

Sheep-raising in the 17 Western States: Populations, Distribution, and Trends

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Highlight: *To study the relationship between sheep and predators, chiefly coyotes (*Canis latrans*), current baseline information was needed on numbers and locations of domestic sheep in the 17 western states. Although sheep population estimates were available from published and unpublished sources for a number of areas, including all 1,059 counties in these 17 states, they varied in types of sheep counted and years covered. When the data were compiled, a few trends were evident. The 17 western states continue to raise about 80% of the United States stock sheep, but there has been a steady downward trend in sheep populations since 1960; in 1972 the 17 western states had only 58.5%, and the 31 eastern states only 44.2%, of the stock sheep present in 1960. Local management conditions vary greatly, and various data suggested a gradual shifting of sheep-raising from mountains to plains and a gradual conversion from sheep to cattle.*

The recent controversy between sheep ranchers and the environmentally aware public has shown how little factual information exists to document the effects of predation by coyotes (*Canis latrans*) on the sheep industry. Consequently, Congress has appropriated research funds, and groups across the country have begun studies on many aspects of the problem. For example, in June, 1973, at least 92 research projects on coyotes were underway or planned (Knowlton, 1973). As a part of this program, the Denver Wildlife Research Center is conducting a wide range of studies at its own facilities and, under contract, at universities and other research centers in several states.

One of the first requirements of the Denver program has been to determine the distribution of coyotes and sheep in the 17 western states where they both occur. This baseline information is necessary to determine the extent of the predation problem and to choose realistic study areas for intensive investigations. Because little published information exists on coyote populations, systematic surveys were begun in 1972 to determine coyote distribution and relative densities

(Linhart and Knowlton, in preparation). However, I found that there were also few sources of data on sheep populations, and none that gave comparable data on populations in local units within all 17 states at any given time. I therefore compiled and arranged the available data to provide as much of this information as possible and, hopefully, to identify trends that may change the pattern of western sheep-raising in the future. This paper summarizes the results.

Sources of Information

E. M. Pohle of the Denver Wool and Mohair Standards Laboratory, Agricultural Marketing Service, U.S. Department of Agriculture (USDA), was of considerable assistance in locating the best statistical livestock bulletins for early sheep numbers and lent me several from his library. Recent nationwide summaries were available from annual bulletins of the USDA Statistical Reporting Service (SRS). For recent county sheep populations, Denver SRS personnel provided contacts with cooperating state offices of the Crop and Livestock Reporting Service (or equivalent) in the 17 western states. Because these offices have differed in funding, emphasis, and length of existence (the Nevada office did not open until 1972), the available records differ in completeness and length of coverage; in several states, county livestock figures are available only from the U.S. Census of Agriculture surveys taken every 5 years (1959, 1964, 1969).

Results

The current pattern of sheep-raising in the 17 western states is shown in Figure 1, where sheep densities are mapped by county. The January 1 counts on which these densities are based represent the places of residence of the sheep owners, so anyone wanting to know exact locations of flocks would have to inquire locally; some sheep may be grazed in winter 100 miles or more from their summer range. The figures used were the most recent available: 1972 stock sheep (does not include those on feed) in California, Montana, and North Dakota; 1971 stock sheep in Nebraska and Wyoming; 1970 stock sheep in Colorado; 1969 stock sheep in Nevada and Washington;

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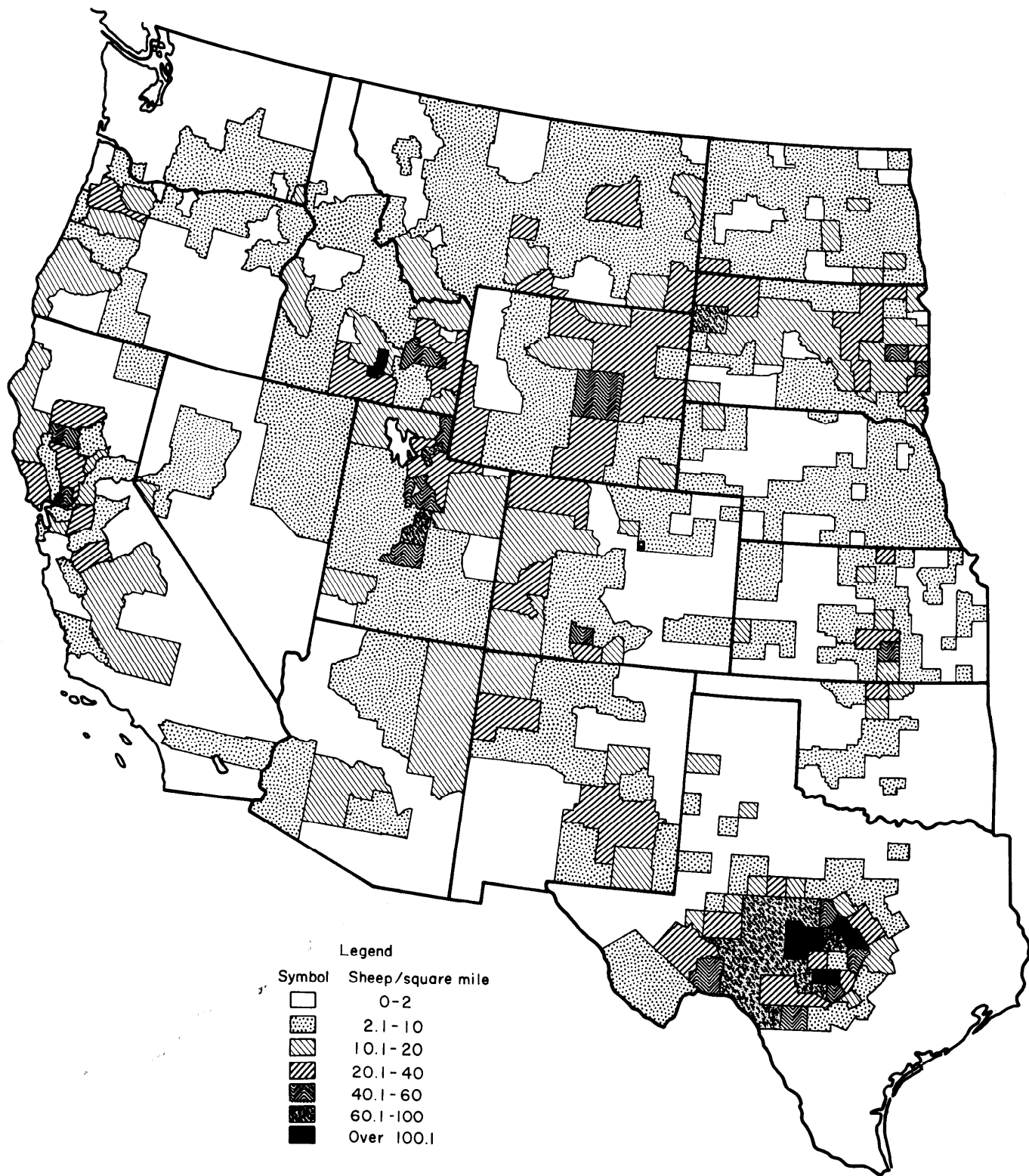


Fig. 1. Density of sheep in 17 western states, by counties.

1972 all sheep in Kansas, South Dakota, and Texas; 1971 all sheep in New Mexico, Oklahoma, and Oregon; and 1969 all sheep in Arizona, Idaho, and Utah. Although these figures do not represent simultaneous, comparable counts for all counties, the differences in the two categories of stock sheep and all sheep over the 4 years should be relatively small when the data are grouped in density ranges as in Figure 1. Of the

1,059 counties in the 17 states, only about one-third, or 343, had over five sheep per square mile; another third, or 348, had one to five sheep per square mile; and the remaining 368 counties had less than one sheep per square mile. Heavy sheep densities (40 or more per square mile) occurred in only 40 counties, representing only 3.1% of the land area in the 17 states.

Table 1. Stock sheep populations in the 17 western states, 1960-1972.

| State | Stock sheep (thousands) | | | | | | | 1972 density (sheep/mi ²) ¹ | 1972 pop. as % of 1960 pop. |
|-----------------------|-------------------------|-----------------|--------|--------|--------|--------|--------|---|-----------------------------------|
| | Mean 1960-63 | Mean 1964-67 | 1968 | 1969 | 1970 | 1971 | 1972 | | |
| Texas | 5,649 | 4,671 | 3,986 | 3,787 | 3,408 | 3,510 | 3,125 | 11.9 | 54.5 |
| Wyoming | 2,143 | 1,948 | 1,749 | 1,766 | 1,713 | 1,679 | 1,561 | 16.0 | 69.4 |
| South Dakota | 1,494 | 1,234 | 1,096 | 1,052 | 1,010 | 1,030 | 1,031 | 13.6 | 67.8 |
| California | 1,593 | 1,398 | 1,356 | 1,234 | 1,185 | 1,149 | 1,011 | 6.5 | 59.1 |
| Montana | 1,595 | 1,342 | 1,165 | 1,130 | 1,085 | 1,042 | 900 | 6.2 | 50.9 |
| Utah | 1,200 | 1,047 | 1,019 | 988 | 978 | 929 | 891 | 10.8 | 71.3 |
| Colorado | 1,375 | 1,066 | 884 | 857 | 823 | 749 | 720 | 6.9 | 50.2 |
| New Mexico | 1,126 | 950 | 823 | 799 | 791 | 762 | 682 | 5.6 | 60.5 |
| Idaho | 983 | 771 | 719 | 687 | 632 | 632 | 678 | 8.2 | 63.3 |
| Oregon | 803 | 601 | 498 | 483 | 449 | 422 | 426 | 4.4 | 49.4 |
| Arizona | 453 | 466 | 414 | 428 | 424 | 430 | 412 | 3.6 | 90.8 |
| North Dakota | 579 | 423 | 329 | 309 | 300 | 291 | 307 | 4.4 | 51.9 |
| Kansas | 516 | 405 | 333 | 286 | 272 | 253 | 240 | 2.9 | 48.6 |
| Nebraska | 349 | 280 | 241 | 222 | 215 | 208 | 204 | 2.7 | 54.4 |
| Nevada | 302 | 245 | 220 | 209 | 201 | 183 | 176 | 1.9 | 52.5 |
| Washington | 275 | 177 | 134 | 130 | 125 | 126 | 112 | 1.7 | 38.0 |
| Oklahoma | 196 | 127 | 114 | 109 | 104 | 97 | 90 | 1.3 | 40.5 |
| All 17 western states | 20,631 | 17,151 | 15,080 | 14,476 | 13,715 | 13,492 | 12,566 | 6.9 | 58.5 |
| Other 31 states | 6,610 | 4,682 | 3,998 | 3,829 | 3,669 | 3,453 | 3,250 | 2.8 | 44.2 |
| All 48 states | 27,241 | 21,833 | 19,078 | 18,305 | 17,384 | 16,945 | 15,816 | 5.3 | 54.8 |

¹ Thousands of stock sheep.² Based on total land area of each state (Long, 1971).

Table 1 lists total annual populations of stock sheep in the 17 western states for 1960-1972 (Economic Research Service, 1970, 1972; Statistical Reporting Service, 1973). The states are listed in order of their 1972 sheep populations, which may differ from their 1972 sheep densities. For example, Texas ranked first in population but third in density. This compilation shows that the 17 western states where coyote predation is a potential problem continue to raise about 80% of the nation's stock sheep, but that the number raised is steadily declining nationwide.

Figure 2 shows the pattern of this decline from 1947 through 1973. The downward slope from 1947 to 1949 was a continuation of a sharp decline that began earlier; from 1942 to 1949, the estimated total number of stock sheep in the United States dropped from 49.3 million to 26.9 million, a decrease of more than 45% (Economic Research Service, 1970). Sheep populations leveled off in the 1950's, and actually increased in the western states in 1958-1960 before beginning a steady decrease of 5% to 7% a year in 1961. The most recent national figures show that this pattern is still continuing; in January, 1974, United States stock sheep totaled only 13.9 million (Statistical Reporting Service, 1974), down about 12% from 15.8 million in January, 1972 (Statistical Reporting Service, 1973).

Discussion

Most available data on United States sheep populations are merely counts made on arbitrary dates within various geographic units and do not indicate why populations should vary from place to place and from year to year. Examination of the data and conversations with people contacted during the study have suggested some possible reasons for annual fluctuations, the retention of higher sheep populations in some states than in others, and the overall pattern of decline. While these speculations by no means provide a complete picture of the economics of the United States sheep industry, they may give some insight toward predicting changing trends in sheep

culture and identifying where coyote predation may continue to be a serious concern.

Annual Fluctuations

In many states with long-term records, some counties showed unusually large population differences from year to year, particularly in the "all sheep" category. These

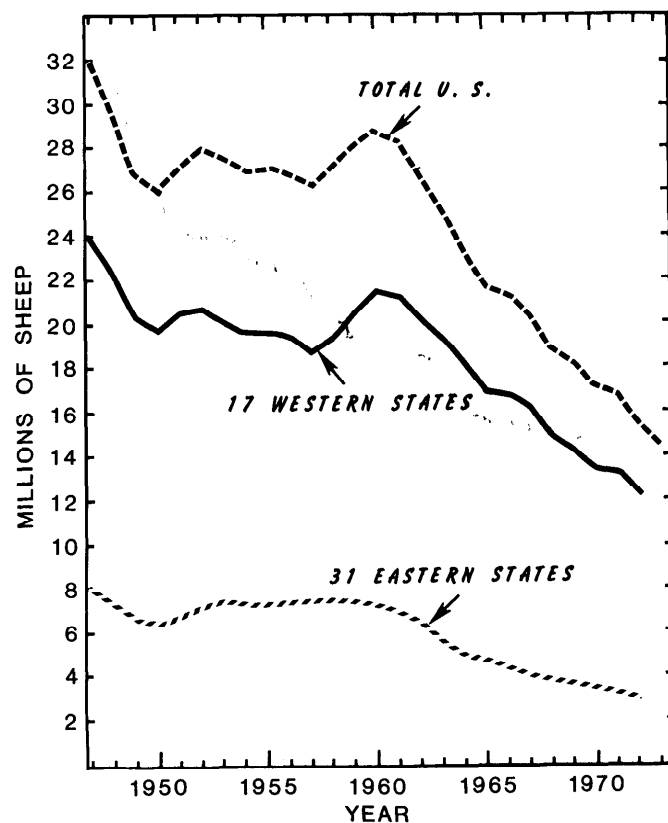


Fig. 2. Recent numbers of stock sheep in western, eastern, and the entire United States.

fluctuations are apparently related to local conditions for winter grazing. For example, according to SRS personnel in Topeka, such fluctuations in Kansas result mainly from lambs imported to feed on winter wheat; if fall precipitation permits early planting and good plant growth, large numbers will be imported and still be there when January 1 estimates are made. The availability of winter forage may account for similar fluctuations in South Dakota. For example, following good fall grain crops there in 1971 (South Dakota Agriculture, 1972), January, 1972, stock sheep numbers were down 3% from the previous year but sheep and lambs on feed were up 11%. Although such differences in counties probably do little to change state totals and tend to average out over a few years, they can markedly change local sheep distribution in a given year.

Retention of Sheep Populations

The last column in Table 1 shows large differences among the 17 western states in their retention of sheep populations since 1960. The only state to retain most of its sheep was Arizona, where the extensive arid lands are apparently far more suitable for sheep than cattle. Non-Indian groups in Arizona own all sheep and lambs on feed, but Indians own over three-fourths of the stock sheep, which are closely tied to their traditional way of life (Arizona Agricultural Statistics, 1972). These reasons may explain Arizona's 90.8% retention of sheep, and may also partly apply to New Mexico, which has retained slightly higher-than-average sheep populations.

Wyoming and Utah rank second and sixth, respectively, as sheep-producing states and have retained about 70% of their 1960 populations. More than half the total acreage in both these states is federal and state lands, much of which can be leased for seasonal livestock grazing. Since most of these areas either are very arid or are rugged mountain forests, their forage can probably be more efficiently used by sheep than cattle. A recent Wyoming study (Stevens, 1971) showed that efficient management is essential in marginal sheep-producing areas but that grazing allotments on public lands are a help to the more successful ranchers. The availability of public lands for grazing is not the entire answer, however, since Colorado and Montana have retained only about 50% of their 1960 sheep populations despite large acreages of public lands.

The reason why South Dakota has retained more sheep than most other states is unclear. Part of the answer may be its combination of soils, topography, and moisture that permits balanced crops and low-cost livestock grazing after crop harvest. South Dakota ranks high nationally in production of a variety of grains and hay, thereby offering large areas for gleanings and temporary grazing. In 1969, the average South Dakota farm had 118 sheep, about 1.5 to 4 times larger than flocks in neighboring states (Statistical Reporting Service, 1972).

The greatest losses in sheep populations occurred in the Pacific Northwest (Washington and Oregon) and in the south-central plains (Kansas and Oklahoma). This trend did not extend south, however; California and Texas, whose rocky central Edwards Plateau region contains the densest county sheep populations in the nation, were intermediate.

Another way to look at sheep population shifts is by crop-reporting districts (blocks of counties with similar agricultural conditions) used by the joint state and federal Crop and Livestock Reporting Boards. Of the 113 districts in

the 17 western states, only 3 showed increased numbers of sheep between 1960 and 1970; one district each in Idaho and Nevada gained about 3%, and the northern district in Arizona (largely Indian lands) gained about 16% and had over 70% of the state's sheep in 1969. Although losses occurred in all the other districts, some were much greater than others in proportion to state totals and often suggested local shifts in sheep-raising economics.

One of the best examples of such a shift was in Oregon, where more sheep have been retained in the farm flock operations west of the Cascade Range than on the more arid, generally open range of eastern Oregon (K. H. Larsen, U.S. Fish and Wildlife Service, 1972, personal communication). In 1971, the three coastal crop-reporting districts west of the Cascades had retained more than 68% of the sheep present in 1960, while the three eastern districts had retained only 38%. This shift apparently continued an earlier trend; the three coastal districts, which held 52.3% of Oregon's sheep in 1960 and 65.8% in 1971, held only 23.7% in 1940.

A more typical pattern, however, appeared to be somewhat better retention of sheep in the level, often arid, plains than in the mountainous areas of the state. The four mountainous districts of northern and eastern California, for example, held 20.1% of the state's stock sheep in 1960 but only 14.7% in 1972. Populations also decreased somewhat in the coastal and north-central districts, but the long central valley showed a gain from 25.3% of the state's sheep in 1960 to 37.5% in 1972. In Wyoming, the more level eastern and south-central districts showed a similar gain from 67.2% of the state's sheep in 1962 to 73.3% in 1971. Montana's five western mountainous districts retained fewer sheep than the two eastern plains districts, which held 34.7% of the sheep in 1960 and 45.2% in 1972. In Washington, sheep populations decreased 8.5% in the north-central mountains and eastern slopes of the Cascades and increased 8.4% in the more level and rolling lands of the Columbia Basin and southeastern Washington.

The Declining Sheep Industry

Among the various reasons given for the steady decline in western sheep-raising over the past decade were some that were significant locally—e.g., heavy predation, reduced grazing allotments on public lands, labor problems, increased production costs (Goodsell, 1971)—and one that seemed to apply widely. A number of people indicated that, where possible, sheep ranchers are gradually converting to the usually more profitable cattle industry. I did not collect comparable data for cattle, but cattle data were included with sheep data in a number of states. "All cattle" numbers were available from five of the seven states showing the largest percentages of sheep lost since 1960 (Table 1) and revealed the following: Washington had 29.6% more cattle in 1967 than in 1958, Oklahoma had 15.7% more in 1971 than in 1966, Kansas had 30.9% more in 1972 than in 1966, Colorado had 45.5% more in 1970 than in 1960, and North Dakota had 5% more in 1968 than in 1962. Cattle numbers in the eleven far western states plus Texas passed sheep numbers for the first time in 1947 (U.S. Dep. Agr., 1950) and have continued to exceed them since. SRS reports from three states (Texas, South Dakota, and Nevada) indicated that in January, 1972, "all cattle" in the United States totaled 117.9 million, while "all sheep" totaled only 18.5 million.

This trend may not be irreversible, however. The world need for red meat production continued to increase and, at present at least, beef prices are dropping. As many have pointed out (e.g., Morrison, 1946), sheep are more efficient converters of forage to meat than are cattle, and sheep can be grazed on rough, poor land unsuitable for tillage and unsuitable or marginal for cattle. In addition, lambs can be marketed 9 months after the ewes are bred and there is the possibility of added income from the wool. With these advantages, it is possible that changes in livestock economics could reverse the decline in stock sheep raising.

In recent years, considerable research effort has been devoted to finding ways to increase lamb crops and lamb survival, new and more efficient feeds and feeding methods, and improved drugs and techniques to help check diseases and parasites. The Sheep Industry Development (SID) program of the American Sheep Producers Council has brought scientists and sheepmen together in several parts of the country to help speed the conversion of research findings to practical ranch use. With so much predator research now underway, there will soon be a need for similar cooperation in bridging the gap between researchers from a variety of disciplines, and between the researchers and the sheep ranchers who can put their findings to use. The development and implementation of safe, practical predator control techniques cannot alone reverse the downward trend of the sheep industry, but should at least help to make sheep-raising more profitable than in the recent past.

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