A Variation of Deferred Rotation Grazing for Use under Southwest Range Conditions

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DURING the past several years there has been considerable discussion regarding the relative merits of deferred rotation grazing. Much of the material presented is unfavorable to this system of use.

In any system of grazing, however, there are many factors to be taken into consideration. As was aptly stated, (Sampson 1951) "It becomes clear that regional and local conditions have much to do with the results achieved."

The majority of rotation grazing studies have been conducted on two or three-pasture systems and most of these systems concentrate livestock on one pasture while the remainder are resting. It would seem that as rainfall diminishes such a system becomes more and more hazardous since, during the period of concentrated grazing, a pasture might be damaged to the extent that it could not recover during the ensuing rest period.

The three-pasture rotation system, with grazing concentrated on one pasture, was used in the studies of Dickson, *et al.* (1948), Frandsen (1950), Rogler (1951) and McIlvain and Lagrone (1953). In all of these studies except that of Frandsen there appeared to be little advantage, if not a definite disadvantage, in deferred rotation grazing as far as livestock gains were concerned. However, most of these studies indicated that vegetation improved under rotation. The example of deferred rotation given by Frandsen has no period of time in which livestock were concentrated for more than 46 days on a pasture producing green vegetation. This concentration was always followed by a period in which vegetation was allowed to make at least 92 days' growth. This system of grazing apparently gave favorable results.

Procedure

A deferred rotation system was established at the Ranch Experiment Station on the Edwards Plateau of Texas in a comparison with continuous grazing at three rates of stocking. This study has been carried on for a period of four years, from July 1, 1949 to June 30, 1953, using a combination of three classes of livestock—cattle, sheep and goats. Under the yearlong grazing system, three rates of stocking were employed, namely, heavy at 48 animal units per section, moderate at 32 animal units per section and light at 16 animal units per section. Under the deferred rotation system, four 60-acre pastures were set up as a rotation unit in which a combination of cattle, sheep and goats was used at a moderate rate of stocking, or 32 animal units per section.

In the rotation system (Fig. 1) each pasture is grazed 12 months, then rested 4 months. In Figure 1 the pasture which is rested during any period is enclosed by heavy black lines. The rest period comes at a different season in each succeeding 16-months grazing cycle. Thus, during any given four years'

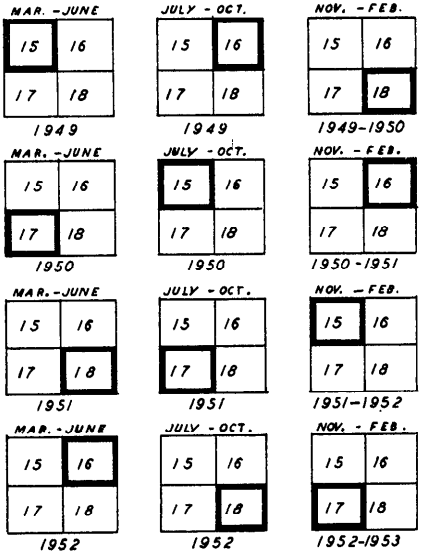

FIGURE 1. Grazing system on rotation pastures showing deferment sequence.

grazing, each pasture is deferred once during each of the 4-month seasonal periods. This allows some plants to set seed and gain vigor. Under this system only one group of livestock is moved every four months. The stocking rate on each of the three stocked pastures during any given 4-month period is 43 animal units per section. When the acreage of the deferred pasture is included for computing stocking rates in the four pasture rotations, the rate is 32 animal units per section overall.

Rainfall

During the first year of the study, 1949–50, the rainfall was 26.97 inches, which was above the average of 24 inches for the station. The three years following were characterized by a severe drought. The yearly rainfall for the three years, 1950–53, was 14.61 inches, 6.96 inches and 4.91 inches respectively.

Results

Reaction of Livestock to Deferred Rotation as Compared to Yearlong Grazing

In the first year of this study, 1949–1950, rotation grazing showed little evidence of being superior to yearlong grazing. At a stocking rate of 32 animal units per section for both systems, steers made a gain of 285 pounds per head under rotation grazing and 283 pounds per head under the yearlong system. On the other hand, sheep made slightly less gain under rotation than under yearlong grazing, or 35.0 and 37.2 pounds per head, respectively.

In the three years following 1949–1950, the trend has been for livestock weights to increase in the rotation pastures above those under yearlong stocking, except for 1952–1953 in which steers in the rotation pastures gained only 143 pounds per head while those in the yearlong-grazed pastures gained 175 pounds per head. The weight gains

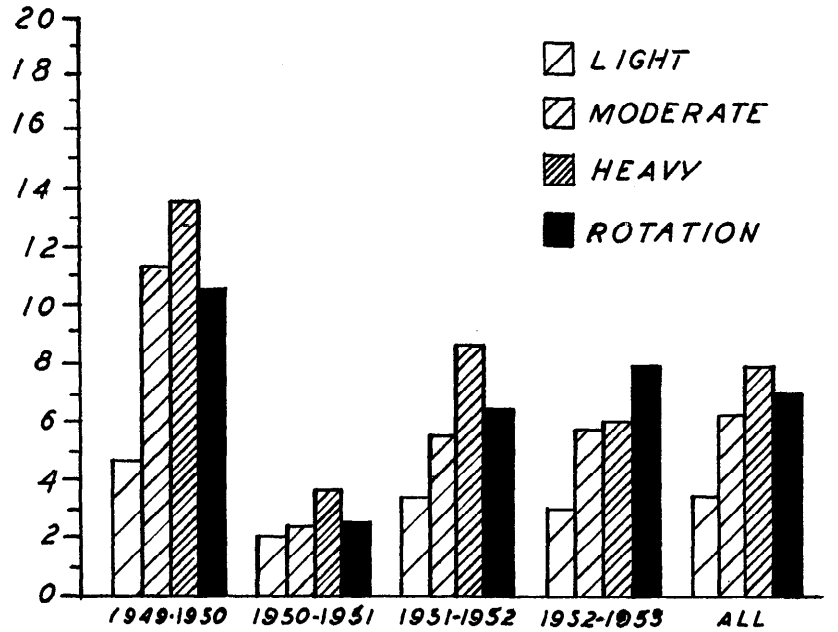

FIGURE 2. Per-acre gains for sheep under continuous and deferred rotation grazing.

of sheep in the rotation system have steadily increased as compared with those under yearlong grazing.

Per-acre gains of sheep under yearlong and rotation grazing are shown in Figure 2. During the first year of the study, 1949–50, the highest gains of 13.5 pounds per acre were obtained from pastures grazed yearlong with 48 animal units per section, followed in order by gains of 11.2 pounds per acre from yearlong stocking at 32 animal units per section, 10.2 pounds from rotation grazing at 32 animal units per section and 4.3 pounds from yearlong stocking at 16 animal units per section.

In 1952–53, sheep on the moderately stocked rotation pastures made the highest gains of 7.9 pounds per acre, followed by the heavily stocked, yearlong-grazed pastures with a gain of 5.8 pounds per acre, and the moderately stocked yearlong-grazed pastures with 5.6 pounds per acre. During the entire four-year period, the highest annual gain of 7.8 pounds per acre was made on the heavily stocked pastures grazed yearlong. The second highest weight gain of 6.8 pounds per acre was made on the moderately stocked rotation pastures, followed in order by the moderately and lightly stocked yearlong-grazed areas with gains of 6.1 and 3.1 pounds per acre, respectively. In succeeding years, however, the advantage in gain per acre held by the pastures heavily grazed yearlong steadily diminished, while the deferred rotation pastures made consistent gains.

Figure 3 shows the per-acre gains obtained from steers under the various systems of grazing. The results are similar to those obtained from sheep, except that the steer gains of 7.7 pounds per acre under rotation grazing exceeded those from all other systems of use during the second year. Yearlong grazing at the moderate stocking rate showed the second highest gains of 5.7 pounds per acre, followed by heavy grazing with 4.9 pounds and light grazing with 3.8 pounds per acre. During the year 1952–53, the per-acre as well as the per-head gains of steers declined in the rotation as compared with moderately stocked, yearlong-grazed pastures. During the four-year period of 1949–53, nearly identical gains of 9.7, 9.8 and 9.9 pounds per acre

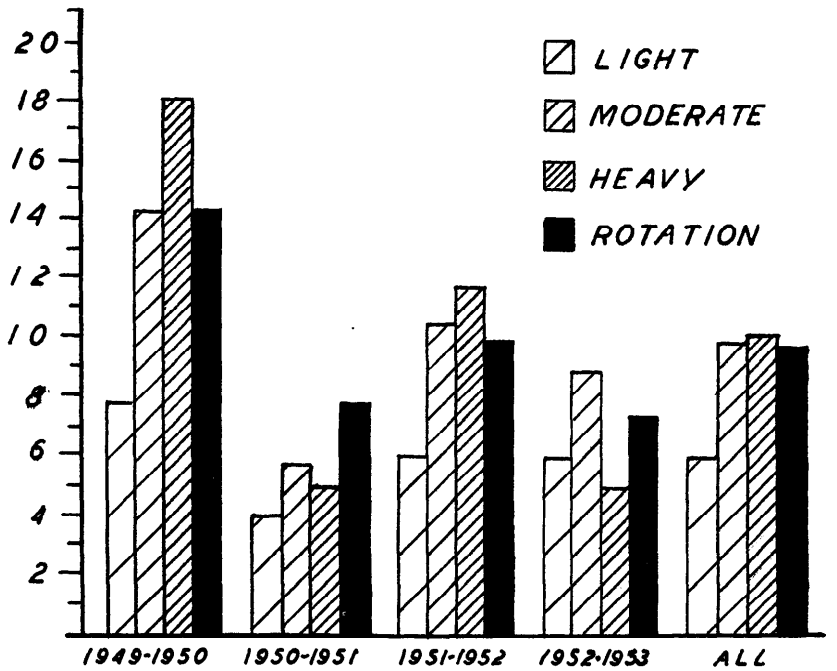

FIGURE 3. Per-acre gains for steers under continuous and deferred rotation grazing.

were obtained from the moderately stocked rotation pastures and the yearlong moderately and heavily stocked pastures, respectively.

In May 1953 a severe tornado passed through the rotation pastures and destroyed practically all of the grass on approximately one-third of the area. Decline in steer weights on these pastures during 1952–53 is attributed to this cause. The storm did not strike the moderately stocked, yearlong-grazed pastures and thus the vegetation was not disturbed as on the rotation areas.

Vegetational Response

Plots were established on all pastures for determinations of vegetational trends under the various systems of grazing. The initial survey indicated that all pastures had a similar cover of grass. The composition of this cover during the first year of the study was as follows:

Curly mesquite grass	77 percent
Hairy triodia and red grama	13 percent
Needle grasses	6 percent
Desirable bunch grasses (sideoats grama, hairy grama, silver bluestem, little bluestem, fall witchgrass, Texas wintergrass and others)	4 percent

The vegetational composition had changed very little on most pastures by the fall of 1952. However, the greatest improvement was made on the moderately stocked rotation pastures and on the lightly stocked pastures grazed yearlong. The bunch grasses, lightly utilized, were seeding and the seedling grasses were establishing themselves in the areas. In the moderately stocked pastures grazed yearlong, the bunch grasses were grazed more closely, and, although the mature plants were seeding, few grass seedlings were becoming established. There was no evident reseeding on the pastures heavily grazed yearlong.

A survey of grass survival made recently following three years of severe drouth showed a marked difference in the amount of grass which survived under the several systems of grazing. Curly mesquite grass, which in normal years comprised 77 percent of all grass cover, suffered death losses under yearlong grazing of 91, 89 and 85 percent, respectively on heavily, moderately and lightly grazed pastures. The moderately grazed rotation pastures showed a 78% loss in grass cover. However, this was true only on the areas not damaged by the tornado.

Summary

The rotation system used is simple in application, since it is necessary to move only one group of livestock every four months. Under this system each pasture is grazed 12 months and rested 4 months. The rest period comes at a different time of the year in each rotation cycle.

No definite advantage in livestock gains has been found on deferred rotation pastures as compared with those grazed yearlong at the same stocking rate. However, the vegetation on the rotation pastures is obviously improving more than that on the yearlong grazed areas. There is, therefore, a steady trend toward improved range conditions as well as increased financial returns on these pastures.

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