showing the trap and methods of capturing the animals. Credit was given the transplant program for increasing in part the herd from 1,000 animals in 1918 to over 15,000 in 1962. Each year annual hunts were held and in 1962, 2,138 permit holders obtained 1,905 antelope.

**Wright, P. L. and S. A. Dow, Jr.** 1962. Minimum breeding age in pronghorn antelope. *J. Wildl. Managt.* 26(1):100-101.

From penned known aged antelope it was established that: (1) yearling male antelope were capable of impregnating females; and (2) that a female fawn was bred and gave birth to twins.

**Wyoming Game and Fish Commission.** 1966. The pronghorn antelope in Wyoming. *Wyoming Wildlife* 30(6):11-30.

The Wyoming Fish and Game Commission presented in the June 1966 issue of *Wyoming Wildlife* this comprehensive look at the state's most widely known animal. Articles were provided on matters such as a historical review, management practices and problems, and research findings. "The ultimate fate of Wyoming's future antelope populations will be determined by how effectively we, as managers of a living resource, can minimize the destruction, alteration, and outright loss of the relatively small amount of remaining suitable antelope habitat."

✓ **Yeaman, F. A.** 1965. (No title.) *Proc. Antelope States Workshop* 1:13-21.

Wyoming first closed hunting of antelope in 1908. Pronghorns were first censused in 1918 with an estimated total of 8,387 animals. By 1923 there were around 13,895. In 1960, it was estimated there were 175,000 and 31,674 were harvested. A definite decrease in Wyoming's total antelope population has been evident since 1961. The severe winter storm of 1949 practically eliminated antelope in southwestern Wyoming and many of these herds have not since recovered in numbers. Provided is the following list of recommendations for fences: 1. A four strand barb wire fence with the bottom wire not less than 16" above the ground and the top not more than 40". 2. A 32" net only fence. 3. A 26" net 2" off the ground with one barb wire 4" above. 4. The installation of standard size cattleguards in the greatest numbers possible. 5. The construction of dirt ramps or jumping devices in corners of fences. Water developments need greater emphasis. Guzzlers are currently being installed and appear beneficial.



**Yoakum, J.** 1957. Factors affecting mortality of pronghorn antelope in Oregon. M. S. thesis, Ore. State College, Corvallis, Ore. 112 p.

Listed are all the known mortality factors affecting pronghorns in Oregon. Included were findings on: Pre-natal and Parturition Deaths; Old Age; Disease; Parasites; Weather Conditions; Natural Accidents; Man-Influenced Accidents; Predation; Human Kills; and Range Management. The author stated that no single factor appeared to have been a limiting factor and that possibly the ranges were stocked to current carrying capacity.

..... 1958. Seasonal food habits of the Oregon pronghorn antelope (*Antilocapra americana oregona* Bailey). Inter. Antelope Confer. Trans. 9:47-59.

Data pertaining to 189 antelope rumen samples collected from 1939 to 1956 was analyzed as to seasonal forage utilization. The average volume percent of plants consumed was browse 69%, forbs 21%, grass 7%, and the remaining 3% trace species. At least 82 plant genera and 46 species were recorded. Cultivated crop species were found in samples only in trace amounts.

..... 1962. The Interstate Antelope Range, its research and management needs. Inter. Antelope Confer. Trans. 13:52-58.

A review of past and present numbers of antelope in the Interstate Antelope area (Oregon, California, Nevada and Idaho) was presented. Also discussed were findings from past research on antelope and ranges inhabited. Static antelope population problems appeared to have been due to range carrying capacities. Range manipulation projects could possibly contribute to increased antelope numbers.

**Young, S. P.** 1946. Sketches of American wildlife. The Monumental Press, Baltimore, Maryland. 143 p.

Chapter IV was entitled "The Comeback of the Antelope". It discussed the original antelope population, reasons for decline, and recent increases. About half the chapter was devoted to a discussion of the Hart Mountain Antelope Refuge in Oregon and the Charles Sheldon Antelope Refuge and Range in Nevada.

**Young, S. P. and E. A. Goldman.** 1944. The wolves of North America. Amer. Wildl. Inst., Wash., D. C. 636 p.

Antelope during pristine times were preyed upon by wolves almost to the same extent as were buffalo. Wolf teamwork as a means of obtaining a meal was observed by the writer when he witnessed an attempted wolf attack on antelope in southwest Colorado.

..... 1946. The puma, mysterious American cat. Amer. Wildl. Inst., Wash., D. C. 358 p.

In only one place do the authors refer to antelope in this extensive monograph on the North American cougar. This was page 127 where antelope was listed once (July) in the contents of field examined puma stomachs between 1918-1922.

**Young, S. P. and H. H. T. Jackson.** 1951. The clever coyote. Amer. Wildl. Managt. Inst., Wash., D. C. 411 p.

On page 55, the authors described how a pair of coyotes worked as a team to catch and kill a female antelope on the Charles Sheldon Refuge in northwestern Nevada. Another example of a coyote chasing an antelope fawn was described in detail on page 96. The author stated antelope were a favorite prey of coyotes. Pages 146 to 148 gave several more individual accounts of coyote-antelope prey relationships.

ZoBell, R. S. 1963. Background of the Wyoming antelope fencing study. *Inter. Antelope Confer. Trans.* 14:61-66.

During the past few years there has arisen in Wyoming a controversy over the effects of livestock fences relative to antelope welfare. Many miles of woven wire fences have been constructed on the range to manage domestic sheep. Recent reports indicate that these woven wire fences affect antelope, however, little factual data is provided. Therefore, a cooperative study of State, Federal, and private interests is being implemented to study this problem in detail. A number of experiments will be conducted under various methods to obtain data on fences that can be constructed to control livestock, but will not be adverse to wildlife populations.



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 Interstate Antelope Conference  
 1962  
 Jewett 1946  
 Langdon 1964  
 McAtee 1939  
 Milek 1966  
 Ogilvie 1953  
 Popowski 1959  
 Rand 1945  
 Rouse 1954  
 Rouse 1962  
 Russell 1951  
 Sill 1964  
 Spillet 1965  
 Sunderstrom 1966  
 U. S. Bureau of Land  
 Management 1965

- Yeaman 1965  
Zobell 1963
- Fetuses  
Buck 1947  
Hepworth 1965  
Larsen 1964a  
Mitchell 1965  
Tyron and Buck 1950
- Fires  
Allen 1842  
Long 1965  
Rand 1945  
Roosevelt, Van Dyke, Elliott, and Stone 1908
- Florida  
Elliott 1966
- Food and Feeding Habits  
Ackerly and Regier 1956  
Bailey 1936  
Baker 1953a  
Beale 1963  
Bear 1965  
Bever 1951  
Bridge 1942  
Buck 1947  
Buechner 1950a  
Buechner 1950c  
Buechner 1950d  
Cole 1956  
Cole 1957  
Cole and Wilkins 1958  
Deming 1963  
Dirschl 1960  
Dirschl 1963  
Doell and Smith 1965  
Douglas 1953  
Ferrel and Leach 1950  
Ferrel and Leach 1952  
Fichter and Nelson 1962  
Gregg 1955  
Griffith, G. 1962  
Gullion 1964  
Hepworth 1965  
Hepworth, W. 1965  
Hjersman and Yoakum 1959  
Hoover, Till, and Ogilvie 1959  
Knipe 1944  
Mace 1949  
Martinka 1966c  
Mason 1952a  
Mason 1952b  
Nichol 1942  
Ogilvie 1955  
Roosevelt, Van Dyke, Elliott, and Stone 1908  
Rouse 1941  
Russell 1964
- Sampson 1952  
Sather and Schildman 1955  
Scarvie and Arney 1957  
Seton 1929  
Skinner 1922  
Smith, Beale, and Doell 1965  
Spillett 1964  
Stoddart and Smith 1955  
Stokes 1952  
Terwilliger 1946  
Terwilliger 1953  
Throckmorton 1945  
Tileston and Yeager 1962  
U. S. National Park Service 1964  
Villa 1951  
Yoakum 1958
- Forage production  
Fichter and Nelson 1964  
Folker 1956  
Gabrielson 1935  
Hailey, De Arment, and Evans 1965  
Rouse 1959  
Scarvie and Arney 1957
- Gestation period  
Hepworth 1965  
Larsen 1964a
- Glands  
Caton 1877  
Seton 1929
- Habitat  
Alvarez 1963  
Bailey 1936  
Bear 1965  
Beer 1944  
Benson 1956  
Buechner 1950d  
California Department Fish and Game 1966  
Caton 1877  
Einarsen 1938  
Ferrel and Leach 1952  
Foree 1959  
Griffith, G. 1962  
Guzman 1961  
Halloran 1956  
Hinman 1959  
Jones 1954  
Knipe 1944  
Langdon 1964  
Larsen 1964a  
Larsen 1964b  
Leopold 1959a  
Mace 1949  
Mason 1947  
Mc Lean 1944  
Nelson 1925



Oregon State Game Commission  
1961  
Popowski 1959  
Rand 1945  
Rouse 1959  
Rush 1944  
Russo 1965  
Seton 1929  
Skinner 1922  
S. Dakota Dept. Game, Fish and  
Parks 1951  
Stanton 1962  
Tileston and Yeager 1962  
U. S. National Park Service 1964  
Villa 1951  
Wallace 1940  
Wyoming Game and Fish  
Commission 1966

#### Hart Mountain National Antelope

Refuge  
Bailey 1932  
Du Mont 1951  
Gabrielson 1935  
Gabrielson 1943  
Hansen 1955  
Jewett 1939  
Mason 1952a  
Novak and Deming 1960  
Ruth 1937  
Young 1946

#### Harvests

Buechner 1947  
Buechner 1948  
Buechner 1960  
Griffith, G. 1962  
Hay, Hunter, and Robbins 1961  
Hoover, Till and Ogilvie 1959  
Knipe 1944  
Lang 1956a  
Lay 1946  
Martinka 1966b  
Mathisen 1960  
Nielson 1962  
Powell 1954  
Snyder 1965  
S. Dakota Dept. Game, Fish and  
Parks 1965  
Stokes 1952  
Till 1956  
Yeaman 1965

#### Hawaiian Islands

Craig 1963  
Nichols 1960

#### Helicopter

Buechner 1950b  
Fichter 1958  
Hazzard 1958

#### Herd composition

Ackerly and Regier 1956  
Bear 1965  
Brown 1954  
Buechner 1950b  
Chattin and Lassen 1950  
Doell and Smith 1965  
Fichter 1956  
Fichter 1958  
Griffith, G. 1962  
Hailey 1965  
Hansen 1955  
Hansen 1957  
Lang 1956b  
Martinka 1966b  
Nielson 1962  
Powell 1954  
Prenzlow 1965  
S. Dakota Dept. Game, Fish, and  
Parks 1965

#### Historical accounts

Allen 1942  
Baird 1857  
Bryant 1848  
Burcham 1957  
Cones 1893  
Einarsen 1948  
Leister 1932  
Leopold 1959b  
McKinley 1960  
McLean 1944  
Nelson 1912  
Newberry 1855  
Nielson 1962  
Popowski 1959  
Rand 1945  
Richardson 1829  
Roosevelt, Van Dyke, Elliott,  
and Stone 1908  
Seton 1929  
Spillett 1964  
Stokes 1952  
Till 1956  
Torquemada 1723  
U. S. Fish and Wildlife 1962  
Wyoming Game and Fish  
Commission 1966

#### Homesteaders (see Settlers)

#### Horn

Anonymous 1961  
Anonymous 1964  
Audubon and Bachman 1851  
Bailey 1920  
Boone and Crockett Club 1964  
Bridge 1942  
Buck 1947  
Caton 1877  
Fryxell 1924

Grinnell 1921  
Harlam 1825  
Hay 1914  
Hay 1927  
Lyon 1908  
Matthew 1904  
Mearns 1907  
Morrison 1961  
Noback 1932  
Norgren 1940  
Ord 1818  
Pocock 1905  
Runkles 1966  
Seton 1929  
Spencer 1941  
Throckmorton 1945

#### Hunter success

Bear 1965  
Hay, Hunter, and Robbins 1961  
Jackson 1944  
Lang 1956a  
McKenzie 1963  
Snyder 1965

#### Hunting

Anonymous 1943  
Anonymous 1950  
Arizona Game and Fish  
  Department 1956  
Baird 1852  
Baker 1954  
Baker 1956  
Baker 1958  
Bear 1965  
Brown 1954  
Buechner 1950a  
California Department Fish and  
  Game 1966  
Coleman 1947  
Davila 1960  
Dirschl 1960  
Dirschl 1963  
Doell and Smth 1965  
Dow 1952b  
Edson 1960  
Einarsen 1938  
Einarsen 1939  
Einarsen 1940  
Fichter 1957  
Forsyth 1942  
Gabrielson 1935  
Griffith, G. 1962  
Grinnell 1929  
Hailey, Thomas, and Robinson  
  1966  
Hay, Hunter, and Robbins 1961  
Horne 1925  
Hunt 1948  
Jones 1964

Knipe 1944  
Lang 1956a  
Lay 1946  
Longhurst 1957  
Mace 1949  
Martinka 1966b  
McKenzie 1963  
McLean 1944  
Mitchell 1965  
Mobley 1960  
Murray 1932  
Newberry 1855  
O'Connor and Goodwin 1961  
Popowski 1959  
  Roosevelt, Van Dyke, Elliott,  
  and Stone 1908  
Rush 1944  
Russo 1965  
Sather and Schildman 1955  
Scarvie and Arney 1957  
Snyder 1965  
S. Dakota Department Game,  
  Fish, and Parks 1965  
Stokes 1952  
Till 1956  
Torquemada 1723  
Uzzell 1953  
Villa 1951  
Wilcox 1963  
Yeaman 1965

#### Idaho

Dikmans 1933  
Edson 1960  
Fichter 1956  
Fichter 1957  
Fichter 1958  
Folker 1956  
Foree 1959  
Gazin 1935  
Lay 1946  
Merriam 1918  
Nielson 1962  
Shaw 1960  
Springer 1950  
Yoakum 1962

#### Illegal kills

Baker 1953b  
Baker 1954  
Jones 1949  
Lang 1956a  
Longhurst 1957  
Mobley 1960  
Rosko 1948  
Villa 1951  
Villa 1959  
Yoakum 1957

#### *Illingoceros alexandrae*

Merriam 1909



- Merriam 1911
- Illinois  
 Fryxell 1926  
 Hay 1927
- Indians  
 Bailey 1931  
 Baird 1852  
 Burcham 1957  
 Burroughs 1961  
 Einarsen 1938  
 Fryxell 1926  
 Grinnell 1929  
 Rhoads 1894  
 Richardson 1829
- Interstate Antelope Conference  
 1958-66  
 Einarsen 1947  
 Yoakum 1962
- Iowa  
 Hay 1914
- Kansas  
 Hall 1955  
 Hlabachik 1965
- La Brea Tar Pits  
 Stock 1956
- Law enforcement  
 Baker 1958  
 Horne 1925  
 Hunt 1948  
 Keiss and Morrison 1956  
 Knipe 1944  
 Leopold 1959b  
 Russell 1951  
 S. Dakota Dept. Game, Fish, and  
 Parks 1965  
 Villa 1959
- Lewis and Clark  
 Allen 1842  
 Burroughs 1961  
 Coues 1893  
 Ord 1815  
 Ord 1818
- Life history  
 Arizona Game and Fish Depart.  
 1956  
 Bailey 1936  
 Buechner 1950a  
 Buechner 1950c  
 Einarsen 1938  
 Einarsen 1948  
 Ferrel and Leach 1952  
 Halloran and Glass 1959
- Hay, Hunter and Robbins 1961  
 Hepworth 1965  
 Hoover, Till, and Ogilvie 1959  
 Knipe 1944  
 Leopold 1959b  
 Mace 1952  
 Mason 1947  
 McLean 1944  
 Meyers 1963  
 Mohr 1958  
 Newberry 1855  
 O'Connor and Goodwin 1961  
 Oregon State Game Commission  
 1961  
 Pearl 1963  
 Prenzlów 1965  
 Rhoads 1894  
 Richardson 1829  
 Roosevelt, Van Dyke, Elliott, and  
 Stone 1908  
 Rush 1944  
 Sather and Schildman 1955  
 Seton 1929  
 U. S. Fish and Wildlife 1962  
 Walker 1964
- Life zones  
 Bailey 1936  
 Grinnell 1933  
 Guzman 1961  
 Hall 1946
- Limiting factor  
 Buechner 1950a  
 Compton 1958  
 Dirschl 1960  
 Hinman 1959  
 Hinman 1961  
 Jewett 1939  
 Jones 1947  
 Mason 1947  
 Rosko 1948  
 Snyder 1965  
 Udy 1953  
 Yoakum 1957
- Livestock competition  
 Allred 1943  
 Anonymous 1937  
 Anonymous 1950  
 Baker 1958  
 Buechner 1947  
 Buechner 1948  
 Buechner 1950a  
 Buechner 1950c  
 Buechner 1960  
 Douglas 1953  
 Einarsen 1938  
 Ferrel and Leach 1950  
 Ferrel and Leach 1952

- Griffith, G. 1962  
 Hailey, Thomas, and Robinson 1966  
 Hepworth 1965  
 Hinman 1961  
 Hjersman and Yoakum 1959  
 Jones 1949  
 Lay 1946  
 Leopold 1959a  
 Ligon 1927  
 Mason 1952a  
 Rosko 1948  
 Sampson 1952  
 Stoddart and Rasmussen 1945  
 Stokes 1952  
 Taylor 1936  
 Throckmorton 1945
- Livestock (see Cattle and/or Sheep)  
 Allen 1962  
 Allred 1943  
 Baker 1953b  
 Buechner 1950c
- Longevity  
 Hepworth 1965
- Malnutrition (see Nutrition)
- Management  
 Arrington and Edwards 1951  
 Bear 1965  
 Brown 1954  
 Buechner 1950b  
 Buechner 1950c  
 Buechner 1960  
 California Department Fish and Game 1966  
 Cale 1956  
 Doell and Smith 1965  
 Dow 1952a  
 Einarsen 1938  
 Einarsen 1947  
 Einarsen 1948  
 Fichter and Nelson 1964  
 Foree 1959  
 Foree 1960  
 Gilman 1960  
 Griffith, G. 1962  
 Hansen 1958  
 Hay, Hunter, and Robbins 1961  
 Hinman 1957  
 Hoover, Till and Ogilvie 1959  
 Jackson 1944  
 Jones 1949  
 Knipe 1944  
 Leopold 1948  
 Leopold 1959a  
 Leopold 1959b  
 Longhurst 1957  
 Luman 1960
- Mace 1949  
 Mace 1952  
 Mason 1947  
 Mathisen 1960  
 McAtee 1939  
 Meyers 1963  
 Nelson 1925  
 Novak and Deming 1960  
 O'Connor and Goodwin 1961  
 Oregon State Game Commission 1961  
 Pearl 1963  
 Russell 1951  
 Sather and Schildman 1955  
 Shaw 1960  
 Snyder 1965  
 S. Dakota Depart. Fish, Game, and Parks 1965  
 Spillett 1964  
 Stokes 1952  
 Till 1956  
 U. S. Fish and Wildlife 1962  
 U. S. National Park Service 1964  
 Wyoming Game and Fish Commission 1966  
 Yoakum 1962
- Marking (see Trapping)
- Measurements  
 Bailey 1932  
 Boone and Crockett Club 1964  
 Buck 1947  
 Harlan 1825  
 Mason 1952b  
 Ord 1818  
 Tryon and Buck 1950
- Merycodus*  
 Hesse 1935  
 Matthew 1904  
 Matthew 1934  
 Merriam 1909  
 Merriam 1911
- Merycodus nevadensis*  
 Merriam 1911
- Mexico  
 Alvarez 1963  
 Baker 1956  
 Baker 1958  
 Burt 1938  
 Dalquest 1953  
 Davila 1960  
 Goldman 1945  
 Guzman 1961  
 Halloran 1957  
 Leopold 1959b  
 Lumbholtz 1912  
 Mearns 1907



- Merriam 1901  
 Nelson 1912  
 Nelson 1925  
 Torquemada 1723  
 Villa 1951  
 Villa 1959
- Migration and/or Movements
- Ackerly and Regier 1956  
 Baker 1953a  
 Crump 1961  
 Doell and Smith 1965  
 Einarsen 1947  
 Ferrel and Leach 1952  
 Griffith 1962  
 Hepworth 1965  
 McLean 1944  
 Prenzlów 1965  
 Rouse 1954  
 Rouse 1962  
 Seton 1929  
 Skinner 1922  
 Spillett 1965  
 Springer 1950  
 U. S. Bureau of Land  
 Management 1965
- Mining
- Baker 1956
- Minnesota
- Fashingbauer 1965  
 Grinnell 1929  
 Johnson 1930
- Missouri
- Easterla 1965  
 McKinley 1960
- Montana
- Allen 1875  
 Beer 1944  
 Brown 1954  
 Buck 1947  
 Cole 1956  
 Cole 1957  
 Cole and Wilkins 1958  
 Couey 1946  
 Craig 1963  
 Dow and Wright 1962  
 Gabrielson 1943  
 Martinka 1966a  
 Martinka 1966b  
 Martinka 1966c  
 Nichols 1960  
 Rouse 1954  
 Rouse 1962  
 Rush 1927  
 S. Dakota Depart. Game, Fish,  
 and Parks 1965
- Tryon & Buck 1950  
 Whitaker 1966
- Mortality
- Anonymous 1961  
 Baker 1953b  
 Baker 1954  
 Chattin and Lassen 1950  
 Doell and Smith 1965  
 Dow 1952a  
 Fichter 1958  
 Folker 1956  
 Foree 1959  
 Hailey 1965  
 Hailey, De Arment, and Evans  
 1964  
 Halloran 1956  
 Halloran and Glass 1959  
 Hansen 1955  
 Heller 1930  
 Hinman 1959  
 Hjersman and Yoakum 1959  
 Johnson 1931  
 Larsen 1964a  
 Larsen 1964b  
 Martinka 1966a  
 Martinka 1966c  
 Mathisen 1962  
 Mitchell 1965  
 Prenzlów 1965  
 Spencer 1941  
 Spillett 1964  
 Tileston and Yeager 1962  
 Yoakum 1957
- Movements (see Migration)
- Nebraska
- Barbour and Schultz 1934  
 Mathisen 1960  
 Mathisen 1962  
 Sather and Schildman 1955
- Neotragocerus lindgreni*
- Merriam 1918
- Neotragocerus improvisus*
- Merriam 1918
- Nevada
- Bryant 1848  
 Coleman 1947  
 Du Mont 1951  
 Foree 1959  
 Foree 1960  
 Furlong 1942  
 Gabrielson 1943  
 Gullion 1964  
 Hall 1946  
 Hall 1965  
 Leopold 1959a

- Mason 1952a  
 Merriam 1909  
 Merriam 1911  
 Springer 1950  
 U.S. Fish and Wildlife 1962  
 Yoakum 1962  
 Young 1946
- New Mexico  
 Bailey 1931  
 Barker 1948  
 Buechner 1950d  
 Carr 1927  
 Fisher 1942  
 Gilmore and Allen 1960  
 Halloran and Glass 1959  
 Howard 1966  
 Larsen 1964a  
 Larsen 1964b  
 Lay 1946  
 Ligon 1927  
 Mearns 1907  
 Russell 1937  
 Russell 1951  
 Russell 1964  
 Snyder 1965  
 Stock 1932
- North Dakota  
 Bailey 1926  
 Goldsby and Eveleth 1954  
 McKenzie 1963  
 Richards 1964
- Nutrition  
 Anonymous 1937  
 Baker 1954  
 Dirschl 1960  
 Dirschl 1963  
 Doell and Smith 1965  
 Edwards 1958b  
 Ferrel and Leach 1952  
 Foree 1959  
 Hailey, Thomas, and Robinson  
 1966  
 Jones 1949  
 Larsen 1964b  
 Ligon 1927  
 Long 1965  
 Martinka 1966a  
 Martinka 1966c  
 Russell 1951  
 Sampson 1952  
 Smith, Beale, and Doell 1965  
 Weswig 1956
- Oklahoma  
 Buechner 1950b  
 Buechner 1950d  
 Halloran 1956  
 Halloran and Glass 1959
- Hazzard 1958
- Ord, George  
 Burroughs 1961  
 Coues 1893  
 Ord 1815  
 Ord 1818  
 Rhoads 1894
- Oregon  
 Bailey 1932  
 Bailey 1936  
 Compton 1958  
 Einarsen 1938  
 Einarsen 1939  
 Foree 1959  
 Furlong 1932  
 Gabrielson 1935  
 Gabrielson 1943  
 Hall 1965  
 Hansen 1955  
 Jewett 1939  
 Lay 1946  
 Luman 1960  
 Mace 1949  
 Mace 1952  
 Mason 1947  
 Mason 1952a  
 Sheldon 1959  
 Springer 1950  
 U. S. Fish and Wildlife 1962  
 Yoakum 1957  
 Yoakum 1962
- Parasites  
 Allen 1962  
 Allen and Samson 1960  
 Allen and Samson 1961  
 Allen, Samson, and Schad 1959  
 Allen and Kyles 1953  
 Bever 1955  
 Chattin and Herman 1944  
 Dikmans 1933  
 Gilmore and Allen 1960  
 Goldsby and Eveleth 1954  
 Hailey, De Arment, and Evans 1964  
 Herman 1945  
 Honess and Winter 1956  
 Hoover, Till, and Ogilvie 1959  
 Huizinga 1942  
 Larsen 1964b  
 Lucker and Dikmans 1945  
 Price 1927  
 Russell 1964  
 Sayana 1952  
 Skinner 1922  
 Tileston and Yeager 1962  
 Yoakum 1957
- Parturition  
 Craig 1963  
 Edwards 1958b



- Howard 1966  
Larsen 1964b  
Wright and Dow 1962  
Yoakum 1957
- Plioceros*  
Stirton 1938
- Precipitation  
Buechner 1950a  
De Arment 1965  
Dirschl 1960  
Fichter 1962  
Fichter and Nelson 1962  
Ficheter and Nelson 1964  
Hailey 1965  
Hailey, Thomas, and Robinson 1966  
Halloran 1956  
Halloran and Glass 1959  
Hansen 1957  
Hinman 1959  
Larsen 1965  
Wallace 1940
- Precipitin test  
Keiss and Morrison 1956
- Population dynamics  
Buechner 1960  
Doell and Smith 1965  
Edson 1960  
Einarsen 1938  
Fichter and Nelson 1962  
Foree 1959  
Foree 1960  
Forsyth 1942  
Gilman 1960  
Griffith, G. 1962  
Grinnell 1929  
Hall 1946  
Hall 1955  
Jackson 1944  
Luman 1960  
Meyers 1963  
Nelson 1925  
Novak and Deming 1960  
Russell 1951  
U. S. Bureau of Sport Fisheries and  
Wildlife 1937-1966
- Predation  
Ackerly and Regier 1956  
Arnold 1954  
Arrington and Edwards 1951  
Baker 1954  
Buechner 1950a  
Buechner 1950d  
Compton 1958  
Davis and Putman 1951  
Doell and Smith 1965  
Edwards 1958b  
Fichter 1956
- Fichter 1958  
Folker 1956  
Foree 1959  
Gabrielson 1935  
Griffith, G. 1962  
Hailey, De Arment, and Evans 1964  
Halloran 1956  
Hinman 1959  
Hinman 1961  
Imler and Kalmbach 1955  
Jones 1949  
Knipe 1944  
Lehti 1947  
Leopold 1948  
Mace 1949  
Mason 1947  
Murie 1935  
Murie 1940  
O'Connor and Goodwin 1961  
Ogilvie 1955  
Popowski 1959  
Powell 1954  
Rosko 1948  
Seton 1929  
Skinner 1922  
S. Dakota Dept. Game, Fish, and  
Parks 1965  
Sperry 1941  
Spillett 1964  
Stokes 1952  
Thompson 1949  
Tileston and Yeager 1962  
Udy 1953  
Van Wormer 1963  
Wallace 1940  
Yoakum 1957  
Young and Goldman 1946  
Young and Jackson 1951
- Proantilocapra platycornea*  
Barbour and Schultz 1934  
Stirton 1938
- Productivity  
Arrington and Edwards 1951  
Brown 1954  
Chattin and Lassen 1950  
De Arment 1965  
Doell and Smith 1965  
Dow 1952a  
Edwards 1958a  
Edwards 1958b  
Fichter 1957  
Fichter 1962  
Fichter and Nelson 1962  
Fichter and Nelson 1964  
Folker 1956  
Hansen 1955  
Hansen 1957  
Heller 1930  
Hjersman and Yoakum 1959

- Jones 1949  
 Lang 1956b  
 Larsen 1964a  
 Larsen 1964b  
 Larsen 1965  
 Leopold 1948  
 Martinka 1966c  
 Mitchell 1965  
 Oregon State Game Commission  
 1961
- Puma**  
 Young and Goldman 1946
- Rabbitbrush**  
 Hepworth 1965  
 Hepworth, W. 1965
- Railroads**  
 Baird 1857  
 Benson 1956  
 Murray 1932  
 Newberry 1855
- Radio transmitters**  
 Griffith 1962
- Rainfall (see Precipitation)**
- Raising antelope**  
 Heller 1930  
 Murray 1932  
 Nichol 1942
- Range conditions**  
 Beale 1963  
 Buechner 1950c  
 Burcham 1957  
 California Department Fish and  
 Game 1966  
 Deming 1959  
 Dirschl 1963  
 Fichter and Nelson 1964  
 Foree 1959  
 Foree 1960  
 Gabrielson 1935  
 Gilman 1960  
 Griffith, G. 1962  
 Grimm 1939  
 Hailey 1965  
 Hailey, Thomas, and Robinson 1966  
 Hinman 1957  
 Hinman 1961  
 Hjersman and Yoakum 1959  
 Knipe 1944  
 Leopold 1948  
 Leopold 1959a  
 Ligon 1927  
 Luman 1960  
 Mitchell 1965  
 Murie 1940  
 Novak and Deming 1960
- Oregon State Game Commission  
 1961  
 Rouse 1959  
 Russell 1951  
 Scarvie and Arney 1957  
 Shaw 1960  
 Spillett 1965  
 U. S. National Park Service 1964  
 Wallace 1940  
 Yoakum 1957
- Range improvements**  
 Bever 1951  
 Deming 1963  
 Hepworth 1965  
 Langdon 1964  
 Leopold 1959a  
 Mace 1949  
 Stanton 1962  
 Yoakum 1962
- Rattlesnake**  
 Rush 1944
- Refuges**  
 Du Mont 1951  
 Gabrielson 1943  
 Halloran 1954  
 Halloran and Glass 1959  
 Knipe 1944  
 Leopold 1948  
 Nelson 1925  
 Novak and Deming 1960  
 Ruth 1937  
 Scarvie and Arney 1957  
 Taylor 1936  
 U.S. Fish and Wildlife 1962
- Reproduction (see Productivity)**
- Research**  
 Bear 1965  
 Griffith, G. 1962  
 Hoover, Till and Ogilvie 1959  
 Prenzlow 1965  
 Snyder 1965  
 Tileston and Yeager 1952  
 U. S. Bureau of Land  
 Management 1965  
 Wyoming Game and Fish  
 Commission 1966  
 Yoakum 1962
- Restoration**  
 Allred 1943  
 Anonymous 1937  
 Anonymous 1942  
 Anonymous 1950  
 Barker 1948  
 Bear 1965  
 Bever 1951  
 Buechner 1950d



- California Department Fish and Game 1966  
 Chattin and Lassen 1950  
 Dasmann 1952  
 De Arment 1965  
 Douglas 1953  
 Elliott, C. 1966  
 Elliott, R. 1948  
 Ferrel and Leach 1952  
 Fisher 1942  
 Forsyth 1942  
 Gabrielson 1943  
 Grinnell 1929  
 Hall 1955  
 Halloran 1954  
 Halloran 1956  
 Hlabachik 1965  
 Hoover, Till, and Ogilvie 1959  
 Jones 1954  
 Jones, J. 1964  
 Jones, P. 1941  
 Knipe 1944  
 Leopold 1948  
 Leopold 1959a  
 Mathisen 1960  
 Mathisen 1962  
 McKnight 1965  
 Nelson 1925  
 Nichol 1942  
 Nichols 1960  
 Nielson 1962  
 Ogilvie 1953  
 Popowski 1959  
 Russell 1937  
 Russell 1951  
 Russell 1964  
 Snyder 1965  
 S. Dakota Depart. Game, Fish, and Parks 1951  
 Stokes 1952  
 Thompson 1947  
 Throckmorton 1945  
 Tileston and Yeager 1962  
 U. S. Fish and Wildlife 1962  
 Whitaker 1966  
 Wilcox 1963  
 Young 1946
- Rumen analysis  
 Baker 1953b  
 Brown 1946  
 Buck 1947  
 Couey 1946  
 Dirschl 1962  
 Dirschl 1963  
 Ferrel and Leach 1950  
 Ferrel and Leach 1952  
 Fichter 1956  
 Fichter and Nelson 1962  
 Hepworth 1965  
 Martinka 1966c
- Mason 1952a  
 Mason 1952b  
 Powell 1954  
 Scarvie and Arney 1957  
 Tileston and Yeager 1962  
 Yoakum 1958
- Sagebrush  
 Beale 1963  
 Bever 1951  
 Buck 1947  
 Deming 1963  
 Dirschl 1960  
 Ferrel and Leach 1950  
 Ferrel and Leach 1952  
 Grimm 1939  
 Hall 1963  
 Hall 1965  
 Hepworth 1965  
 Langdon 1964  
 Martinka 1966a  
 Martinka 1966c  
 Murie 1940  
 Smith, Beales, and Doell 1965  
 S. Dakota Depart. Game, Fish, and Parks 1951  
 Stanton 1962  
 Stoddart and Smith 1955  
 U.S. National Park Service 1964
- Sagebrush defoliator  
 Hall 1963  
 Hall 1965
- Salt  
 Audubon and Bachman 1851  
 Bailey 1931  
 Knipe 1944  
 Nichol 1942  
 Skinner 1922
- Saskatchewan  
 Benson 1956  
 Chapman 1946  
 Dirschl 1960  
 Dirschl 1963  
 Forsyth 1942  
 Kolenosky and Miller 1962  
 Martinka 1966a
- Settlers  
 Bailey 1926  
 Beer 1944  
 Benson 1956  
 Forsyth 1942  
 Horne 1925  
 Leopold 1959a  
 Ligon 1927
- Sex ratios (see Herd composition)
- Sheep, bighorn  
 Grimm 1939

- Merriam 1901  
 Murie 1940  
 Stoddard and Smith 1955  
 Taylor 1936
- Sheep, domestic  
 Allen and Samson 1960  
 Allen and Samson 1961  
 Allen, Samson, and Schad 1959  
 Allen and Kyles 1953  
 Bever 1955  
 Buechner 1947  
 Buechner 1950a  
 Buechner 1950c  
 Davila 1960  
 Douglas 1953  
 Elliott, R. 1947  
 Goldsby and Eveleth 1954  
 Hepworth 1965  
 Hinman 1961  
 Horne 1925  
 Huizinga 1942  
 Lay 1946  
 Leopold 1959a  
 Milek 1966  
 Rouse 1962  
 Spillett 1965  
 Stoddard and Smith 1955  
 Stoddard and Rasmussen 1945  
 U. S. Bureau of Land  
 Management 1965
- Sheldon National Antelope Refuge  
 and Game Range  
 Du Mont 1951  
 Gabrielson 1935  
 Gabrielson 1943  
 Ruth 1937  
 Young 1946
- Shelter  
 Rouse 1959
- Snow  
 Rouse 1941
- Soil  
 Fichter 1962  
 Long 1965
- Solar radiation  
 Shelford 1954
- Sonoran antelope  
 Goldman 1945  
 Halloran 1954  
 Halloran 1957  
 Jones 1954  
 Humboldt 1912  
 Russo 1965
- South Dakota  
 Bever 1951
- Bever 1955  
 Griffith 1962  
 Long 1965  
 Lucker and Dikmans 1945  
 S. Dakota Depart. Game, Fish,  
 and Parks 1951  
 S. Dakota Depart. Game, Fish,  
 and Parks 1965  
 Terwilliger 1946
- Speed  
 Bridge 1942  
 Carr 1927  
 Hazzard 1958  
 Seton 1929  
 Sheldon 1959  
 Throckmorton 1945  
 Walker 1964
- Sphenophalos*  
 Furlong 1932  
 Merriam 1909  
 Merriam 1911  
 Stirton 1938
- Sphenophalos nevadanus*  
 Furlong 1932  
 Merriam 1909  
 Merriam 1911  
 Stirton 1938
- Stockoceros*  
 Hibbard and Dalquest 1960
- Summer range  
 Ackerly and Regier 1956  
 Rouse 1959  
 Skinner 1922
- Survival (see Mortality)
- Tarbrush  
 Hailey 1965  
 Hailey, Thomas, and Robinson  
 1966
- Taxonomy  
 Harlan 1825  
 Jones 1964  
 Meyers 1963  
 Miller and Kellogg 1955  
 Prenzlow 1965  
 Seton 1929  
 Villa 1951
- Tetrameryx*  
 Gazin 1935  
 Matthew 1934
- Tetrameryx conklingi*  
 Roosevelt and Burden 1934  
 Stock 1932



*Tetrameryx knoxensis*

Hibbard and Dalquest 1960

*Tetrameryx onusrosagris*

Roosevelt and Burden 1934

Texas

Buechner 1947

Buechner 1948

Buechner 1950a

Buechner 1950c

De Arment 1965

Fisher 1942

Hailey 1965

Hailey, Thomas, and Robinson  
1966

Hibbard and Dalquest 1960

Lay 1946

Mearns 1907

Murray 1932

Runkles 1966

Sampson 1952

Throckmorton 1945

*Texoceros*

Stirton 1938

Thesis, M. S.

Buck 1947

Compton 1958

Dinges 1958

Dow 1952b

Edwards 1958b

Folker 1956

Hansen 1955

Morrison 1961

Spillett 1964

Wenzel 1955

Yoakum 1957

Thesis, Phd.

Buechner 1950a

Gregg 1955

Mitchell 1965

Thiamine

Cook *et al* 1949

Timber

Grinnell 1933

Mearns 1907

Transplants (see Restoration)

Trapping, Tagging and Marking

Ackerly and Regier 1956

Allred 1943

Anonymous 1942

Anonymous 1950

Baker 1953a

Barker 1948

Beale 1966

Chattin and Lassen 1950

Crump 1961

Dinges 1958

Dow 1952a

Elliott, C. 1966

Elliott, R. 1948

Fichter 1956

Fichter 1957

Fichter 1958

Fichter and Nelson 1962

Fisher 1942

Griffith, G. 1962

Hansen 1955

Hepworth 1965

Hoover, Till and Ogilvie 1959

Lang 1956b

Lightfoot 1958

Mathisen 1962

Nielson 1962

Powell 1954

Prenzlow 1964

Russell 1937

Russell 1951

Russell 1964

Snyder 1965

S. Dakota Depart. Game, Fish,  
and Parks 1951

Stokes 1952

Thompson 1947

Wilcox 1963

Utah

Beale 1963

Hinman 1959

Hinman 1961

Rosko 1948

Smith, Beale, and Doell 1965

Venison

Baird 1852

Burcham 1957

Burroughs 1961

Caton 1877

Cook *et al* 1949

Newberry 1855

Popowski 1959

Vision

Allen 1842

Bridge 1942

Caton 1877

Rouse 1959

Vitamin A

Weswig 1956

Water

Bailey 1931

Beale 1963

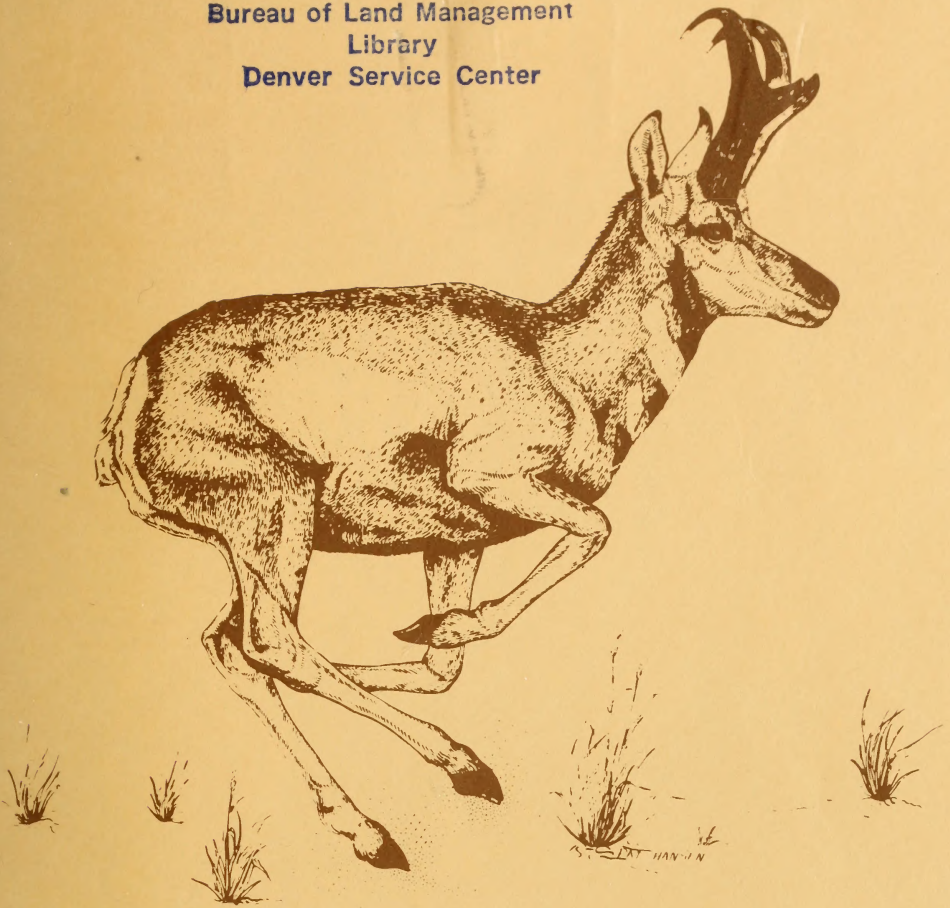
Bridge 1942

Davila 1960

- De Arment 1965  
 Dirschl 1960  
 Hansen 1955  
 Jones 1954  
 Leopold 1948  
 Mace 1949  
 Rosko 1948  
 Rouse 1941  
 Rouse 1959  
 Walker 1964
- Water developments  
 Beale 1963  
 Benson 1956  
 Davila 1960  
 Knipe 1944  
 Langdon 1964  
 Oregon State Game Commission  
 1961  
 Yeaman 1965
- Weather (also see Climate)  
 Bridge 1942  
 Hailey 1965  
 Hailey, DeArment, and Evans  
 1964  
 Hansen 1955  
 Hepworth 1965  
 Mason 1947  
 Rand 1947  
 Yeaman 1947  
 Yoakum 1957
- Weeds  
 Buechner 1947  
 Douglas 1953  
 Terwilliger 1953
- Weights  
 Baker 1953a  
 Hepworth 1965  
 Hepworth, W. 1965  
 Mason 1952b  
 Mearns 1907  
 Stoddart and Rasmussen 1945  
 Tryon and Buck 1950
- Winter range  
 Ackerly and Regier 1956  
 Grimm 1939  
 Grinnell 1929  
 Hall 1965  
 Johnson 1931  
 Jones 1949  
 Martinka 1966a  
 Martinka 1966c  
 McLean 1944  
 Murie 1940  
 Rouse 1941  
 Rouse 1959  
 Skinner 1922
- S. Dakota Depart. Game, Fish,  
 and Parks 1965  
 Springer 1950  
 Taylor 1936  
 U. S. National Park Service 1964
- Wolves  
 Young and Goldman 1944
- Wyoming  
 Allred 1943  
 Anonymous 1942  
 Anonymous 1943  
 Anonymous 1961  
 Anonymous 1964  
 Bailey 1920  
 Baker 1953a  
 Blunt 1950  
 Bridge 1942  
 Edwards 1958b  
 Gregg 1955  
 Hansen 1957  
 Hansen 1958  
 Hepworth 1965  
 Hepworth, W. 1965  
 Honess and Winter 1956  
 Huizinga 1942  
 Hunt 1948  
 Lay 1946  
 Long 1965  
 Milek 1966  
 Murie 1935  
 Rouse 1954  
 Rouse 1962  
 Russell 1937  
 S. Dakota Depart. Game, Fish,  
 and Parks 1965  
 Spillet 1965  
 Trueblood and Post 1959  
 Wenzel 1955  
 Wyoming Game and Fish  
 Commission 1966  
 Yeaman 1965  
 Zobell 1963
- Yellowstone  
 Allen 1875  
 Grimm 1939  
 Halloran and Glass 1959  
 McAtee 1939  
 Murie 1940  
 Skinner 1922  
 U.S. National Park Service 1964
- Zoo  
 Heller 1930  
 Lyon 1908  
 Noback 1932  
 Pocock 1905  
 Price 1927



Bureau of Land Management  
Library  
Denver Service Center



Created in 1849, the Department of the Interior—a Department of Conservation—is concerned with the management, conservation and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that non-renewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States . . . now and in the future.

The Bureau of Land Management administers the millions of acres of public lands according to the principles of multiple use management. The lands, as the Nation's vital material asset, are managed for the highest possible good, now and for future generations.



