

many livestock producers is getting on range early and taking cattle off high cost winter feeding programs. However, very often forage growth does not start until well into April, with very little forage produced until after the first of May. We have turned cattle out on old growth forage held over from the previous year, with a little regrowth that provides additional nutrients. Supplements can play an important role in this type of program; however, the same ranges should not be used year after year but alternated on some rotation basis.

Rest rotation systems and deferred rotation systems have provided some management flexibility and in some cases have improved forage productivity. Several years ago some of the big terms were high intensity, moderate intensity, and low intensity grazing, in which systems were designed to take off something like 80, 60 or 40% of the available forage. Under these systems high intensity or heavy grazing generally returned more pounds of beef per acre. Light grazing returned greater gains per head with the moderate grazing in between. Generally, high intensity grazing resulted in some long term deterioration of the range, ultimately leading to lower beef production per acre. When we learn more about forage quality and seasonal patterns of use as they relate to livestock gains and performance we can suggest alternate uses.

We have looked at the practice of grazing a given area first with yearling cattle or cows with suckling calves, so we essentially cream off the top 30% of the forage and then move on to another pasture. This does not overuse the range, and we can put the cows back on these areas after the calves have been early weaned. Following this practice our yearling cattle and suckling calves have gained significantly faster than those in a year-long or season-long type grazing system.

One of the latest schemes being employed and studied is short-duration grazing. This offers an excellent opportunity to intensify total management of both grass and pasture and uses the combination of knowledge available to us to manage forage. It requires some fencing investment but enhances the ability to manage cattle.

As the need for more intensive forage management has developed so have the techniques, materials and knowledge of economical fencing systems. Probably one of the greatest boons to forage management is the modern electric fence, sometimes called the New Zealand fence. This permits us to develop fencing, move fences and generally do a better job of manipulating cattle movement at reasonably low cost and significantly less work.

MEADOW GRAZING

Meadow forage offers alternatives and opportunities not available on rangeland. Normally, meadowland would be grazed in a continued, rotational or other scheme in order to get regrowth of higher quality. Meadowland which cannot be grazed in this manner is generally hayed when quality is, hopefully, near optimum for animal production. Other uses employed are rake-bunching, some types of standing cure or grazing with a supplement.

Haying is probably the traditional way of harvesting meadow forage to maintain consistent quality feed for livestock. The high cost of energy, machinery and labor for putting up hay and feeding it later demands a new look at schemes to increase the efficiency and economy of livestock systems. We have looked at and are still looking at several schemes to use this

FORAGE UTILIZATION BY GRAZING

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ABSTRACT

Optimum range livestock production can be achieved only through compatible livestock and forage management. Forage resources should be inventoried, both quantitatively and qualitatively, to establish a base for developing a range livestock and forage management program. Since forage available to the grazing animal is an ever-changing product, it must be monitored with respect to nutrients and availability throughout the grazing period. The principal objective of the studies contributing to this report was to evaluate forage periodically throughout the grazing season and relate these data to animal requirements to establish a program permitting maximum livestock production from the forage. Since it is not possible to harvest all forage when it will give maximum animal production, management programs were developed to use forage with particular classes of animals when it would contribute the greatest return to the animal production system.

In discussing forage utilization by the grazing animal we need to understand that wherever forage is grown it is an everchanging product, starting out with young growth high in nutrient quality that decreases as the plant matures. These same qualities are apparent wherever grass grows, in the highly productive tropical areas of the southeast or the arid ranges of the west. In order to discuss livestock grazing and forage utilization we need to understand the grasses, how they grow and when they grow and their nutrient quality during the times the animal is grazing them. Optimum range livestock production can be achieved only through compatible livestock and forage management.

The first requirement in a livestock and forage management program is a quantitative and qualitative inventory of forage resources. This inventory should include the range forage, meadowlands and developed irrigated pastures available for grazing and must include the nutrient composition of these forages throughout the year. Only after the relative seasonal availability of nutrients is known can livestock be managed to obtain a maximum return from the available forage resource.

To develop a good management plan we need to put the total system in perspective, considering when each area or type of forage resource will fit into the range livestock production system to give an optimum return. This may mean that we utilize a given meadow or range forage pasture at a time when we could probably get more production out of it with a different class of animal or possibly grazing a certain class of animal at a different

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time. This type of integrated management is not new and can extend from an extremely intensive system to a more extensive system. Our forefathers employed many of these concepts in their management; however, today we have tools for refinement that can give us greater returns.

One of my frustrations in my early range livestock nutrition and management research was the view of the average cattle producer regarding forage. If forage was there, little regard was given to the nutrients available to the grazing animal. Yet, this same producer would not buy a sack of feed or a ton of blocks without first inquiring as to the protein content, the mineral content and the general makeup of the feed to supplement a forage he knew little about. In many cases this forage was 95 to 100% of the diet. We need to know more about forage and how grazing might influence productivity and quality.

Finally, to maintain an ecological balance, cattle management with a forage system must be consistent with and based on the physiological requirements of the plants. This presentation will not cover these aspects, but they are an integral part of any of our management plans.

EVERCHANGING FORAGE

It is obvious that we cannot discuss all the ramifications of forage production systems around the world. Therefore, our comments will be confined to western rangelands and complementary forages such as meadowlands and irrigated pastures. We will draw on our experiences and research with the sagebrush-bunchgrass rangelands and the meadowlands and pastures complementing them.

Forage quality in these areas can be affected by many factors, among them the season and amount of use, the mixture or variety of species as they are grazed and the moisture pattern within a particular growing season. In fact, we have measured greater differences within grass and grass-like species between years than we have between species within any given year. The manager of a forage beef production system must consider the nutrient quality of available forages and how forages meet the requirements of specific classes of animals for specific levels of production. With this type of knowledge he can manipulate cattle management to optimize the return from forage.

In early growth forages are high in nutrient quality, and as they go through the growth stage this quality decreases rapidly. Forages in late April and early May may be more than 20% crude protein, with corresponding high levels of digestible energy. The mineral content of these forages is also generally in good balance. As forage reaches the flowering and seed production stage the protein level drops to 7 to 8%, with a corresponding drop in energy. Generally, whether we are on rangelands or meadowlands we will see a drop in crude protein of about 1% per week and possibly even greater. Generally, by the first of August the crude protein content of our meadow forages and our rangelands is down to 4 or 5%. Later in the season, as the plant matures, the nutrient quality drops at a slower rate, so by the first of September it is in the area of 3 to 4%. When we relate forage quality to livestock production we find that suckling calves on this type of forage will gain about 2 lbs per head per day during April, May and June, about 1½ lbs per head per day during July, 1 lb per head per day during August and almost no gain after the first of September. Yearling cattle follow the same pattern, gaining 2 to 2½ lbs per head per

day during the months of May and June, about 1½ lb per day during July, less than a pound during the month of August and almost no gain beyond this point. This data suggests that some management changes can be made to capitalize on the knowledge we have.

PRODUCTION POTENTIAL THROUGH MANAGEMENT

Breeding Period

There are several management factors that need to be considered to capitalize on our knowledge of range forage quality. A short breeding period (not over 60 days) offers many advantages. We can increase breeding efficiency by employing several management practices that are not generally available or are at best costly and difficult with an extended breeding period. We can use more pastures, have better water control and better bull distribution. If artificial insemination is a consideration, it will be more effective under these conditions.

If we confine breeding to 60 days, we can reduce pasture size and select pastures that respond well to fertilization. We can generally expect a production increase of about 50% from modest levels of fertilization. When we measure the low production of many of our forage areas against the cost of fertilizer application the benefits seem marginal. On the other hand, if through the practice of fertilization we can increase carrying capacity by 50% and, consequently, use a smaller pasture for breeding, we may increase conception rates by 10% or more in a 60-day breeding season. This makes the economics of fertilization quite favorable.

Another advantage of the 60 day or shorter breeding period is the uniformity of the calf crop. A uniform group of calves is more attractive to the buyer and is even more important for those ranchers who maintain ownership. Calves that are uniform in weight and size require less management. At weaning time we can put them under a single management program; whereas, if we have calves of various ages and sizes it is essential that each class be put under a management and feeding program designed for their specific needs.

Weaning Time

Traditionally, weaning time has been when cattle come off the ranges, and, as a result, many of our range calves are not weaned until November or December. We are losing the opportunity for these calves to gain during a three or four month period that may be the most productive and efficient period of their lives. If we look at the production curve, we usually find that 80% of the production on the calf comes during the first half of the period that the cow is nursing the calf. Once calf gains drop to less than a pound a day it is questionable that we can afford to keep the cow and calf together.

Early weaning permits the brood cow to do a better job of foraging and come into the winter in better condition, requiring less winter feed. Early weaning also gives the calf an opportunity to adjust to weaning before the stress of bad weather. Calves weaned during warm September or early October weather will adjust readily to weaning and new feed and take the stress of bad weather in stride without ill effects.

Calving Time

Traditionally the majority of our cattle calve in spring. Mother Nature has provided this schedule as a result of the weather pattern and the time when forage is produced in abundance and high quality. It may be that an advantage can be gained by switching our calving to a different date, earlier or later. In our research we have shown excellent opportunities for additional gain and efficiency with fall calving.

The object of switching calving time is to capitalize on the high nutrient quality of forage available to the animal at a particular time of the grazing season. For example, in the high desert country of southeastern Oregon, calves are dropped in March and April and go onto range at that time. Forage quality is high, and the cow comes into peak milk production rather rapidly and sometimes provides more milk than the calf can readily consume. As a result, the calf may scour. Regardless, it makes ineffective use of this higher milk production. By the time the calf is large enough to consume greater quantities of milk and use the forage, forage quality has dropped, milk production drops off rapidly and the calf is unable to make effective use of the forage directly. A larger calf going on this range can make more effective use of the forage.

Many operators who switch to fall calving are able to intensify their management and increase production. Others have attempted fall calving and are unhappy, but, in most cases, this is because they failed to take advantage of the opportunities resulting from switching their calving date.

SUPPLEMENTS TO ENHANCE PRODUCTION

If range forage is adequate in quality to provide for maintenance of the animal and a one pound per day gain, a supplement should give a very efficient return. Some of the range supplement programs that we have worked with were extremely intensified and will not fit into a general pattern of range beef cattle management. On the other hand, where we have improved ranges, such as seeded or fertilized ranges or meadowlands that can be grazed, we can practice some intensive management.

As pointed out earlier, yearling cattle will gain 2 to 2½ lbs per head per day during the months of May and June, then drop off to 1½ lb per day during July and less than a pound during August. With a modest level of supplementation, gains can be enhanced during the early part of the season and maintained throughout an extended period, giving an excellent return from the supplement. We have conducted several studies in which over the summer grazing period 200 pounds of supplement gave us an additional 100 pounds of gain. In any supplementation program we should make sure that we are truly supplementing the animal and not substituting a supplement for the forage that we are attempting to harvest. Remember that in most cases the only reason we have cattle grazing is to provide a means of marketing the forage.

FORAGE MANAGEMENT SYSTEMS

There are many forage management systems and schemes applied by private operators and public management agencies, and no one system fits every situation. I think the range user must have a program that fits his needs from the standpoint of maintaining high quality forage as well as producing high quality cattle with an economic return. The critical time for

forage and increase the economic return to the livestock producer.

Rake-bunching is a system in which the hay is cut when it nears maximum yield in nitrogen and dry matter. In southeast Oregon this generally occurs in the first two weeks of July after the grasses have flowered and are in the early seed stage. This meadow hay will be 8 or 9% crude protein with reasonably good digestibility values. This also is the time we would harvest this hay for conventional haying practice.

Hay is raked into small bunches and left lying in place on the field. As this hay dries and cures the exposed portion bleaches, with considerable loss of vitamin A. However, it should be realized that vitamin A is simple to supplement to the animal. There is very little leaching and spoilage and the quality and palatability remain high. This undoubtedly is because of the low moisture in this area. If we were in a higher rainfall area, rotting would probably occur.

Cattle grazed on this type of forage have performed as well as those fed harvested hay. We eliminate the costs involved in haying and feeding. However, we may sustain more loss and waste than we do from feeding. Also, we run the risk of losing feed in years of deep snow. However, we have maintained cattle on this type of operation with very limited supplemental hay feeding during some rather bad snowfall years. The value of the wasted or lost hay is more than offset by the lower cost of getting the feed to the animals compared to the traditional haying and feeding method.

Chemical curing studies have been conducted in which Paraquat is sprayed on forage when it normally would be hayed, and the forage is grazed in late fall and throughout the winter. Other than the loss in vitamin A, the nutrient quality of this forage is maintained throughout the winter, and, while animal intake may have been limited somewhat compared to traditional forage from the haying operation, the cattle came through the winter in adequate condition. We were fortunate in having light snow cover through those years. These studies have been limited, since the material has not been cleared for this use.

One of the easiest feeding methods is to use a no-cure, no-harvest, standing forage and supplements to maintain cattle throughout the winter. This has been done with reasonably modest supplemental cost but requires further evaluation. Electric fencing has played an important role in all these management schemes for wintering cattle on meadowland forages. It permits one to intensify the grazing in a small area, following a practice that was developed many years ago, strip grazing irrigated pastures and essentially walking animals through a pasture on a one, two or three day basis. This forces the animal to eat all the feed without putting a long-term stress on the animal. If we offer these animals a small amount of feed, as opposed to turning them into the entire field, it forces them to do a better job of cleaning up and eliminates long periods of stress.

We have barely scratched the surface as far as a production potential of our forage lands are concerned. We need to do a better job of using the technology we have in forage improvement and management in order to produce higher quality cattle and forage. We also need to do a better job of cattle management so we can optimize the return from these forages. We must be concerned with efficiency of production, but efficiency of production must have economic parameters.

If the livestock producer cannot pay the way, he will either be forced out of business or search for lower-cost means of operating. The bottom line is the net return to the operator.