The Preferred Grazing System

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The Past 75 Years

Articles on Range Management, Ecology, Wetlands and Riparian, Grazing Systems, and Planning were reviewed extending back to 1915. The purpose was to (a) chart the progress that had been made in range management, (b) determine what problems had been identified that had not been solved, and (c) to plan action for the future.

Range bulletins and USDA publications, later followed by *The Rangelands Journal, Rangeman's News,* and *Rangelands* were studied for articles which were then categorized under the headings shown above.

The following is a synopsis of these articles starting from the earliest date and proceeding to the date of this analysis. A total of eighty one (81) articles were reviewed, followed by a condensation for brevity purposes and to provide a format for future thinking. Since all facets of range management should be considered in range plans, each of the subject headings should be analyzed for an acceptable grazing system for the future.

Range Management

In 1915 Jardine wrote in the 1915 yearbook of agriculture about overgrazing by livestock of choice plants and the evils of loose stock. Sampson in 1918 wrote about erosion and stream flow. These were the earliest writings found.

In 1957, Tomanek, Martin, and Albertson wrote about the grazing preference comparisons of Six Grasses in the Mixed Prairie. They developed a chart of the preference of various grasses over others. They stated that there were site as well as species preference. In the same year Tomanek and Albertson made studies showing plants' reaction to grazing. Moldenhauer and Everhart in 1958 developed the minimum vegetation required to keep erosion below 0.25 ton per acre in ARS bulletin 41-20. In 1960 the Rocky Mountain Forest and Range Experiment Station completed research of Upland and Bottomland rangeland with regard to site preference.

Paulsen and Ares in 1961 stated that sustained grazing capacity does not exist on arid southwestern rangeland.

"The Wildlife Management Institute" in 1973 published the *New North American Wildlife Policy.* Fragile ecosystems in wilderness and national parks were commented upon and the problem of grazing of arid lands led to substantial deterioration of the range. The role of wildlife on rangelands was covered in their policy statements. SRM contends that multiple use management is essential. In 1974 Management was stated as the key to wildlife variety and abundance. *Outdoor* Editor Bob Thomas in seven issues reported overstocking of rangelands throughout Arizona's arid rangelands.

Flexibility by following a conservation plan where range sites and condition classes along with climax plants was discussed by Fields in 1977. A range condition procedure was discussed. Cosby in 1978 stated that range management benefited wildlife. The range ecosystem and range condition were recommended as guides to range analysis.

Everhart in his book "Land Classification For Uses, Management, and Valuation" published in 1981 presented tables of (a) site preference, (b) species preference, (c) map of primary non-rangeland based on the "The Western Range", U.S. Government Printing Office, (d) generalized precipitation map of the United States, and (e) relationship of soil quality and vegetation quality. Also presented classification groupings for wildlife and forest lands.

Managing rangelands for Mule Deer was discussed by Holechek in 1982 with preferred species, deferred grazing and need for protective brush for wildlife emphasized. Whetsell in 1982 stated that livestock selected vegetation by species preference and his system placed more cattle on smaller areas for a short time period. "Pen Points" in 1984 indicated that fencing should separate range types and conditions. "Viewpoints" in 1984 presented USLE on rangelands (an erosion formula). Similar to the above, Renard et al. in 1984 discussed the "Universal Soil Loss Equation". Rangeland vegetative succession and wildlife was emphasized by Kindschy wherein the classification of seres with the use of habitat groups was covered. Hann in 1986 discussed "Habitat Groups".

Ecology

In 1916 Clements in his book wrote about plant succession and indicators on rangeland. Sampson in 1917 wrote concerning Succession as a Factor in Range Management, then in 1919 Plant Succession in relation to Range Management. This was followed by Dyksterhuis in 1949 writing "Condition and Management of Rangeland Based on Quantitative Ecology". "Benchmarks" in 1971 provided a statement of Principles and Positions. The statements quoted and defined *"non-productive land",* also land use capability classification. In 1974 "Ecology—The Foundation of Wildlife Management" discussed ecology and wildlife. McKay in 1975 in writing "Producing from

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Rangelands" discussed acres of rangeland in excellent, good, and fair condition. In 1985, Dyksterhuis re-examined range sites and condition classes in a "follow up" as based on quantitative ecology.

Bottomlands, Overflow Lands, Wetlands, and Riparian Lands

In 1977 Winegar in his article, "Camp Creek Channel Fencing—Plant, Wildlife, Soil, and Water Response", discussed meadows and wildlife habitat. Kramer in 1978 discussed livestock ponds and fences and the location of fences along geologic land forms. In 1978, Meehan et al. wrote about livestock grazing and the aquatic environment reporting the over use of desirable species and the concentration of livestock in favored areas. Fish habitat should be protected. Peek et al. in 1981 reported on a study of riparian areas in Idaho, and stated that riparian use is a serious issue—that spawning areas should be protected and Fisheries Biologists should be used. In an article on the biological importance of streambank stability the need for stability of banks was emphasized by Bohn. Thomas in 1986 wrote about riparian protection and enhancement in Idaho and stated that fencing was used and that fish preferred the ungrazed areas. Elmore, et al. in 1987 discussed riparian area management in watershed management. A riparian research program was discussed in the 1987 article by Prouty, who stated that the Forest Service had a variety of disciplines focused on this problem. Tixler et al. in 1988 stated that riparian areas were trampled.

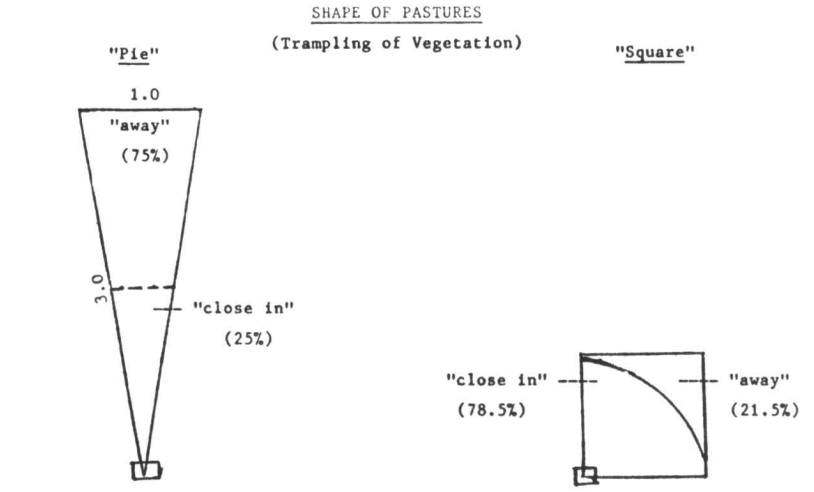
Grazing Systems

Preferred grazing was discussed in 1977 by Sipe along with wildlife. Penfield in 1982 discussed topography, marshlands, wetlands, need for planning, burning, etc... More grass means more cattle was presented in 1982 by Whetsell.

The Savory Grazing Method was discussed in 1982 by Steger. Ranges should be divided by range types and grazing should be done when nutrition is highest, says Holechek and Herbel in 1982. In 1982, Kelton states a grazing system does not improve range condition, also cattle should be moved one time per week.

Blackburn in 1983 presents livestock grazing impacts on watersheds. Creeks should be fenced out, also all water sources (springs, reservoirs, etc.), says Anseth in 1983. It slows erosion, he says.

Holechek in 1983 discussed all systems, also seasonally suitable, fenced riparian areas, and discussed preferred areas and preferred species. Evaluation, selection, and different types on ranges need different times of grazing, says Platou in 1985. He states that high intensity is not adapted to Shrub Steppe. In 1985, Penfield discusses a workable grazing program. He states that marshlands need to be treated differently from dry sites. Quigley in 1987 wrote about Short Duration grazing from an economic perspective. A grazing system is not adapted to steep slopes, also not adapted to many areas (terrain, season of use, type of land, etc.). Trampling is a big problem, says Pieper in 1988 in his article, "Is Short Dura-



one pasture - 960 acres

area within 1.5 miles to water ("close in")
1/2 distance out = 25% of pasture area.

area away is 3.48 times as large as square shape

one pasture = 640 acres

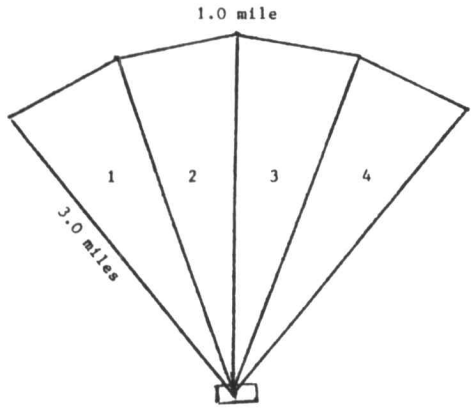
area within 1.0 miles to water ("close in") is 78.5 percent of whole

area close in is 3.14 times as large as pie shape.

Comment: 75 percent of the time (last 3/4 of grazing period) must be spent trampling already fully utilized range in the pie pasture, therefore 25 percent is sacrificed for the remmaining 75 percent.

FIGURE 1

FENCING ANALYSIS



Parts of 12 sections - 50% fenced

12 miles of fence - 3,820 acres

1 mile of fence per 202 acres

Difference: Square = 320 acres per mile of fence
Pie = 202 acres per mile of fence
118 acres per mile of fence

- -

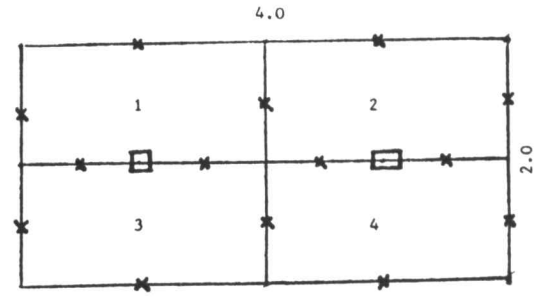
50 percent of 7,680 acres fenced (see figure 2), therefore a loss of 50 percent due to not being in the system.

Loss:

Improper fencing - 56 percent

Not fenced into the system - 50.0 percent

Total . . . . . 106 percent



8 sections - 100% fenced

16 miles of fence - 5,120 acres

202 divided by 320 = 63 percent loss

- -

100 percent of 5,120 acres fenced.

No loss of fenced areas.

Loss:

Insufficient fencing - None

Not fenced - None

Total . . . . . None

FIGURE 2

tion Grazing the Answer". Minimum ground is needed and only certain amounts of vegetation can be safely harvested.

Planning

Nothing can be done without systematic planning. Colbert in 1977 discusses land use planning following land use classification and ecosystem analysis. Anderson in 1977 states planning is needed in the management of renewable resources.

The Preferred Grazing System

Since 1915 when Jardine wrote about range erosion, 75 years have passed and a summary and analysis is in order. These articles have been separated into various subjects for further study. This writer who has spent much of his life—45 years (1946-1991)—in range management first as a ranch planner then as a range specialist, then as a Certified Range Management Consultant—will attempt to present a Preferred Grazing System.

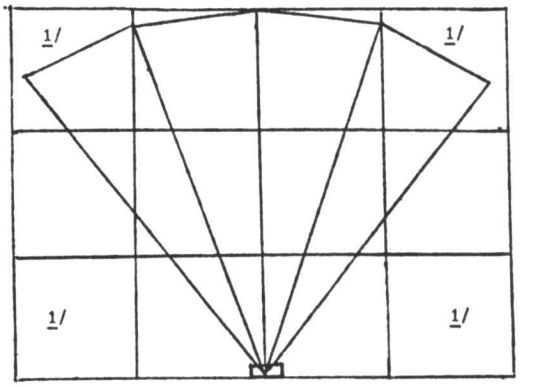
1. Range surveys must be the first item that is to be accomplished. Range sites and condition classes should be mapped to serve as a basis for all grazing of livestock, grazing systems, trend analysis, and planning. Along with this the soils map, vegetative survey resources inventory, and geologic map analysis for slopes must be done. The next step is to develop a habitat group map for wildlife management as wildlife is a part of every good management plan. Determine what range improvements are needed such as water facilities, fencing, brush control, erosion prevention, etc.. Fencing and water needs can not be determined at this point as other decisions will impact these items. The growing season as to total days and dates must be itemized. Annual precipitation and time of year (season) must be determined, also the frequency of drought (duration and extent) obtained. Climatic zones such as wet, humid, subhumid, dry subhumid, semi-arid, and arid must be obtained and placed with the inventory and classification of resources. A research of vegetative cover that is needed by the various range sites that must be left to prevent erosion and to provide protection for the soil microorganisms and plant roots for the next season of use must be then made.
2. The next item is to analyze all of the plant inventories: site and condition survey, habitat groups, wildlife inventory including stream analysis (spawning beds, fish and mollusks, etc.), need for wildlife brush and tree cover, and recreation improvements such as camp sites along streams, etc..

   Analyze possible classes of livestock, age, and season of use with consideration of the amount and season of precipitation, evaporation, and transpira-

tion, and the *needs of the land* as to vegetation left at the end of the season of use. Study the carrying capacity of the range including the amount needed by the wildlife for *food and cover.*

Analyze vegetation cover as to what range improvement can be realized such as (a) can the poor condition sites be realistically improved if sufficient land cover is left for soil protection and (b) can the fair condition sites be improved to good condition and, if so, what grasses need to be protected during the grazing season.

3. Tentatively map the range types that are not compatible to be grazed in the same pastures with other range types. Then map out bottomland sites, overflow sites, wetland sites, and riparian areas that must be separately fenced. This may call for a range consultant to assist in this difficult assignment. Assign preclimax, climax, and postclimax to all range sites for grazing system analysis. Put the requirements of each site in the proper prospective.
4. If the grazing unit (the ranch) is a mixture of types, greater care must be taken and help may be necessary as sacrifice areas must be held to a minimum. The fencing and water facilities must be placed properly as these are costly items. More about this when the system is selected.
5. Fencing analysis for proper grazing systems must be studied with great care. The location of the fence must separate range types with varying site and species preferences. Bottomland sites, overflow lands, wetland (potholes or marshes) and riparian lands (along creeks, streams, rivers, etc.) must be fenced out if not determined to be sacrifice areas.
   Figure 1 shows efficiencies of rectangular fencing.
   Figure 2 shows the loss due to improper fencing and also areas not fenced into the system.
   Figure 3 shows the trampling effect of improper fencing.
   Figure 4 shows a proper fenced ranching unit.
6. High density, short duration grazing systems are proper for ranges with site and species preference problems *in an environment of proper precipitation for adequate regrowth.* Rotation grazing is proper in an area of below precipitation for adequate regrowth.
7. The grazing rotation should provide for a minimum of four pastures and a maximum of eight. The livestock should be placed in one pasture and left for a minimum of 10 days if there are eight pastures, and 15 days if there are 4 pastures. Each pasture can be regrazed as many as 2 more times (a total of 3) during the season then placed in all pastures if desired and if allowed in the computed carrying capacity. Do not use pie shaped pastures because of (a) trampling and erosion and (b) cost of inefficient fencing.



1/ Not in the system

Figure 3

FENCING SCHEMATIC

Riparian and Bottomland Range Sites

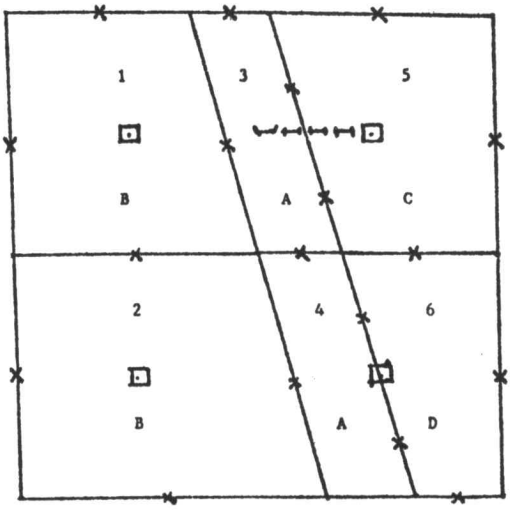


Figure 4

Pasture 1, 2, 3, 4, 5, 6

A = Riparian and Bottomland site

B = Climax sites (too steep to graze 10%)

C = Climax and preclimax intermingled (70% climax)

D = Preclimax and climax intermingled (30% climax)

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Environmental Effects on Picloram Translocation in Leafy Spurge

Rodney G. Lym and Calvin G. Messersmith

Variable herbicide absorption due to changes in the environment or plant growth stage can result in inconsistent weed control, especially with perennial rangeland weeds such as leafy spurge. Leafy spurge grows on a wide variety of terrain from flood plains to river banks, grasslands, ridges, and mountain slopes (Bakke 1936). Leafy spurge is primarily found in untilled non-cropland habitats such as abandoned cropland, pasture, rangeland, woodland, roadsides, and waste areas. Leafy spurge causes economic losses from both reduced forage production and avoidance of weed-infested areas, by cattle. Leafy spurge can reduce carrying capacity from 50 to 75% (Alley et al. 1984, Reilly and Kaufman 1979).

Leafy spurge is difficult to eradicate, but topgrowth control and gradual reduction in the underground root system are possible. Picloram (Tordon)^{R} is the most effective herbicide for leafy spurge control (Lym and Messersmith 1985). Generally, herbicides are most effective when applied during the true-flower growth stage in mid-June or during regrowth in the fall from late August until a killing frost occurs in October. However, results can be inconsistent. Picloram has given from 100% to less than 5% control 2 months after application even when properly applied at the maximum labelled use rate.

Occasional poor leafy spurge control by picloram may be due to poor herbicide absorption and translocation caused by unfavorable weather conditions or by limited carbohydrate movement within the plant. High relative humidity and an increase in air temperature of 2° F or more 24 hours before treatment can result in more picloram absorption and translocation in leafy spurge (Lym and Messersmith 1990). Since both picloram and carbohydrate movement in leafy spurge are weather dependent and roots must be killed for long-term control, the effect of leafy spurge growth stage and weather conditions for picloram movement to roots was investigated.

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Methods

Radiolabeled picloram (^{14}C-picloram) was applied weekly from mid-May until mid-October for 2 years to leafy spurge plants grown in pots in the field. Plants were harvested 72 hours after treatment and were sectioned into treated leaf, remaining stem and leaves, and roots. The amount of picloram absorbed and translocated was determined for two growing seasons at two depths and the relationship between root carbohydrate and picloram content estimated.

Results and Discussion

Picloram absorption was similar throughout most of the growing season and averaged 36% of applied picloram (Fig. 1). The poorest absorption occurred during summer dormancy. In growth chamber experiments, picloram absorption increased as the relative humidity increased during treatment but was not affected by the air temperature before or after treatment. To maximize picloram absorption in leafy spurge, plants should be treated when growing rapidly and during periods of high humidity such as early morning or late evening.

Picloram concentration in the leafy spurge topgrowth was greatest when the herbicide was applied during the vegetative growth stage in the spring but declined rapidly when the plant began to flower (Fig. 2). There was a small increase in picloram concentration around early Sep-