seeding at a 1.0-inch depth could be an advantage on areas where the surface soil dries out rapidly.

The soil firming treatment tested in this study had no effect on seedling emergence. Studies are needed in different soils to determine the effects of various degrees of firming at different soil moisture levels.

**Summary**
De-winged seeds of fourwing saltbush were sown 0.5, 1.0, 1.5, and 2.0-inch depths in two soils. Total seedling emergence at the end of 30 days was greater, and the rate of emergence higher, from the shallower depths of seeding. Seedlings emerged about the same in sandy loam soil on an A horizon and clay loam soil from the B horizon. Firming the soil over the seeds had no effect on seedling emergence. Seedings depths of 0.5 to 1.0 inch are suggested for de-winged seeds.

**LITERATURE CITED**
nomic value have been confusing and misleading.

5. Pressures of vested interests—Much publicity and advertising by these groups making claims of superior performance, quality, etc. for their breed or bloodline.

6. Timid scientists — Sometimes after learning the truth some scientists hesitate to push it.

The feeder is dependent upon and should be interested in calf producers. In our ranching operation at Spur, in order to get the most out of our product, we have integrated to the extent that we keep all the calves we produce. We grow and finish them on the ranch. This has proven to be considerably more profitable than straight calf production. But the most valuable thing about this integration is that it has enabled us to learn a great deal more about our product and has led us into applying research in order to improve.

There are a number of developments in this business in recent years that significantly add to overall production—such things as performance testing, and a number of other techniques have all offered possibilities for improvement. Three of these developments, I think are especially significant:

I. Deferred Grazing and Systematic Pasture Rotation.—This is one of the most significant and valuable research findings of our time (Fig. 1). It is not new. Shepherds 1,000 or more years ago found it paid to move flocks and not come back to the same area too frequently. The practice has been re-evaluated and still looks good.

We have almost ruined the grass in this country. At one time we were grazing 150 to 200 head per section in West Texas. Now we have trouble maintaining 30 to 40.

Research at Sonora, Texas over the past 18 years has shown that deferred-rotation grazing resulted in a 35% increase in production and the grass is still improving. Research at Throckmorton, Texas indicated a 10% increase in calf weights after five years of deferred-rotation grazing. At the Spur Headquarters Ranch we have found at 15 to 20% increase in stocking rate after eight years of deferred grazing along with significant improvement in better grasses.

In spite of this research and rancher experience, systematic rotation is possibly being used on only two % of the grassland in Texas. Yet, by proper application of known methods of range management, we could probably increase production by 20 to 25% in 10 years. Certainly we are badly in need of more research in this field, as we are just scratching the surface on the possibilities of real range management.

II. Cross Breeding.—This is another research development that has been getting quite a lot of publicity lately. However, very little use is being made of the findings.

Cross breeding is nothing new. It has been going on many hundreds of years. It has been demonstrated with plants, animals, and people. We have just recently been reappraising and re-evaluating this technique.

Following is what some of the authorities have to say about cross-breeding.

Dr. George F. Ellis, Jr. (Texas Tech), at McGregor Field Day, February 1966: "When the advantages of all traits are summed up, cross-breeds have about a 20% advantage over the present breeds.

Professor John Riggs (Texas A&M). "Poultry and hog producers, who have maximum use of hybrid vigor, are pleased now when they add two or three % with a new cross. Yet beef cattle men are sitting on a potential 25% increase and very few are using it."

Dr. L. M. Hazel (Iowa State), in personal correspondence, states: "It appears entirely probable that with the rotational cross-breeding schemes where both the cow and her calf are crossbred we may be able to get an increase of 30% in production per brood cow."

All of these estimates provide for using large dairy-type breeds or Brahman crossed with English breeds. More feed will be required, but more production per cow will result in greater net gains.

Fig. 1. Rancher Jim Barron inspects the vegetation covering the Spur Headquarters Ranch under a program of deferred grazing.

Dr. Hazel said, "The very best thing about Brown Swiss crosses is their carcass." Kept under the same conditions with Hereford and Angus, they will outweigh them by 125 to 150 lb live weight, will grade a little higher than Angus, and considerably higher than the Hereford.

Dr. Ralph Durham (Texas Tech) says practically the same thing about Holstein crosses. It appears that these crosses may produce a tailor-made carcass to meet the demands of the future.

My own experience so far has been mostly with English breeds—Hereford cows and Angus bulls (see Cover Photo). We are just now getting into the third breeding using Brown Swiss, Cross Angus-Swiss, and Cross Holstein-Angus bulls (Fig. 2). From research data available so far, it looks as though the Swiss or Holstein with the English beef breeds is the best bet for our area. From the first cross Angus-Herefords we have found heavier calves (25 to 30 lb) at weaning and 75 to 80 lb heavier through the feed lot with the crossbreds outgrading the straight Herefords about one-half grade.

A heavier, better-grading calf is profitable to the producer, but the most significant thing to his business is the cross-bred dam. Her mothering ability, fertility, and general performance is a real eye opener. Some
Fig. 2. Crossbred program at the Spur Headquarters Ranch consists of Hereford-Angus crosses and a backcross to Brown Swiss, Angus-Swiss, and Holstein.

Fig. 3. A simple drylot can be constructed on the ranch to fatten calves and to hold cattle under low-cost returns maintenance.

of the things we have experienced include:

1. Conception in virgin heifers—For years we have averaged about 90% conception in virgin replacement Hereford heifers. With three crops of crossbred heifers we have gotten 97 to 98% conception.

2. Breeding back for second calf—We have always had trouble getting heifers calved at two years of age to breed back for the second calf. Last summer was hard and dry. This spring in comparing the breeding records of Herefords and Angus-Hereford crosses of this category, nine out of 30 Herefords failed to breed back and only two out of 52 crossbreds were open.

3. The crossbreds breed back more quickly and have a more uniform calf crop.

4. Mothering ability—We note a marked improvement in crossbreds. Even after difficult calving the crossbred claims her calf quickly.

5. The crossbred cow is healthier and has more vigor. This is obvious in periods of stress and under adverse conditions.

III. All Concentrate.—The third significant research finding is truly a relatively new development. Work as late as 1940 indicated that an all-concentrate ration couldn’t be fed to cattle. Breakthroughs were made by scientists in the late 50’s and early 60’s in Europe and the United States. The studies with sorghum grains in all-concentrate rations, pioneering at Texas Tech by Dr. Durham and his co-workers, have probably been the most successful efforts of its kind in the United States. The work has set a pattern for much of the research that has followed around the country.

All-concentrate rations have changed our own operation at the Spur Ranch. After two years of use we are sold on this approach (Fig. 3).

1. We have changed from a fattening program with silage base to all-concentrates. Cattle are performing better in our fattening program because all-concentrate is more efficient for fattening, and we are now making better use of silage as a maintenance ration.

2. We have had excellent luck with all-concentrate with very few problems, up to 3.5 lb net gain for 120 days with conversions of 7 lb and under.

3. Calves fatten rapidly and reach a high grade quickly. Recently we fed 35 steers for 105 days to a pay weight of 1,018 lb. These graded one prime, 33 choice, and one good (all but one of these were first cross Angus-Hereford).

4. All-concentrate is a versatile feed-for fattening, hurry up, warm-up rations, and for cull cows (better job on this than anything). Thin, healthy cows 30 to 50 days on all-concentrate gained 4.5-lb/day net with increased grade of cow two or three cents/pound. All concentrate is also good for growing or fattening rations for young calves (150 lb up).

5. We have used these rations experimentally in cooperation with the Spur Exp. Sta., to maintain brood cows. Fifty cows were fed an average of 10 lb/head/day of feed for 107 days. They calved during the test with no ill effects. We at least proved this can be done and it certainly could prove advantageous to calf producers under severe drought or other adverse conditions.

6. The all-concentrate approach makes the small feeder competitive with the large operator in cost of gain. We can’t afford milling equipment (steam rollers, etc.), but through the increased efficiency of all-concentrates we can compete.

7. Simplicity of the ration is valuable to the small feeder. We need only three ingredients, premix, protein supplement, and milo (ground or cracked). These rations are easy to mix and to handle.

May I conclude by challenging scientists to keep up the good work. Even if ranchers don’t adopt their findings willingly, it looks as though the growing population and economic pressures will force us to adopt them to survive. As I see it, there are still many open fields for the researcher and many challenges for the ranchers in this business of beef production.