The Philosophical Difference between Range and Pasture Management in Oklahoma

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Proper management of range and introduced pasture has a common objective of providing forage for the herbivores of our choice. Almost every farm or ranch in Oklahoma has the potential to develop both introduced grass pastures suited to intensive management inputs and rangeland suited to extensive management practices. Bermudagrass is the primary introduced forage grass in Oklahoma, and it is adapted to all dryland areas except the Panhandle region. The Panhandle region of the state is now witnessing an expansion of introduced pasture in the form of the old world bluestems. Other introduced grasses having a significant impact are weeping lovegrass on sandy soils of western Oklahoma and tall fescue in the eastern half of the state.

A new textbook on range management states that "Stands of introduced forages that are maintained without annual cultivation and irrigation and are harvested by grazing animals are considered as rangeland" (Holechek et al. 1989). While this definition may be adequate in the arid west, the definition is too broad for the sub-humid regions where fertilization, burning, mowing, and interseeding are common pasture management practices.

There are some distinct differences in the management strategy of high input introduced grass pastures vs. low input rangelands that often confuse grassland managers. Since introduced grasses and native range are found on nearly every ranch in the state, it is important to the graduates of our range program and for the success of extension activities that these management differences be recognized.

There are common physiological traits that range and introduced grass pastures share. For example, all forage has its highest quality at the youngest stage of growth. Thus, quality of a growing plant is not static, but is usually declining. The grass manager must comprise between securing high quality forage and highest forage yield. The management principles with respect to root carbohydrate reserves and plant senescence and the principles of animal response to stocking rate apply equally to rangeland and introduced grass pastures.

There are also some important differences in the management of rangelands compared to introduced pastures. One fundamental difference is that range management strives to maintain or improve persistence of desirable species in a multispecies stand while pasture management is often devoted to maintaining a monoculture for high quality and quantity forage.

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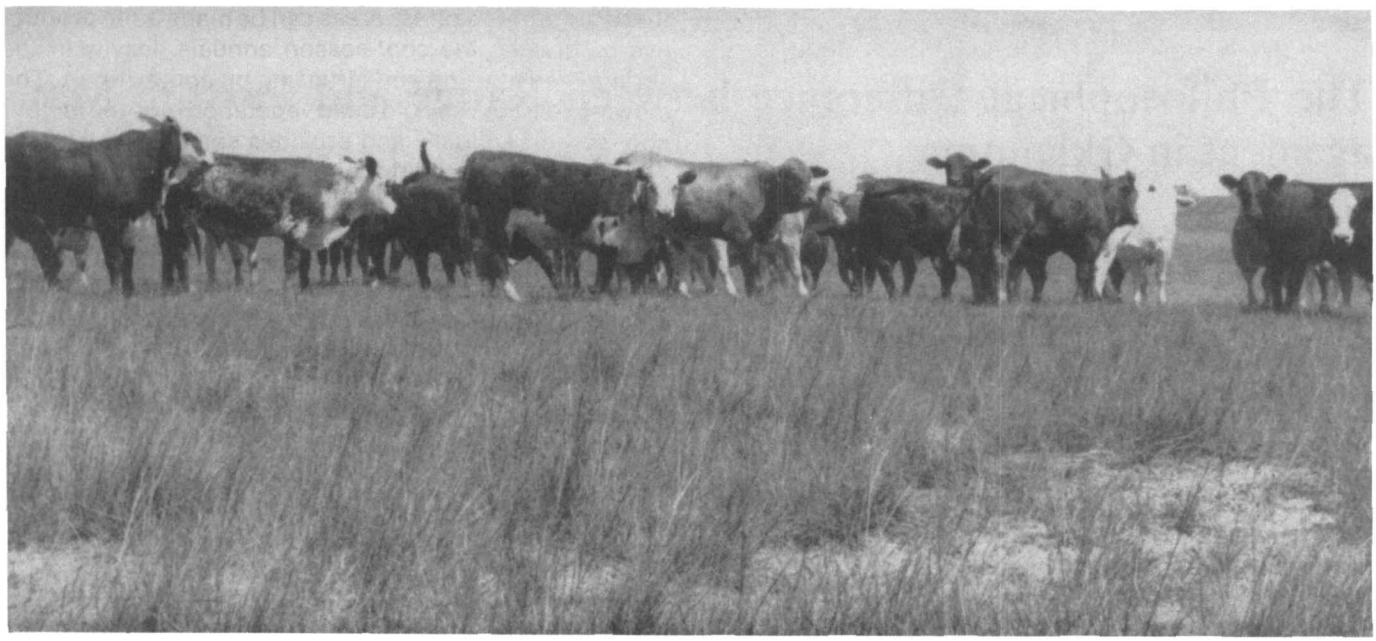
Journal article 5379 of the Oklahoma Agr. Exp. Sta., Stillwater 74078.

Speed of Physiological Maturity

Weeping lovegrass and bermudagrass have a much faster growth rate, and therefore, mature more rapidly than native grasses. Weeping lovegrass begins growth 2-4 weeks earlier than the warm-season native grasses and by mid-May seed heads have emerged (McMurphy et al. 1975). It is important to remove the first crop of weeping lovegrass by June 1, either by grazing or hay removal, because weeping lovegrass will reach physiological maturity and be very low quality forage after that date without forage removal.

Fertilized bermudagrass should be grazed close several times during the growing season, but that grazing management would be disastrous to the native tall grass prairie.

Bermudagrass becomes a low quality forage even faster than weeping lovegrass; therefore, management should be designed to graze bermudagrass when it is between 2 and 4 weeks of age (Burton and Hanna 1985). Some hybrid bermudagrasses do not develop seed heads and some common genotypes will flower very quickly; thus, stage of physiological maturity cannot be defined and age is an important factor in quality. A rotation grazing schedule with stocker cattle on bermudagrass should provide grass that is between 2 and 3 weeks old because stockers require high quality for rapid gains. Bermudagrass will provide adequate forage quality for cow-calf systems if the grass is between 3 and 4 weeks of age.



Weeping lovegrass with good management can provide high quality forage for stocker cattle.

Forage production will be greater because of the longer deferment interval. Both weeping lovegrass and bermudagrass must be used, either grazed or hayed, at appropriate intervals to maintain the forage quality.

Native warm-season grasses are much slower in reaching physiological maturity and range forage that has been deferred until July 1 will still be of reasonable quality (Waller et al. 1972). However, deferring weeping lovegrass and bermudagrass until July 1 would result in very poor quality forage, and some ranchers claim that cows will eat the wooden fence posts before they will eat such grass. Thus, a rancher has more flexibility in timing the utilization and deferment of native range than with introduced grasses. The introduced grasses must be utilized at the appropriate quality stage or forage quality becomes prohibitively low.

Speed of Regrowth

One of the major differences between introduced grasses and native range is in their regrowth response. Whenever environmental temperature is appropriate, soil moisture is available, and soil nutrients are adequate, the introduced grasses will have a much faster rate of regrowth following forage removal than the native grasses (Langston and McMurphy 1972). This rate of forage regrowth is greatly enhanced by the use of adequate nitrogen fertilizer.

This speed of regrowth together with the speed of physiological maturity and the rate of root carbohydrate replenishment dictate the time schedule of a rotation. Weeping lovegrass requires about 4-5 weeks recovery to maintain the plant vigor (Denman et al. 1953), but native range if grazed as closely as weeping lovegrass will require a far longer time interval for recovery. Weeping lovegrass is a bunchgrass and grazing will leave mostly stubble with very little leaf area. Bermudagrass is rhizomatous and stoloniferous, develops a close turf when grazed, and maintains considerable leaf area following grazing. Thus, bermudagrass can survive and be productive under a rotation schedule with only 2 weeks deferment.

Ecological Concepts

A basic principle of range management is to encourage plant succession to the highest successional stage which is consistent with the suitability of the vegetation for the manager's objectives. This successional goal is qualified because the climax dominants in some range areas may be brush (blackjack oak, post oak, sand sage, and shinnery oak), and a subclimax of the warm-season native tallgrasses would be the most productive forage type for cattle. Forage production and thus, livestock production, is enhanced by control of these unwanted woody species and the reasonable management objective is a subclimax dominated by the tallest native grasses that the site will support.

Introduced pasture management is often based upon a monoculture and plant succession must be stopped. The annual weedy grasses and forbs that immediately infest an introduced pasture seeding represent the beginning of plant succession (the pioneer stage) and the pasture manager must constantly strive to prevent plant succession in order to maintain the introduced species of his choice.

Range and Pasture Improvement

Overgrazed rangeland must receive a deferment from grazing during the growing season to restore vigor to the native grasses. Areas in poor to fair condition may require deferment for an entire growing season or longer to res-

Unmanaged weeping lovegrass with old mature stems is not forage.

tore vigor to the native grasses. Winter or dormant season grazing is acceptable and should be encouraged especially in the higher precipitation areas of central and eastern Oklahoma to prevent excessive accumulations of mulch. Plant succession can be enhanced with judicial use of herbicides and controlled burning. However, the most important ingredient in range improvement is to provide the native grass a chance to grow during the growing season to enhance vigor and density. An obvious complementary role of the introduced grass pasture is to provide forage while the range is being deferred.

Since grazing deferment for an entire growing season promotes succession, this would be a pinnacle of mismanagement for established introduced grasses. The quality of introduced grasses deferred for an entire growing season would be lower than that of native range (Dahl et al. 1987). Native range deferred for the growing season can and should be used for winter grazing with appropriate protein supplementation, but the introduced grasses do not make satisfactory winter standing forage unless these introduced grasses are harvested at least once during the growing season.

One effective way to improve an introduced grass pasture is to mow, fertilize with nitrogen, and graze. Many old bermudagrass fields in central and eastern Oklahoma visually appear to be poor condition rangeland. However, these old bermudagrass areas can be made quite productive by grazing the cool-season annuals heavily in the spring, then mowing and fertilizing on about June 1. The mowing removes any old dead vegetation plus the mature cool-season annuals, and provides some weed control. The bermudagrass with its fast regrowth and ability to respond to nitrogen will quickly dominate. No deferment is necessary after mowing bermudagrass, but weeping lovegrass must always be given a deferment because it has very little leaf area remaining following mowing.

If native range were to be subjected to a June 1 mowing, fertilizing, and continued grazing, the result would be economic and ecological disaster.

Degree of Grazing Utilization

The old range management rule-of-thumb about "Take half and leave half of the forage" is still good advice for season-long and year-long continuous grazing. With some types of rotation grazing systems this rule can be modified, but if more than half of the forage is removed during the growing season, then it is essential to give the native grass some deferment during the same growing season.

The rule of "Take half and leave half" does not apply to introduced grass management. With introduced grasses the objective is to grow a crop of quality forage, graze it or make hay, then defer it for the rapid regrowth which produces the next crop. We are less concerned about root food reserves for the winter survival of the introduced grasses. An exception is weeping lovegrass in northern Oklahoma, where this grass is at its northern limit of adaptation. Thus, in northern Oklahoma it is prudent to provide a fall deferment of weeping lovegrass for 3-5 weeks to insure better winter survival.

Stocking Rates

The operator of native range must make an estimate of the carrying capacity of his range and stock it accordingly. This means that he must adjust the number of animals to the quantity of range forage he expects to produce.

The manager of introduced pasture has one additional option in that he can use nitrogen fertilizer to adjust the quantity of forage to meet the forage demand of his animals. Admittedly, precipitation events can still limit forage production, but with these introduced grasses, a late summer rain plus adequate nitrogen fertilization can quickly provide much needed forage. This ability to rapidly grow more grass is invaluable for relieving grazing stress on adjacent range and helps provide stability to the overall forage-livestock management program.

Grass with Low Root Carbohydrates

Following a season of overutilization the range manager has the limited options in the next season of either lighter stocking, deferment, or rest. With introduced species the critical factor is grass survival through the winter. The use of nitrogen fertilizer can quickly restore the plant vigor and recovery is rapid.

Other Introduced Forage Species

The role of the Old World bluestems, which include the varieties Spar, Plains, and Caucasian, in the forage system is not as clearly defined. Although the Old World bluestems are slower in reaching physiological maturity than weeping lovegrass and bermudagrass, the principles of introduced pasture management apply equally. The quality of regrowth of the Old World bluestems is very good in late summer, and the manager should opportunistically graze these pastures to harvest that high quality.

The cool-season pastures of tall fescue in eastern Oklahoma and tall wheatgrass on salty sites in central Oklahoma are valuable additions to the forage system because they provide forage in the late fall, winter, and early spring when the native range is dormant.

Complementarity of Native Range and Introduced Pastures

The major role of introduced grasses in a ranch operation should be to provide winter forage where cool-season species are adapted, and to use warm-season introduced grass pasture to provide opportunities for the improvement of range through deferment from grazing during the summer (McIlvain and Shoop 1973). There is no question about the proper grazing period of introduced grasses because the introduced grasses must be utilized whenever quantity and quality are available. The warm-season introduced grasses do not maintain forage quality if permitted to grow too long. However, weeping lovegrass, bermudagrass, and Old World bluestems that have been properly fertilized and managed will also make good winter forage, sometimes with sufficient crude protein to meet maintenance requirements of dry beef cows. The native range grasses benefit from growing season deferment and are well suited for wintering livestock when properly supplemented with protein.

Site selection is important for success with the introduced grasses, and generally, this means planting these introduced species on the most productive soils. This provides an added benefit to total forage production, and the subsequent carrying capacity of the total ranch system is greatly enhanced.

Summary

There are distinct differences in management requirements of range vs. introduced pasture with respect to ecological objectives, regrowth potential, and maintenance of forage quality. Knowledge of these differences enables a manager to use a combination of native range plus some introduced grass pasture to achieve greater flexibility and to increase total beef production when each is used to complement the weaknesses of the other.

Literature Cited

Burton, G.W., and W.W. Hanna. 1985. Bermudagrass. p. 247-254. *In:* M.E. Heath, R.F. Barnes, and D.S. Metcalf (ed.) Forages the Science of Grassland Agriculture, 4th ed. Iowa State Univ. Press, Ames.

Dahl, B.E., M. Caldwell, and P.F. Cotter. 1987. Winter stocker cattle performance with protein supplement on ungrazed weeping lovegrass. p. 21. *In:* L.M. Smith and C.M. Britton (ed.) Research Highlights-1987 Noxious Brush and Weed control; Range and Wildlife Management. Vol. 18. Texas Tech Univ., Lubbock.

Denman, C.E., W.C. Elder, and V.G. Heller. 1953. Performance of weeping lovegrass under different management practices. Oklahoma Agr. Exp. Sta. Tech. Bull. 48.

Holechek, J.L., R.D. Pieper, and C.H. Herbel. 1989. Range management principles and practices. Prentice Hall, Englewood Cliffs, NJ.

Langston, D.L., and W.E. McMurphy. 1971. Old World bluestem, weeping lovegrass and native grass fertilization. p. 35-42. *In:* Oklahoma Agr. Exp. Sta. Res. Rep. 662.

McIlvain, E.H., and M.C. Shoop. 1973. Use of farmed forage and tame pasture to complement native range. p. L1-L19. *In:* F. Baker (ed.) Great Plains Beef Symposium. Great Plains Agr. Counc. Pub. 63. University of Nebraska, Lincoln.

McMurphy, W.E., C.E. Denman, and B.B. Tucker. 1975. Fertilization of native grass and weeping lovegrass. Agron. J. 67:233-236.

Waller, G.R., R.D. Morrison, and A.B. Nelson. 1972. Chemical composition of native grasses in central Oklahoma from 1947 to 1962. Oklahoma Agr. Exp. Sta. Bull. 697.

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