

mature brush, they are less inclined to break through fences in search of better feed.

Other Considerations

In addition to the problems of herding, fencing, and supplying water, other problems associated with managing goats in mountainous areas include these:

- Roads are usually not good, and can be rendered impassable by snowfall or heavy rains. Scheduling of mountain operations in southern California should usually be set for the period April 15 to November 15. At other times, uncertainty increases as to road conditions. In northern California, the dates may be May 15 to October 15, and shorter at the higher elevations.
- Rough, steep, rocky terrain takes a toll on herders, dogs, and horses that is unknown in lowland agricultural areas. The herding efficiency may be greatly reduced because of the difficulty of traversing steep slopes. Dogs, horses, and people have become injured or lame for various periods due to these terrain conditions. Herders must learn to adjust their methods and approaches to the job in order to succeed in the mountains. Strategic fencing is often part of the success formula, allowing less legwork for all.
- Wide diurnal temperature fluctuations (15° to 85° F [-10° to 29° C]) or low temperatures associated with storm fronts may occur in spring and fall, causing hardship or death to kids (when chill factors are too low) and discomfort to herders.
- The general remoteness of most fuelbreak areas from people, stores, and the amenities of life imposes a strong psychological burden to most people who try goat herding. These conditions will continue to severely limit the number of people available for managing goats in the mountains. Yet, there are people who have a cultural background consistent with both the work required and the remote conditions in which it is done.

GOATS AND THE ENVIRONMENT

Competition with Wildlife

Much has been made in some quarters about the prospect of goats out-competing native wildlife species for food and territory. While it is true that goats and mule deer (for instance) have similar diet preferences, several factors tend to mitigate the effects of this competition:

- Few wildland goat operations are active in the State. We estimate that less than 2000 goats are on public

land in California. This small number is due primarily to marginal economics caused by high interest rates, mountain conditions, and uncertain markets. This situation will change gradually. Consequently, there is time—in our judgment—to determine desirable areas and carrying-capacity relationships for a planned approach to greater use of goats.

- The use of goats to control brush regrowth, in areas where there are insufficient populations of browsing wildlife species to do so (anywhere in the chaparral), actually benefits the wildlife in two ways: (a) Brush areas, rather than reverting to closed brush stands, are kept open so desirable forbs, grasses, and brush sprouts can grow. (b) Water developments for seasonal goat use become sources of water for wildlife.

Although further research is needed on competition between goats and wildlife, we have concluded that a well-managed operation can contribute to the attainment of wildlife habitat objectives as well as range and fire control objectives. The habits and diet of the goat *per se* are not a threat to wildlife. Intelligent management, or the lack of it, is the factor that determines whether the results reflect an ecosystem improved for wildlife.

Damage to Native Plants

Concern has been expressed that goats will decimate native plant species—particularly rare plants. On the Cleveland National Forest, rare plants were inventoried before goats were brought in. Where such plants were found, goats were excluded by fencing or herding. Another concern expressed has to do with shifts in species composition resulting from the use of goats. Shifts are inevitable but the key point is whether they are desirable within the context of land management objectives, or whether they are uncontrolled. Goats on the Cleveland National Forest have contributed to a change, as an area was converted from brush to a brush-grass or to grass association. This species shift is clearly desirable and, having been well managed, allows all uses to proceed in relative harmony.

Losses to Cold Weather

Goats in southern California have been lost to cold, stormy weather, flooding, predators, and accidents. Losses during unfavorable weather have been most damaging. Goats cannot withstand wet weather that is accompanied by freezing or near freezing temperatures. Such losses started in our goats even before they came to the Cleveland National Forest. The goats had been held on a small ranch near Goleta, California. Brush was mostly too high for the goats to browse, and they were thin, emaciated, and in no condition to withstand stress. The kids were born during January, and 250 were lost to cold weather (Hughes 1976).

On March 12, 1976, 435 nannies, billies, and kids from the Goleta ranch arrived on the Descanso Ranger District, Cleveland National Forest, at about 4000 ft (1220 m) elevation. During the second week of April, on Monday, a storm dropped snow and rain, and the cold continued over 4 days. Nineteen kids and 8 nannies died even though the herder's trailer home was filled with kids. On Friday, there was snow and sleet for 1/2 hour, and 20 to 30 kids whose mothers had died or had left them had to be bottle fed. Some of these died.

A tropical storm caused intense rainstorms in Mexico and into San Diego County on August 13, 1976. Ten goats drowned in a flooded creek, and 24 carcasses were found in the brush later. In early October, three more goats died during stormy weather. The total 1976 weather-related death loss on the Cleveland National Forest stood at not less than 30 adults and 61 kids when the goats were moved to a lower elevation off-forest wintering area.

Later, in 1979, the second owner of goats on the Cleveland National Forest had a kid crop reduced to about 70 percent, mostly by cold weather-related losses.

In 1975, a prospective permittee for the Bureau of Land Management, U.S. Department of Interior, near Redding, California, imported 500 Angora goats. They arrived during a cold October storm and were trailed 3 or 4 miles (4.8 or 6.4 km) through the brush. A few died during the trailing, but around 100 died from pneumonia or other respiratory disease during the next few days (Walker 1975).

An especially critical time for Angoras is immediately after shearing. This is normally done twice yearly, so there is a hazardous period in both spring and fall. The newborn kids are always sensitive to cold, and shelter must be provided for them.

On the Cleveland National Forest, it was necessary to establish a low elevation wintering area. The site selected contained a brushy canyon with large rock outcrops that would help protect against wind. About 200 open, 50 gallon (190 l) oil drums were dug in slightly among the brush and rocks so that mothers with kids could escape wind and rain. This appeared to be a simple, effective way to protect young goats from adverse weather. The goats were herded and bedded outside this area during good weather, and the special protection was used only during severe storms.

Losses to Predators

Predators of sheep and goats include coyotes, dogs, bobcats, and mountain lions. Coyotes were the primary predators of sheep and accounted for 82 percent of predator losses; dogs caused 14 percent of the losses; and all other predators, including eagles, lions, and bobcats, accounted for 4 percent (Anonymous 1976). No such figures for goats are available, but goat losses due to predators are probably similar to those of sheep (Pearson and Caroline 1981).

Coyotes in south Texas were primarily responsible for reducing an Angora kid crop to 13.5 percent, even with partial predator control. Coyotes selected the youngest, smallest kids before older kids, and older kids before nannies. Predation on nannies in pastures with no predator control began immediately after kids were eliminated (Guthery and Beasom 1978). Lambs were taken first by coyotes in a California study, then the ewes (Connolly and others 1976).

Predator losses in southern California were not excessive as long as the goats were guarded by dogs and a herder who had access to a gun. One nanny was killed by a bear which was then shot by the herder. Coyotes were always around. We could often hear them as the goats were taken out to graze during the morning or afternoon, and the coyotes sometimes vocalized at night. Herders told of individual coyotes stalking the herd for 2 or 3 days at a time. One goat, tethered near a herder's trailer, was killed by a coyote during the day. Two or three goats that managed to stray away from the main herd when a new truckload was being unloaded were killed by coyotes before they could be rounded up. Goats occasionally got caught in the net wire fence, and if not released soon, were preyed upon by bobcats as well as coyotes. A young nanny, 1 of 15 in a flock, was attacked by a coyote and killed while rounding a corner on a jeep trail in midday. A herder, but no dogs, was in attendance.

Mountain lions were a vexing problem near Goleta, California, where they killed about 100 goats during a 3½-month period (Hughes 1976). Personnel at the Kern River Wildlife Sanctuary, Onyx, California, scared away a lion after it had killed one nanny. Domestic dogs were reported by herders to be more and more of a problem as they were closer to population centers. On the north central Texas Grand Prairie rangelands, death losses after weaning were 8 to 13 percent. A large part of the losses was credited to dogs (MaGee 1957). Goats in southern California were occasionally bitten by rattlesnakes, and there were infrequent losses from snake bites.

Losses to Poisonous Plants

Goats are much less common on the Western Range than are sheep or cattle, consequently, information about the reaction of goats to poison plants is scant. Poison plants are generally less palatable than other plant species and are usually eaten only when livestock are hungry. But with goats sometimes forced to eat shrub species of low palatability, poison plants could cause losses.

While checking a Los Angeles County canyon as a possible site for goat browsing, we found five plants that have caused livestock losses—tree tobacco (*Nicotiana glauca* Grah.), Jimson weed (*Datura meteloides* A. DC.), cocklebur (*Xanthium strumarium* L. var. *canadensis* [Mill.] T. & G.), a shrubby nightshade (*Solanum* sp.), and groundsel or senecio (*Senecio* sp.).

Tree tobacco has long been recognized as a plant potentially poisonous to all classes of livestock (Los Angeles County Livestock Department 1938, Sampson and Malmsten 1942). Tree tobacco has also caused congenital deformities in calves when the mothers were fed dried, ground tree tobacco during the first third of gestation (Keeler 1979). The young leaves and stems are the most dangerous parts of the plant, and they are readily available in canyon bottoms and disturbed sites in southern California. Fortunately, they are distasteful to goats. On parts of Catalina Island that are heavily browsed by goats, tree tobacco was utilized only when other forage was severely depleted, and then only sparingly (Coblentz 1977).

Seeds and young leaves of Jimsen weed usually do the poisoning if this plant is eaten to excess, but all parts of the plant are dangerous. The burs or seeds of the cocklebur are highly toxic, and the poisonous alkaloids are concentrated in the cotyledons and first true leaves as the seed germinates (Los Angeles County Livestock Department 1938, Sampson and Malmsten 1942).

The woody nightshade we observed, probably Douglas black nightshade (*Solanum douglasii* Dunal), is suspected of poisoning livestock, but this may be partly because of its close botanical relationship with the annual black nightshade (*Solanum nigrum* L.). *Senecios* have been troublesome on the Western Range, and species growing east of the Sierra Nevada Mountains are more frequently reported as causing losses than *Senecios* growing in California.

Plants that Sampson and Malmsten (1942) report as having caused goat losses in California are black nightshade, laurels and azaleas (*Leucothoe*, *Rhododendron*, *Kalmia*, and *Menziesia*), loco weeds (*Astragalus* sp.), and poison hemlock (*Conium maculatum* L.).

Death camas (*Zygadenus* sp.) grows from a bulb, to a height of 2 ft, and has been a serious cause of range sheep losses during early spring. The onion-like leaves of star or chaparral death camas (*Z. fremontii* Torr.) often appear on burned-over chaparral areas before other herbaceous plants. It should be considered poisonous to goats.

In Texas, goats were reported to eat some plants with impunity that cause illness or economic loss to cattle. For example, goats there appeared unsusceptible to most of the nightshades, and they were less susceptible than cattle to *Senecio*, oak, and larkspur (*Delphinium*) (Dollahite 1972).

ECONOMIC RETURNS FROM GOAT MANAGEMENT

The main obstacle to general use of goats on fuelbreaks has been the inability of herd owners to show an economic return. Several reasons account for this condition:

- Operators have been livestock traders rather than local ranchers, and have made some mistakes that ranchers

experienced in the area would not have made. Examples of these errors include insufficient supplementing during the winter, insufficient protection during cold, wet weather, and insufficient protection against disease.

- The inability to get financing for an economic unit. Bankers are reluctant to loan money on an operation that they do not understand, especially when potential profits do not appear great enough to pay the current high interest rates. However, many of the costs of running a few hundred goats are not much greater if the flock is 1500 or more, a flock size we believe should be minimum.
- The market for goat meat is somewhat uncertain, seasonal, and decentralized, although for several years, mohair has sold for \$4 to \$7 per pound (\$8.80 to \$15.40/kg), depending on hair quality and current demand.

Subsidizing Herd Owners

Despite these obstacles, both land managers with fuelbreaks to maintain and herd owners with goats to feed continue to seek ways to make the idea work. From the land manager's standpoint, fuelbreak maintenance costs of from \$20 to \$200 per acre (\$50 to \$500/ha) for other methods are too high. Many managers feel that a subsidy to the herd owner would be cheaper, and also be more environmentally acceptable than equipment or herbicides.

Subsidies can take several forms, including no charge for natural feed; developing water near areas to be worked; providing fencing material and labor; and paying a direct fee under contract for providing goats.

When considering the amount and kind of subsidy that can be afforded, the land manager must consider costs of alternatives and allow a factor for uncertainty. Thus, if the cheapest method were prescribed fire at \$18 per acre (\$45/ha), the manager might be able to justify an expenditure of \$10 to \$15 per acre (\$25 to \$37/ha) as a goat subsidy. The "hold-back" of \$3 to \$8 represents the cost of a risk that the goat operation will not meet objectives.

Marketing Goats

Several markets in Texas routinely handle goats (Groff 1973), but San Antonio and Los Angeles are the major markets (Dollahite 1972). In California, kids or adult goats can often be marketed on the ranch, or by consignment through local slaughterhouses. Advertisements in local papers and visits to labor camps will attract buyers (Spurlock and others 1978). In 1980, buyers from Mexico offered to purchase the goats being removed from San Clemente Island (Allen 1980).

Demand for young goats is considerable at Christmas and Easter, and a demand for goats is widespread among people of Hispanic and other Mediterranean origin. Goat for barbecuing is becoming more popular with other groups. Young goats are sold as "cabrito," and meat from more mature goats as "chevon." Meat from old animals is commonly used for sausage (Dollahite 1972).

In California, November and December is the best time to sell goats, and spring a good time to buy, according to the owner of goats on the Cleveland National Forest during 1978-79. Spotted or mottled goats are most sought after by buyers, whereas brown or white are the "worst sellers" (Beene 1979).

REFERENCES

- Allen, Carl G. [Personal conversation with Lisle R. Green] 1980 August 3.
- Anonymous. **Coyote is chief predator.** Calif. Agric. 30(7):11; 1976 July.
- Askins, Gary D.; Turner, Everett E. **A behavioral study of Angora goats on west Texas range.** J. Range Manage. 25(2):82-87; 1972 March.
- Aucamp, A. J. **Convert bush problem into meat production.** Die Boerbok. Supplement to Landbouweekblad 41:10-12; 1975 October 17. [Transl. from Afrikaans].
- Batten, G. J. **Controlling scrubweeds with goats.** New Zealand J. Agric. 32(4):31-32. 1979 October.
- Beasom, Samuel L. **Dietary overlap between cattle, domestic sheep, and pronghorns.** In: Sosebee, Ronald E.; Guthery, Fred S., eds. Noxious brush and weed control research highlights—1980. Vol. 11. Lubbock, TX: Texas Tech. Univ.; 1980:40-41.
- Beene, Rocky [Personal conversation with Lisle R. Green] 1979 May 29.
- Brotherhood of the Sun. **Goat grazing on the Caliente allotment.** Type-written. 1974 February. 3 p. Located at Pacific Southwest Forest and Range Experiment Station, Riverside, CA.
- Bryant, F. C.; Kothmann, M. M.; Merrill, L. B. **Diets of sheep, Angora goats, Spanish goats and white-tailed deer under excellent range conditions.** J. Range Manage. 32(6):412-417; 1979 November.
- Calvopina, L. H.; De Vries, T. **Structure of the population of wild goats (*Capra hircus*) and damage caused to the vegetation on the Island of San Salvador, Galapagos.** For. Abstr. 40(7):2193; 1979 July.
- Campbell, Q. P.; Ebersohn, J. P.; Von Broembsen, H. H. **Browsing by goats and its effect on the vegetation.** Herb. Abstr. 32(4):273-275; 1962 December.
- Coblentz, Bruce E. **Wild goats of Santa Catalina.** Nat. Hist. 85(6):70-77; 1976 June-July.
- Coblentz, Bruce E. **Some range relationships of feral goats on Santa Catalina Island, California.** J. Range Manage. 30(6):415-419; 1977 November.
- Coblentz, Bruce E. **Effects of feral goats on the Santa Catalina Island ecosystem.** Power, Dennis M., ed. The California Islands: Proceedings of a multidisciplinary symposium; 1978 Feb 27-Mar 1, Santa Barbara, CA.: Santa Barbara Mus. Nat. Hist.; 1980:167-170.
- Connolly, Guy E.; Timm, Robert M.; Howard, Walter E.; Longhurst, William M. **Sheep killing behavior of captive coyotes.** J. Wildl. Manage. 40(3):400-407; 1976 July.
- Davis, Gary G.; Bartel, Laurence E.; Cook, C. Wayne. **Control of gambel oak sprouts by goats.** J. Range Manage. 28(3):216-218; 1975 May.
- Dollahite, J. W. **Spanish goats have what it takes.** College Station, TX: Texas A&M Univ., Agric. Ext. Serv., Texas Agric. Progr. 18(3):21-23; 1972 Summer.
- Dutoit, P. F. **The goat in a bush-grass community.** Proceedings of the 7th Grassl. Soc. of S. Africa. 1972; (44-50)
- Elam, F. Leland. **Goats cleared our brush.** West. Livest. J. 30:37, 46, 51, 55; 1952 July 15.
- Fraps, G. S.; Cory, V. L. **Composition and utilization of range vegetation of Sutton and Edwards Counties.** Bull. 586, College Station, TX. Texas Agric. Exp. Stn. 1940. 39 p.
- Green, Lisle R.; Wagnon, K. A.; Bentley, J. R. **Diet and grazing habits of steers on foothill range fertilized with sulfur.** J. Range Manage. 11(5):221-227; 1958 September.
- Green, Lisle R. **Fuelbreaks and other fuel modification for wildland fire control.** Agric. Handb. 499. Washington, DC: U.S. Department of Agriculture; 1977. 79 p.
- Green, Lisle R.; Hughes, Catherine L.; Graves, Walter L. **Goat control of brush regrowth on southern California fuelbreaks.** Hyder, Donald N. ed. Proceedings of the 1st Int. Rangeland Congr; 1978 August 14-18; Denver, CO. Denver, Colorado Society for Range Management; 1978; 451-455.
- Groff, Jack L. **Keys to meat-type goat production.** Fact Sheet L-934. College Station, TX: Texas Agric. Ext. Serv., 1973. 4 p.
- Guthery, Fred S.; Beasom, Samuel L. **Effects of predator control on Angora goat survival in south Texas.** J. Range. Manage. 31(3):168-173; 1978 May.
- Hatton, John H. **Eradication of chaparral by goat grazing.** In: Review of Forest Service Investigations, Vol. II Grazing Investigations. Susanville, CA: Lassen National Forest, Forest Service, U.S. Department of Agriculture; 1913; 25-28.
- Hughes, Catherine L. **First annual report on using goats to control brush regrowth.** San Diego, CA: Cleveland National Forest, Forest Service, U.S. Department of Agriculture; 1976; 87 p.
- Huss, Donald L. **Goat response to use of shrubs as forage.** In: Mckell, Cyrus M.; Blaisdell, James P.; Goodin, Joe R. eds. Wildland shrubs—their biology and utilization. Gen. Tech. Rep. INT-1. Ogden, UT: Intermountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 1972; 331-338.
- Jones, Milton B.; Laude, Horton M. **Relationships between sprouting in chamise and the physiological condition of the plant.** J. Range Manage. 13(5):210-214; 1960 September.
- Keeler, Richard F. **Congenital defects in calves from maternal ingestion of *Nicotiana glauca* of high anabasine content.** Clin. Toxicol. 15(4):417-426; 1979.
- Larson, Jan, Staff Civil Engineer, Naval Air Station, San Diego, CA. [Telephone conversation with Lisle R. Green]. January 1981.
- Los Angeles County Livestock Department. **Poisonous and injurious plants of Los Angeles County.** Los Angeles, CA: Los Angeles County Livestock Department; 1938. 27 p.
- MaGee, A. C. **Goats pay for clearing Grand Prairie Rangelands.** MP-206. College Station, TX. Texas Agric. Exp. Stn.; 1957 May. 9 p.
- Malechek, John C.; Leinweber, C. L. **Forage selectivity by goats on lightly and heavily grazed ranges.** J. Range Manage. 25(2):105-111; 1972 March.
- Merrill, Leo B. **The role of goats in biological control of brush.** Beef Cattle Sci. Handb. 12:372-376; 1975.
- Merrill, Leo B.; Taylor, Charles A. **Take note of the versatile goat.** Rangeman's J. 3(3):74-76; 1976 June.
- Minnich, Richard A. **Vegetation of Santa Cruz and Santa Catalina Islands.** In: Power, Dennis M., ed. The California Islands: Proceedings of a multidisciplinary symposium; 1978, Feb 27-Mar 1. Santa Barbara, CA. Santa Barbara Mus. Nat. Hist.; 1980; 123-137.
- Murphy, Alfred H.; Leonard, Oliver A.; Torrell, Donald T. **Chaparral shrub control as influenced by grazing, herbicides, and fire.** Down to Earth 31(3):1-8; 1975 Winter.
- Naveh, A. **The role of shrubs and shrub ecosystems in present and future Mediterranean land use.** In: Mckell, Cyrus M.; Blaisdell, James

- P; Goodin, Joe R. eds. Wildland shrubs—their biology and utilization. Gen. Tech. Rep. INT-1. Ogden, UT: Intermountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 1972; 414-427.
- Pearson, Erwin W.; Caroline, Milton. **Predator control in relation to livestock losses in central Texas.** J. Range Manage. 34(6):435-441; 1981 November.
- Plaister, Robert E.; Dal Porto, Norman. **Angora goats for foothill brush areas.** Amador County, CA: Calif. Agric. Ext. Serv.; 1973. 13 p.
- Plumb, T. R. **Sprouting of chaparral by December after a wildfire in July.** Tech. Paper 57. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 1961. 12 p.
- Raven, Peter H. **A flora of San Clemente Island, California.** Aliso 5(3):289-347; 1963 April 15.
- Sampson, Arthur W. **Plant succession on burned chaparral lands in northern California.** Bull. 685. Berkeley, CA: Calif. Agric. Exp. Stn.; 1944. 143 p.
- Sampson, Arthur W.; Malmsten, Harry E. **Stock-poisoning plants of California.** Bull. 593. Berkeley, CA: Calif. Agric. Exp. Stn. 1942. 90 p.
- Sidahmed, Ahmed E.; Morris, J. G.; Radosevich, S. R. **Summer diet of Spanish goats grazing chaparral.** J. Range Manage. 34(1):33-35; 1981 January.
- Sidahmed, Ahmed E.; Radosevich, Steven R.; Morris, James G.; Koong, Ling J. **Nutritive value of chaparral for goats grazing in fuel-breaks.** Calif. Agric. 36 (5 and 6): 12-14, 24; 1982 May-June.
- Spatz, Gunter; Mueller-Dombois, Dieter. **The influence of feral goats on Koa tree reproduction in Hawaii.** Volcanoes National Park. Ecology 54(4):870-876; 1973 August.
- Spurlock, G. M.; Plaister, Robert; Graves, Walter L.; Adams, Theodore E.; Bushnell, Robert. **Goats for California brushland.** Coop. Agric. Ext., Univ. of Calif. CP-321-100. Berkeley, CA. Cooperative Extension, Univ. of Calif. 1978. 24 p.
- Taylor, Charles, Jr. **Spanish versus Angora in controlling brush.** Presentation at the Spanish Goat Conference, San Angelo, TX. Texas A&M Res. and Ext. Center. 1975 September.
- Trollope, W. S. W. **Role of fire in preventing bush encroachment in the eastern Cape.** Proceedings of the 9th Grassl. Soc. of South Africa; 1974; 67-72.
- Van Dyne, G. M.; Heady, H. F. **Botanical composition of sheep and cattle diets on a mature annual range.** Hilgardia 36(13):465-492; 1965 September.
- Vries, T. De. **How the hunting of goats affected the vegetation on the islands of Santa Fe and Pinta, Galapagos.** For. Abstr. 40(7):2195; July 1979.
- Vries, T. De.; Calvopina, L. H. **Role of goats in vegetation changes on the island of San Salvador, Galapagos.** For. Abstr. 40(7):2194; July 1979.
- Wagnon, Kenneth A. **Behavior of beef cows on a California Range.** Bull. 799. Berkeley CA: Calif. Agric. Exp. Stn. 1963. 58 p.
- Walker, Robert [Telephone conversation with Lisle R. Green] 1975 December.
- Wilson, A. D. **A review of browse in the nutrition of grazing animals.** J. Range Manage. 22(1):23-28; 1969 January.
- Wilson, A. D.; Weir, W. C.; Torell, D. T. **Evaluation of chamise (*Adenostoma fasciculatum*) and interior live oak (*Quercus wislizenii*) as feed for sheep.** J. Animal Sci. 32(5):1042-1045; 1971.

Green, Lisle R.; Newell, Leonard A. **Using goats to control brush regrowth on fuelbreaks.** Gen. Tech. Rep. PSW-59. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 1982. 13 p.

On fuelbreaks, herbicides have been the primary tool for controlling brush regrowth. Vegetation of low volume and low growth is maintained on these wide strips as an aid to firefighting safety. Goats are a promising alternative to herbicides, and may be the best tool available for controlling brush regrowth on fuelbreaks. They eat a wider variety of plants, and more woody plants, than other livestock. They are less selective on first-year brush regrowth, and more selective as brush is older. Goats should not be expected to control tall, mature brush. A good strategy is sufficient goats to eat all leaves from all brush species two or three times per year. Spanish goats are probably a better choice than Angoras for rough mountainous areas. Wethers have some advantages over a breeding herd, but may require more subsidy. Problems to solve when goats are acquired include road access during wet weather, fencing, herding, water and supplemental feeding, protection from predators, disease, and poison plants.

Retrieval Terms: Angora, brush control, chaparral management, diet of goats, fuelbreaks, goat losses, predators, Spanish goats, wethers