Forage Management and Maintenance in Mid-Missouri

William B. Kurtz

"Forage is the basis of our livestock operation," says Matthew Van Dyke, who with his grandfather, J.R. Van Dyke, operates the Van Dyke Farm Company in the prairie breaks northeast of Fulton, Missouri. "Forage management is especially difficult since most of the soils on our farm are thin with low fertility levels. In our case nothing is more impermanent than permanent pasture."

The predominant forage over most of the Van Dyke farm is tall fescue. In addition orchard grass and relatively pure stands of alfalfa, brome, birdsfoot trefoil, and red clover may also be found.

The growth of legumes is encouraged by the Van Dykes, who believe that this is the best and least expensive way to manage and improve their forage system. Tall fescue stands are overseeded with legumes and existing mixed stands are managed to favor the legumes. While they attempt to preserve native grasses and shrubs wherever possible, it has been found that this practice is not very compatible with their summer pasture program and the predominance of tall fescue.

Matching Forage and Beef Production Systems

The Van Dykes have a commercial cow herd, and background[1] their own calves as well as bought yearlings, depending on forage availability and market prices. The University of Missouri production testing system is utilized to monitor herd performance. Bought calves and yearlings are weighed regularly to check weight gains.

To "marry" the forage production and beef production systems the forage management scheme is keyed to land used in two different ways—pasture for the summer program and hay production for the two winter programs. Soil tests are regularly made on all land and particular care is taken to lime according to test specifications. That land used for hay production is further subdivided to produce small round bales that are left and fed in the field, large (800 lb.) round bales that are stored in the field then moved to some desired location and fed, and square bales that are stored and fed back later. Where the round bales are produced the areas are rarely fertilized. However, those areas used to produce the square bales are fertilized annually. These practices serve to keep costs down while still providing adequate, nutritious forage within the three basic management programs that are used—summer, winter (cow herd), and winter (backgrounding herd).

Small round bales of fescue hay that will be fed in the field to the cow herd during the winter.

Summer management program: In March both the cow herd and the backgrounding herd are placed on pastures utilized in a three-pasture rotation. Cattle spend 2 weeks on and 4 weeks off each pasture in the rotation. According to Matthew Van Dyke, "Orchard grass and tall fescue seem to be the top forage producing summer grasses, though fescue produces best in the fall. However, younger cattle present a dilemma when grazed on mixed fescue pastures as they tend to leave clumps of fescue to get older and less palatable while grazing the other grasses and legumes. In order to promote more even grazing we have had good results from seeding red clover in the fescue stands."

To achieve the greatest summer gains the backgrounding herd is placed on those summer-use pastures with the higher legume content. Van Dyke feels that this matches those animals having the highest potential for rapid gains with the highest quality forage.

"Our best overall summer legume is birdsfoot trefoil," says Van Dyke. According to him, birdsfoot trefoil is successful in this area because: (1) it withstands drought and doesn't go dormant; (2) it readily reseeds if rested during part of the summer and (3) it is an outstanding forage producer when

The author is associate professor, School of Forestry, Fisheries and Wildlife, University of Missouri, Columbia, MO 65211. He is past president of the Arkansas-Missouri Chapter, Southern Section, SRM

Editor's Note: In this article the author has attempted to describe not only the management philosophy behind a midwest grazing operation but also some innovative management techniques utilized on the Van Dyke farm. He has been particularly impressed with the mixture of complex management techniques and common-sense shown by the Van Dykes. Furthermore, the author and the editor hope that this article will encourage others to report on their grazing land management activities in this part of the world.

[1] *Backgrounding* is a Missouri term meaning the growing out of steer and heifer beef from weaning to entering the feedlot for finishing.

Large (800-pound) round bales.

used on soil poor enough to reduce grass competition.

Two winter management programs: Different wintering programs are utilized for the two herds on the Van Dyke farm. The more coarse forage is fed the cow herd while the better forage is fed the backgrounding herd.

In about mid-December prior to calving, the cow herd is moved to those pastures where the small, round bales have been left. The main grass put up in these bales is tall fescue. When necessary for additional forage, the large round bales are moved into these pastures and fed from a feeder. This practice keeps labor to a minimum and reduces wastage. Van Dyke notes however that the presence of other grass species and legumes in the hay seem to keep "fescue-foot"[2] to a minimum. Forage utilization is controlled with the use of an electric fence and a hay creep is provided for the calves. Cows are moved into the summer management program in early to mid-March with the earliest calving cows being moved first.

To "tailor" the yearlings to the available forage the backgrounding herd is divided into two groups in November on the basis of weight and age. The heavier group is placed on the more coarse forage, primarily small round bales, like the cow herd. At the onset of severe weather they are hand fed between 3 to 5 lb of a mixture of grain and soybean meal per head per day, depending on the severity of the weather. This group is sold in the spring or summer depending on market conditions.

The younger, lighter calves in the backgrounding herd are put on hay land and fed the stored, square bales. This hay is primarily ochard grass or tall fescue mixed with red clover, all cut as early as possible to maintain a high nutrient level. To keep soil nutrient depletion to a minimum Van Dyke feeds the hay back in the pasture from which it was taken. (The field location of hay is noted as it is stored.) When severe weather sets in the calves are fed 3 to 5 lb of corn and soybean oil meal per head per day. Then as soon as the weather permits, usually in March, supplemental feeding is stopped and calves are moved back into the summer management program.

Pasture Renovation—Plan Ahead

"Pasture renovation is a continuous practice," stresses Mr. Van Dyke. PLAN AHEAD is his motto! "When clearing new ground we try to visualize the results in 10 years, not just immediately after the bulldozer is finished."

On the Van Dyke farm a common-sense approach is taken with the establishment of new pastures. This involves including the following practices: (1) dozer piles are left where future shade is desired as sprouting will quickly occur; (2) shade is left on high ground to result in the most beneficial fertilizer effects as cattle droppings are washed downhill; (3) dense cedar breaks are left for winter cover; (4) new fences are laid out to minimize cattle track erosion; (5) when fencing off a wooded area, a 20-to 30-ft weedy edge is left to be protected by the fence, disking every other year keeps this edge as good wildlife cover; (6) dirt and root wads are pushed uphill to minimize soil loss; (7) clearing done in the late summer allows for immediate, usually successful, seeding to grass in the fall with minimum erosion; (8) grass is seeded with a sod drill and legumes are most successfully seeded with a broadcast seeder followed by a flexible harrow.

For sod renovation Van Dyke gets the best results by allowing livestock to closely graze the pasture in the fall and winter. In the winter, as the weather permits, clover seed is broadcast while the flexible harrow is pulled behind a tractor on a four-foot length of chain. This allows the seed to be lightly covered as it falls in front of and through the harrow. The harrow also helps spread and distribute droppings and old hay over the pasture.

"An important aspect in the success of any grazing operation is to suit the forage to the soil," says Mr. Van Dyke. Through his experience he has found birdsfoot trefoil to do best on areas with a low pH. Red clover seems to be the most productive legume in existing sod. However, he usually mixes legume species when overseeding to reduce the chance of losing a stand altogether if one species should die out. Reed canary grass is best used in low, wet spots and washes to hold the soil in place. In addition, it is very produc-

Mixed grass-legume summer pasture on the Van Dyke farm.

[2]Fescue-foot is a non-infectious disease which constricts blood vessels in the animal's extremities sometimes observed in cattle grazing tall fascue grass. It has not been determined if the toxin responsible for fescue lameness is produced by fungus, by the fescue plant in response to a fungal infestation, or by the fescue plant in response to environmental conditions.

tive as a summer forage on good soils. Tall fescue can be established simply by feeding late cut hay full of seed on bare ground or sod. Brome grass, however, will compete with fescue on good soil when it is drilled into the sod.

Key to Success—Rest

Van Dyke emphasizes that the key to success in maintaining legumes in pasture is rest—from mid-September through mid-October in Missouri. Rest is essential to allow the plants to establish root growth to carry them through the winter. As Van Dyke puts it, "We have never lost a stand that has been rested but we have killed off some that were not."

The Van Dyke Farm Company is an example of how "thinking" cattlemen can operate with a high level of efficiency in the utilization of their basic product—forage—to achieve the greatest amount of production from their livestock. It also serves as an example of a midwestern grazing operation characterized by severe winters, hot summers, and occasional droughts. The Van Dykes do a good job. They have acquired many of their basic ideas and programs from the University of Missouri Extension Division and the Soil Conservation Service. However, they have not hesitated to modify these ideas and suggestions to better suit their conditions to make the programs they adopt most effective. ●

Stockwater Development to Enhance Benefits of Brush to Grass Conversion

J. Roger Simanton and G.W. Frasier

In the western United States, approximately 45 million acres of land are classified as pasture or rangeland used primarily by livestock grazing and wildlife habitat. Of this area, only 9 million acres are classified as good condition. On much of the remaining land, improper management has caused brush to invade previously good grasslands. One of the quickest and, perhaps, the most economical methods used to restore the animal productivity of this land is to convert undesirable brush to desirable grass and forbs.

The conversion of brush to grass may change the hydrologic relationship between precipitation and runoff. This may prevent the full utilization of the potential of the treatment, as illustrated in a study on a brush-dominated sub-watershed within the Walnut Gulch Experiment Watershed near Tombstone, Arizona. This area, typical of thousands of acres of deteriorated semiarid rangeland throughout southern Arizona, New Mexico, and northern Mexico, had a grazing capacity of about 2 animal units (AU)/mi^2/year. The vegetative cover was over 80% small brush, primarily whitethorn (*Acacia constricta*), creosote bush (*Larrea divaricata*), and tar bush (*Flourensia cernua*). Animal drinking water within a 1 mile radius of the study area was a 10 ft deep, 5 ac-ft water capacity earthen stocktank at the subwatershed's drainage outlet. Annual precipitation in the area averages 11 inches, with about 2/3 of the total occurring during the summer thunderstorm season (June through September). Surface runoff into the pond occurs only during the thunderstorm season and is variable in both quantity and frequency. Because of the variable watershed runoff and high seepage and evaporative losses from the pond, the performance of the stockpond as a watering facility was marginal. Because of the limited success of the stockpond and the uncertainty in the hydrologic effects of the rootplowing and seeding, a water-harvesting system was designed and included in the range renovation plan.

In June, 1971, the watershed was fenced to control grazing and then root plowed on the contour. It is common practice to seed immediately after root plowing. However, it was necessary to delay seeding until July, 1972. Because of seed availability, 80% of the area was seeded, using a rangeland drill, to sideoats gramma *(Bouteloua curtipendula)* at a rate of 7 lb/acre. The remaining area was broadcast-seeded to blue grama *(Bouteloua gracilis)* at a rate of 5 lb/acre. The cost of the root plowing and seeding was $40/acre, or about $4,000 for the entire watershed. Three years after seeding, the dominant vegetation of the watershed was grass, comprising about 85% of the total cover.

The water-harvesting system consisted of a 10,000-ft^2 catchment apron covered with an asphalt-fiberglass membrane, a 5,000-gallon closed-storage tank, and a float-valve controlled drinking trough. The catchment site was cleared of vegetation with a road grader, and soil sterilant was spread on the soil surface and wetted into the soil. Fiberglass matting, supplied in 3-ft wide rolls, was unrolled across the catchment, lap-joined, and then saturated with an asphalt emulsion. Two weeks later, a sealcoat of roofing-type asphalt-clay emulsion was spread on the asphalt-

The authors are hydrologist and research hydraulic engineer, Southwest Rangeland Watershed Research Center, Tucson, Arizona 85705.

This article is a contribution of the Soil, Water, and Air Science Program, Agricultural Research, Science and Education Administration, U.S. Department of Agriculture. It was presented at the 32nd Annual Meeting of the Society for Range Management, Casper, Wyoming, 13-15 Feb., 1979 under the title of "Range-Water as Affected by Rangeland Improvement Practices."