Convention Issue

AMERICAN SOCIETY OF RANGE MANAGEMENT

The American Society of Range Management was created in 1947 to foster advancement in the science and art of grazing land management, to promote progress in the conservation and greatest sustained use of forage and soil resources, to stimulate discussion and understanding of scientific and practical range and pasture problems, to provide a medium for the exchange of ideas and facts among society members and with allied technologists, and to encourage professional improvement of its members.

Persons shall be eligible for membership who are interested in or engaged in practicing range or pasture management or animal husbandry; administering grazing lands; or teaching, or conducting research, or engaged in extension activities in range or pasture management or related subjects.

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Editorials

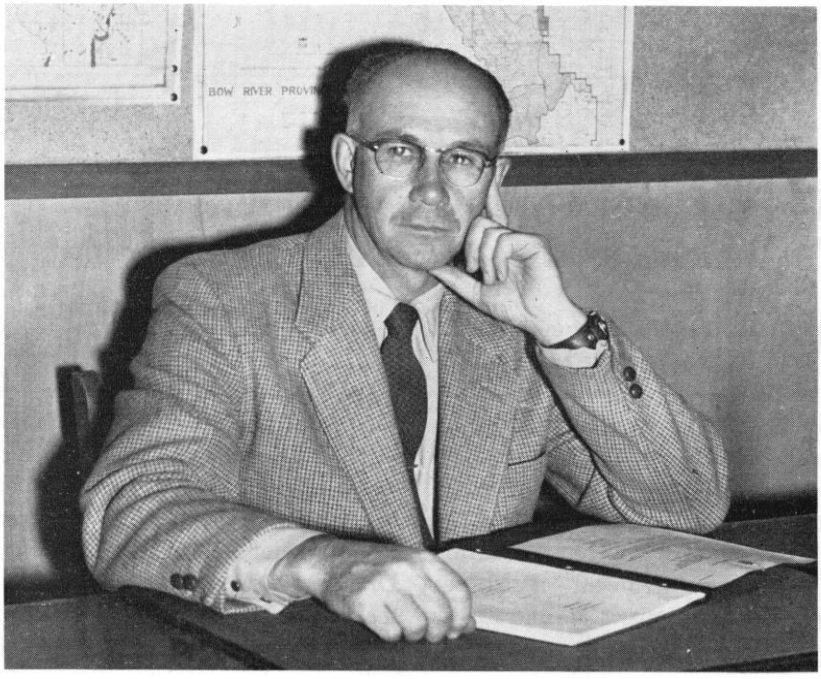
The Local Section

THE following remarks of a retiring member of the Editorial Board are not meant as a complaint that local sections of the American Society of Range Management have been neglected or maltreated, either by the parent organization or the members. They merely reiterate that sections occupy a place of great importance in accomplishing our expressed objectives and will attempt to call to mind some basic concepts concerning the relationship of sections to the rest of the organization.

When the Society came into being at the first meeting in Salt Lake City the attendance and enthusiasm there bespoke big things for its future. Such anticipation has been justified in a continued expansion. So rapid was the growth and spread of membership that local sections were required almost immediately to properly serve the members. It is fortunate that the need for a division into smaller and more intimately-associated groups was recognized at such an early stage of development. Few organizations recognize this need until stagnation sets in and the local-section idea is then adopted as a means of revitalization. It can be said with impunity that the continued healthy growth, beyond the initial spurt, and the high degree of activity of our Society can be attributed, at least in part, to the fact that the ideals and purposes were brought close to the people of a wide area by the formation of active sections.

One danger which threatens every large organization is over-centralization. The natural tendency is to centralize and voluntary effort to counteract the trend is necessary, if such is to be avoided. A completely centralized organization with policies originating at headquarters and emanating outward and downward to the members, loses vitality and either dies or becomes an automaton. With decentralization the individual members are important and their ideas make the program of the local section and these eventually consolidate into the policies and ideals of the parent body. This latter situation encourages healthy growth and vitality from the bottom up.

Our Society cannot be accused of leaning seriously toward centralization or of unduly hampering the freedom of the sections. Incidents which have occurred are more annoying than serious but they may serve as object lessons to point out ways to take and those to be avoided. The case of the local group whose proposed name was rejected by headquarters comes to mind. The members live in Montana and Alberta and proposed to call themselves the International Section. Objections were raised by the Council and new proposals were made. In the end, a name which nobody liked was tacked on: The Northern International Mountain Section. Just try to say it and see if anyone is still listening when you finish. Not that the central body should not integrate activities and keep the sections in line with agreed policies but sections need plenty of freedom to thrive and grow new



WALLACE R. HANSON

wood. They should have freedom in things like the name they choose, their boundaries, their constitutions and their activity programs. If locals are ever subjected to dictation by the parent body stagnation will begin. On the other hand our whole society will remain vital and growthy as long as policies and ideals originate with the membership in the locals and work upward to be sorted and consolidated into the policies and principles of the parent body.

With optimum freedom allowed local sections, great responsibility is placed upon them and their members. To function most efficiently a section must be closely knit in organization and membership. Groups that are too large and too widespread may fail to keep the unanimity and close contact needed. For this reason some of our sections may be too large. Some members are finding it difficult to travel the distance required to attend the functions of the section. True, we have machinery whereby subsections can be formed but, in some cases, local sections may be more appropriate.

The members of each section should have common interests and problems. To ensure this they should be regionally located rather than be limited to political boundaries. The Northern Great Plains Section is a good example. The members of this group felt that the range problems of their region needed special attention and they were determined to have a section with that purpose at heart. In spite of pressure to the contrary they persevered and organized their section to include parts of Montana, North Dakota, southern Saskatchewan and southeastern Alberta.

The broad base of this Society and its opportunity for world influence is attested by the announcement that a Middle East Section has been formed and approved. At the organization meeting it was the expressed intent that the word "American" in the Society's name was "Continental" rather than "National" in concept. And now our influence is spreading beyond the seas. The formation of this section accentuates the points expressed above; the need for freedom on the part of local sections to meet their special conditions and the value of flexibility in boundaries to allow members with common interests to get together.

It may not be out of place at this point to congratulate those who formed the new section in the Middle East; both those of our members from this continent, who undoubtedly sparked the organization, and also our friends in those lands who know even better than we do the need for range conservation. We might add our best wishes and encouragement to the members of the Middle East whose responsibility it will be to keep this section going in the years to come and to form new sections as they are needed.

Let each of us see that his local section is a strong one and the influence of its good work is felt in the range country where it functions and is reflected in the strength of the American Society of Range Management.—*Wallace R. Hanson*, Assistant Chief Forester, Eastern Rockies Forest Conservation Board, Calgary, Alberta.

What About Our Range Management Technical Assistance Programs?

MANY people have emphasized the importance of our technical assistance programs in maintaining the strength of the free world. If this be true, then it behooves us to carefully consider the recent article by Dr. Harlan in the Journal about our representation in overseas technical assistance programs. Perhaps it is time for us to wake up to the fact that our Society has a responsibility to insure the best possible help for others in their range management programs.

Our failure to render our best service is reflected in the opinion of Dr. Harlan and others who criticize our actions abroad. I don't want to insinuate that ours is the only profession under attack. No doubt, even Dr. Harlan would agree that some technicians in all fields (geneticists not excluded) have been guilty of not providing the best possible assistance.

In order to make constructive remedial suggestions it is important to investigate the weakness of our agricultural advisory programs. It has been suggested that we have been guilty of harping on overgrazing and reducing numbers of livestock. Another philosophy of pooh-poohing the effectiveness of grazing management has led us into concentrating on glamour problems such as brush control, poisonous plants and reseeding. At the same time we have largely overlooked the importance of integrating use of improved and unimproved pastures, pin-pointing the critical seasons for

using desirable forage plants, and resorting to livestock management rather than cultural methods as our most important tool in economical range improvement. I think all of us have failed in not insisting on more basic research in range and livestock management. The matter of livestock management may be particularly important in getting the job done where machinery is limited but labor for livestock herding is plentiful!

If the recent article in question is a fair measure of how other technicians regard our range improvement programs, we have failed in our mission to inform people as to the aims and objectives of our Society, particularly in pointing out what professional range management has to offer.

What can we do? In the first place, we can remind ourselves and others that our job is no different from other land managers in that we have to depend upon coordination of research, teaching and extension. Our ability to get the job done will depend upon our performance in all three fields. Let us remember that basic facts on soil-plant-animal relationships are all important in making our range management programs effective. If we adopt this attitude in foreign assignments, some of our difficulties, in spite of the unique socio-economic influences under which we may be working, should begin to dissolve!

Let us remember, further, that an overseas assignment may be the biggest challenge we will ever have to face. As a representative of the U. S. A., we become an important ambassador of good will in addition to reflecting on the standards of our profession. May it never be said that the range scientists failed to do their bit in preserving the peace of the world.—*Donald W. Hedrick*, Assistant Professor of Range Management, Oregon State College, Corvallis, Oregon

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RANGE SOCIETY OFFICERS ELECTED FOR 1955

The Elections Committee, THOMAS G. WILLIS, Chairman, announce the election of the following officers of the American Society of Range Management for 1955:

President: A. P. ATKINS, rancher, Box 470, Guymon, Oklahoma
Vice-President: JOHN D. FREEMAN, Soil Conservation Service, Box 1589, Prescott, Arizona
Board of Directors, 1955–57
LESLIE R. ALBEE, Soil Conservation Service, Box 1671, Rapid City, South Dakota
DONALD F. HERVEY, School of Forestry and Range Management, Colorado A. and M. College, Fort Collins, Colorado

BUSINESS MEETINGS OF DIRECTORS AND SECTION CHAIRMEN ANNOUNCED

Acting President A. P. ATKINS has announced the following schedule of annual business meetings to be held at the Eighth Annual Meeting of the American Society of Range Management at the Hotel Sainte Claire in San Jose, California:

January 25, 9 a.m. to 5 p.m. Business meeting of Board of Directors
January 25, 1 p.m. to 4 p.m. Section Chairmen meeting
January 28, 1 p.m. to 6 p.m. Business meeting of Board of Directors

Livestock and Big Game Relationships[1]

JOHN. M. HALL

Director, Arizona Game and Fish Department, Phoenix, Arizona

THE problem of Livestock versus Wildlife has plagued us since the turn of the century. No issue, except that of water, has raised so many conflicting opinions and problems.

Instead of decreasing in intensity, this battle has become broader and more bitter as the years go by. It would seem that as we learn more about the proper management of both livestock and wildlife on our ranges, some progress would be made toward solving the battle of conflicting use.

In spite of research, the conflicting claims of one side against the other are still being debated on all levels, from the corner bar to the Washington conference table.

It is our good fortune, I believe, that there is a third element entering this fight. This third party is composed of those persons who believe that livestock and wildlife can live side-by-side on the same range, or in the same ecological area, and thrive.

It should be obvious to all of us that we live in changing times. Much as many of us regret it, the ways of the Old West are passing. There was a time when cattle was king and the cattle interests were all-powerful. We are all aware that the cattle industry is still of vital importance to us in the West, *but it is not the only great source of our wealth today*! Cattle has competition in the form of growing industry and growing population. And it is the growing population that is of specific importance to those of us whose job it is to manage game.

Let me quote a bit from a recent issue of Fortune Magazine:

> "Full of vigor and promise, the leisure and recreational market today is one of the largest and most complex in the entire U. S. economy. It measures about $30.6 billion annually, which is half again as much as the American consumer spends on clothing or shelter, and twice what he lays out for new cars or home goods. Its components are a hodgepodge of smaller markets, some wholly inter-dependent, others closely related but antagonistic.
>
> The leisure market becomes more intelligible if it is viewed in two parts: First, the heart of that market is $18 billion of unmistakable leisure-recreational expenditures on spectator amusements, spectator and participant athletics, HUNTING AND FISHING, gardening, boating, etc. A secondary group, totaling a little over $12.6 billion, is made up of consumer expenditures. . . ."

In the past 10 years the income of the Arizona Game and Fish Department has increased by 400 percent. Bear in mind that this increase is a reflection of license numbers, not increases in the cost of licenses.

The budget for the Department for the fiscal year 1954–55 is over one million dollars. That alone is proof positive that hunting and fishing amounts to something in this state.

It has been figured that the cost of a hunter's license is about 3 percent, on the average, of his general expenditure for hunting. Obviously, in a state such as Arizona, with more species of game to hunt than in any other state, the total expenditures of our sportsmen on equipment, gasoline, food and other items concerned with their sport must be considerable.

This general and rapid expansion of hunting and fishing license buyers both in Arizona and nationally, is matched by the immense army of vacationists. These persons claim right to, and use, our national forests. . . . the same lands which are so vital to us as ranges for our cattle and wildlife.

Certainly, in the past few decades, the overall picture has changed. As Jimmy Durante says, "Everyone wants to get inta the act."

The professional cattleman and the professional conservationist are often so biased in their thinking that they are unaware that these changes have taken place. But we must face the facts, and the fact is that at the present time all of the other conflicting interests on our rangelands must force us to work out some mutual solution to the problem of livestock-versus-wildlife.

The professional conservationist usually begins his side of the story by denouncing the cattlemen for the devasting over-use of our ranges. He is bitter in this attack, often forgetting the privation and hardships endured by those hardy, early-day cattlemen who carved a cattle empire in the West. But the conservationist is right when he says that there has been serious overgrazing.

I'm reminded of a cartoon by J. R. Williams. Curly and old Stiffy are riding by a fenced-off plot on the range. Inside the fence the grass is high and luxuriant. Curley is telling Stiffy: "They put that there to show us how high the grass would grow if we didn't run cattle on this ranch!"

Of course, there has been overgrazing and everyone knows it. Putting the finger of blame now on the cattlemen will not bring back the range that was depleted years ago. The main point to make clear

[1] *Paper presented at the Summer Meeting of the Arizona Section, American Society of Range Management, Flagstaff, Arizona, June 11–12, 1954.*

is that the cattle interests have a legitimate right to use our ranges.

But I certainly do not feel that cattle have *exclusive* right to these ranges. Wildlife have the prior right by virtue of being there first. But that, in this modern day and age is not sufficient. Wildlife have a right to be considered as legitimate users of our rangelands because the millions of hunters and fishermen in our nation demand they have that right.

Here in Arizona, we are particularly touchy on this subject. So much of the land in our state is under federal control and so little privately owned, that as controversial a subject as wildlife versus livestock on our ranges is bound to draw fire whenever it is mentioned.

I am convinced that wildlife has a growing place of importance on our ranges. First, because the voice of those who demand more hunting and fishing from Game Departments is growing stronger each year. Secondly, because in many areas the rangeland has become so depleted by overuse that it will support little if anything BUT a wildlife crop.

On what we have left of our ranges we are in the middle of an argument as to their proper use. It must be wildlife AND cattle, not wildlife OR cattle. It is the DEGREE to which a range is used by either wildlife or livestock that is the very heart of our problem.

Generally speaking, there is little conflict between deer and cattle in the choice of food. Cattle prefer grass. . . . deer prefer browse. When a range is overgrazed, the grass dies and browse appears in greater amounts. The cattle are slowly starved out and the deer herd increases. When the deer herd has increased to a point where it has reduced the entire range to well-chewed stubs, the herd dies of malnutrition and disease at a rapid rate. The Kaibab herd is the classic example.

What is left? A range that is useless for years and years for *both* livestock or deer. A herd of cattle may be built up rapidly . . . a deer herd will multiply with astonishing speed . . . but a devasted range may take decades to regain its former vigor and should climatic conditions prove right, it could degenerate into a barren wasteland for thousands of years.

Most western ranges are dry, and the production of forage is slow. Even well-managed ranges, under drought conditions, will have the look of heavy overgrazing. In dry climates plants struggle for their existence even under the best conditions. On some ranges even moderate grazing by either livestock or wildlife will seriously and quickly kill the best forage and leave the less valuable, seldom-grazed plants.

Obviously, we have many areas in the West with too many big game animals, just as there are many areas with too many livestock. The fact that a range has too many big game animals is just as important to us, the game managers, as over-abundance of cattle. In either case, the result is costly.

There have been efforts to develop a concept of separate range use. One range on each area for each species of animal. This may seem rather far fetched but it may be a solution to the problem.

When a range is stocked with either wildlife or livestock there is an immediate use of the most palatable plant species in the areas most accessible to that species. Then, each species begins to consume the foods of secondary preference, which might well be the primary food of the other species. We can readily see that conflict begins when one class of animal or the other has eaten beyond the list of its primary preferences and has begun to eat its second or third choices.

In any event, severe misuse generally results from overstocking by either one species or the other . . . *at any one time*. The class of animal over-using the range can be determined by range examination. When this is done that class of animal causing the depletion should be reduced in numbers until range conditions are brought into balance.

Every effort is being made by the Arizona Department to do just that in the case of deer and elk. In spite of criticism from some quarters, it is our belief that *continued* good hunting can only be accomplished by continuing good range conditions. Providing hunting and fishing is our business . . . we are charged with the wise management of our wildlife resource now and for the future . . . and devastated rangeland from *whatever* cause, is not going to provide good hunting in the future.

Let me be specific, in what we are doing. First, we are making every effort to broaden the scope of our hunts. Each year our deer and elk hunts have taken more animals through relaxed regulations, broader hunting areas, the use of the "any sex" hunt and the opening of many areas to unlimited number of hunters.

These steps were not undertaken in the face of pressure from certain groups, but strictly because we felt that the state of the range in many areas demanded a reduction in deer and elk numbers.

In the case of elk, our elk-proof plots on the Sitgreaves National Forest gave us the first indication that elk herds were increasing in this area. Because of the hunts held in the past several years, we have every reason to believe that the elk herd has been scattered and pressure relieved on critical portions of the range.

Our efforts to control the growing

Kaibab deer herd are almost too well known to mention. Our take of deer on the Kaibab has increased yearly and we feel that we are on top of this herd.

The number of deer harvested in Arizona has doubled in the last five years. We harvested 18,803 deer during the 1953 season. About one-third of this total was from the Kaibab. And through the relaxation of regulations our number of deer hunters last year went to over 57,000.

We certainly believe that we are doing *something* about this problem. The Arizona Game and Fish Commission budget for range development and rehabilitation will be over 180 thousand dollars for fiscal 1954–55. We feel that this is far more than any other organization in the state is spending on direct range rehabilitation.

We have areas that sorely need attention. The south Kaibab is one. On the Bill Williams our men have made continuous range investigations. They feel that there has been severe overuse by both deer and livestock. This range is in such poor condition that although deer numbers are not heavy as compared to other areas, the range is not responding to decreased deer use.

The Moqui has received a good deal of attention from our Department and we have had "any sex" hunting and increased hunting pressure for several years.

These are some of the concrete things we have started in an effort to control wildlife populations to the betterment of the range. However, I must again bring up the subject of DEGREE of use.

It does not necessarily follow that because livestock grazing permits have been reduced by 25 or 30 percent that the wildlife using the range should also be reduced that much. In some cases the wildlife might not be reduced *at all*, and in other cases it would be proper to reduce the wildlife species by many times the reduction in cattle numbers.

How are we going to determine the degree of stocking on our ranges? There is no practical answer . . . yet. A good many men with the tools of modern research . . . and a good many men with years of practical experience will be needed to find the answer.

Our first step must be the accurate inventory of what we now have. We cannot possibly progress any further until such an inventory is made. Our next step is an expanded program of research . . . research that will show us what we can do with what we have.

I sometimes feel that we have been so caught up in catch phrases like "wise land use" and "good land management" that we *say* these things, but usually don't know what we're talking about.

How do we know what is "wise land use" or "proper range management?" And if we actually do not know, then we must very quickly start finding out. Fighting the battle of multiple use of public lands over and over again is a waste of time. While the fight may still be hot the handwriting is on the wall for the opponents of multiple use, and the battle is already lost. The 30 billion, 600 million dollar recreation business that has boomed in the past decade has seen to that.

Let us take a look at a sister industry that has learned a great lesson. Timber resources in the United States were being depleted at a faster rate than any other resource. When the situation became intolerable the fighting between the timber interests, the conservation interests and the federal government ceased and the modern concept of sustained-yield timber production and tree-farming was instituted. That the results of cooperation and understanding have been successful is plain. The timbering interests are now in the forefront in supplying money and research for sustained yield timber management. The public, the government and the timbering interests have all benefitted.

We are going to have to take a lesson from the foresters. Their problem was solved in the most part and our problem of livestock versus big game on our rangelands can be solved, too.

There is a place for both . . . and a need for both . . . and it is not yet too late for a solution that will benefit everyone.

This meeting is as good a time as any to begin concrete accomplishments. Talking and arguing are not the answer. We must work together and work more closely. Every month that goes by reduces the possibility of our ever having better ranges for both livestock AND wildlife.

We are like a posse without a sheriff. We know the bank has been robbed but we stand around arguing about which direction to go. We know that our rangelands need immediate attention—and arguments are not going to give the ranges that attention.

If you *must* have a catch phrase then let me suggest two words: Cooperation and Moderation. Cooperation among ourselves—and moderation in our use of the range.

An Approach to Cooperative Range Management

WAYNE J. CLOWARD and DERREL S. FULWIDER

District Forest Ranger, Humboldt National Forest, U. S. Forest Service, Paradise Valley, Nevada and District Range Manager, Pyramid Grazing District, Bureau of Land Management, Winnemucca, Nevada

A suggested approach to and report of progress on cooperation between private operators and federal land administrators in securing range improvements and more effective use of the range resource.

THERE are many acres of sick land throughout the western states—lands in critical condition upon which many livestock people are depending for their livelihood and for the future of their children and children's children.

One of these areas is in northern Humboldt County. Paradise Valley, so named by the early settlers, because of the vast acreage of perennial "grass waving from hill to hill," is the hub of ranch activities in this part of Nevada. The Santa Rosa Division of the Humboldt National Forest and the adjacent lands administered by the Pyramid District Grazing Office of the Bureau of Land Management comprise the seasonal ranges necessary to the year-round livestock operations in this locality.

The history of use of these ranges is similar to many other comparable regions throughout the West: early settlement, rapid development of livestock industry and influx of many nomad grazing herds. These nomad herds, lacking a base of operations, stayed on the ranges as long as weather permitted. This use coupled with the grazing herds of the bona fide rancher and settler together with game herds increasing under protection by law, rapidly damaged or denuded much of the grassland area of Paradise Valley.

Some of the lesser damaged areas have and are responding to regulated use initiated through stockmen participating in Federal management programs. Other areas, almost completely devastated early in the century, are still carrying too many livestock for too long a period to provide for recovery and reestablishment of the perennial forage species.

The Paradise C & H allotment on the forest and the adjacent Paradise Unit on the Bureau of Land Management lands is one of those areas which had not responded to ordinary good management practices. Flash floods, soil and vegetation losses, decrease in perennial grasses and the spread of Halogeton, sagebrush and other undesirable plants were still progressing

In order to reverse the downward trend in soil and forage condition and insure a continuous long range supply of clear water and usable forage, it was apparent that it was necessary to adjust the use to the available forage or increase the forage to meet the grazing demands and watershed requirements or both.

The range trend was still downward. Therefore, adjustments in use appeared necessary. The topography of the higher country where appropriate ordinary management practices are in effect is too steep and rough for reseeding. The adjacent BLM lands are level, deep soiled and very adaptable to reseeding. These lands had been nearly denuded of palatable forage over the years and the grazing capacity was estimated to be 20 acres or more per AUM. Sagebrush and Halogeton had invaded this area in considerable quantities.

The irrigated meadows on the ranches were producing more than enough hay for their annual livestock needs, in comparison to range forage production.

After various separate and joint investigations, the Forest Service, the BLM and the permittees got together and analyzed the condition of the ranges, the job to be done, and the economic effects of initiating special management practices. The result was a signed agreement which committed the two agencies and the permittees to pool their resources, reaching toward a common objective of range rehabilitation and stabilization of the livestock industry and tax structure of the valley.

The agreement provided for combining Forest and BLM lands into a broad grazing allotment in the following manner: Approximately 12,000 acres of lower reseedable BLM land was set up as Unit I. A two and one-half mile strip of unreseedable BLM lands between Unit I and the fenced forest boundary was set up as Unit II. This comprised approximately 15,000 acres. The high country within the forest boundary totaling 21,000 usable acres became Unit III.

The Forest Service adjusted the opening date in Unit III to absorb the spring grazing load formerly carried on the BLM Unit I and II until the reseeded area in Unit I was ready for grazing.

The agreement further provides that after the seedings become established, no increase will be allowed in livestock numbers but instead, two weeks less use will be allowed on the national forest and the AUMs involved will be absorbed by the increased grazing capacity on Unit I. Any further adjustments will be worked out

cooperatively with the three parties involved.

Since the permittees need the period from April 1 to September 1 for hay production on the meadows, it is necessary for the cattle to be on the public lands throughout this period. The permittees agreed to take the cattle off the public lands and put them on their cutover hay meadows about September 1.

The reseeding is very successful at the time of this publication and checks indicate that the grazing capacity in Unit I will be increased from seven to nine times. Control fences are being constructed as rapidly as funds are available to provide for rotation and deferment on those parts of the Units requiring further remedial measures.

Prior to the next grazing season, the permits will be rewritten to coincide with the estimated proper period of use for each Unit. The opening dates on each unit will be flexible to insure proper use at the time of range readiness depending on seasonal fluctuations in forage production.

Units I, II and III plus the cutover hay lands will be used in that order with each unit to be grazed only to the extent considered proper. Each unit will be managed by the agency having jurisdiction over the land in close working relationship with the other agency and with the permittees. Specific annual management will be determined by conditions on the ground.

By this action, it is planned to accomplish the objectives of reducing the use of the high mountain areas to provide for reestablishment of desirable forage species and soil stabilization, stop the spread of Halogeton, replace sagebrush with grass and put worn-out grazing land into full production through reseeding, and to eventually provide a more dependable long range supply of forage and water for the livestock grower.

Ultimate success of the whole program now depends on future cooperation in management of the area in order to maintain benefits being received and insure the stability of the rehabilitated range.

Accomplishment to date has been with fullest cooperation of the agencies and permittees involved. It is working here and it is believed there are many other areas where such cooperative planning and action will work as well.

An Australian Grass in Texas

RICHARD D. BURR

Range Conservationist, Bureau of Land Management, Lander, Wyoming

SILKY BLUESTEM (*Andropogon sericeus* R. Br.), a subtropical grass of major importance on certain Australian ranges, is encountered more and more frequently on Texas grasslands. It has appeared, with but few exceptions, on Texas pastures through the accidental importation of its seed with those of other grasses, usually rhodesgrass (*Chloris gayana*). At present collections and field observations by personnel of the Soil Conservation Service have established occurrence of the Australian grass in 20 counties in South Texas with the northern limit of its range in Bexar, Medina, Comal and Guadalupe counties (Fig. 1).

This grass was not reported in the first edition of "Manual of the Grasses of the United States" by Hitchcock (1935). In the revised edition (Hitchcock, 1951) it is reported as "spontaneous on roadside banks, Cameron County, Texas." Swallen (1950) says of the grass "It has been cultivated at experiment stations and occurs along roadsides in South Texas."

The spread of silky bluestem, or Queensland bluegrass as it is known in Australia (Hartley *et al.*, 1942), should excite interest. It is highly regarded as a forage grass in its native country as indicated by White (1934):

> "Bluegrass has an exceptionally high reputation as a fodder among pastoralists. It is usually one of the earliest grasses to shoot in response to spring and early summer rains, but it is not particularly drought resistant. It makes one of the best grass hays possible and as it produces an abundance of seed it is worthy of study by the agrostologist and plant breeder."

Breakwell (1915, 1923) stated that reasonable rainfall would produce nine months of highly palatable grazing and the grass would recover quickly from use. He commented that the grass stood heavy trampling, made good hay and a good seed crop. McTaggart (1936) and Roe (1940) refer to silky bluestem as one of the better grasses.

Silky bluestem is highly variable in vegetative characters. Smooth, bright-green or dull-blue plants, with but a ring of silky hairs at the nodes, may intermingle with specimens on which the white hairs of the foliage almost obscure the color of the leaves and sheaths (Fig. 2). Little variation occurs on the seed heads. All are covered densely with silky white hairs which contrast with the deep brown awns of the fertile florets. White (1934) comments on the large number of distinguishable forms of the species in its native habitat.

The grass is generally palatable to livestock but stockmen disagree as to its relative palatability. All will agree that it is not as good as bermudagrass (*Cynodon dactylon*) which possesses a preferential status in pastures throughout much of Texas. Variations in palatability are associated with the variations in vegetative characteristics. On one pasture observed in June 1952 the variant preferred by cattle was the "blue" form densely covered with white hairs. Plants of that aspect were grazed to the ground. Few observations have been made on this point.

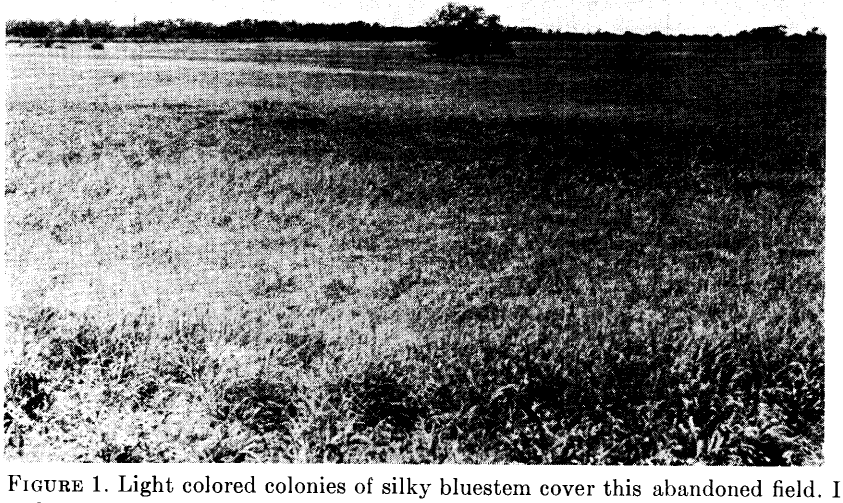

FIGURE 1. Light colored colonies of silky bluestem cover this abandoned field. It was planted in 1944 to Australian-harvested rhodesgrass.

Climatic Limitations

Silky bluestem is the most common of Australian bluestems (Breakwell, 1923) and the limits of its range occur in New Caledonia and the Philippines. In Australia, silky bluestem is a dominant or co-dominant in an area including the Darling Downs and Liverpool Plains of Queensland and New South Wales near the east coast in latitudes 25 to 32°S., according to McTaggart (1936). This area approximates the latitudinal range in Texas from Comal County (30°N. Lat.) south to Cameron County (26°N. Lat.). A north-south strip in this portion of Texas with an average rainfall of 20 to 30 inches, of which 40 percent falls in the winter, is markedly similar to the larger portion of the two Australian sections. Silky bluestem would seem adapted in this area of Texas. This inference is substantiated by its behavior through natural increase in areas of introduction. On the other hand, its extended range into the Tropics indicates a degree of adaptability southward into Mexico but would limit northward extension of its present limits in the United States.

Site Preference

Under Australian conditions the grass exhibits marked site preferences. Breakwell (1923) says that the grass "will fight shy of poor country". In his ecological account of Australian grasses, McTaggart (1936) consistently correlates the occurrence of silky bluestem with the better soils of all localities.

A corroborative check was made of the establishment of silky bluestem on various soil types in a tame pasture in eastern Medina County seeded in 1944 to Australian-produced rhodesgrass. Silky bluestem was present as an impurity in this seed. Colonies of silky bluestem have become established and spread while the original pasture grass has disappeared.

Nearly all established colonies of silky bluestem were found to be confined to the deepest of three calcareous soil types of the area (Orrben, 1942). Virtually no plants occurred on the very shallow soil type.

Typical Pastures Planted to Australian-grown Rhodesgrass Seed

Most stands of silky bluestem in Texas seem to have come from plantings of a tame pasture grass, usually rhodesgrass, harvested in Australia. Three such pastures occur within a one-mile radius of the eastern city limits of San Antonio. In three fields selected as typical, the initial planting in 1944–45 was to rhodesgrass. Examination in 1951 and 1952, by line intercepts of basal areas of the grasses revealed that rhodesgrass had almost completely disappeared from the fields and Australian and native grasses were established. Silky bluestem had become the dominant grass in all fields (Table 1). The native species were those normally established on fields turned-out from cultivation: red threeawn (*Aristida longiseta*), pinhole bluestem (*Andropogon perforatus*) and silver bluestem (*Andropogon saccharoides*). Texas wintergrass (*Stipa leucotricha*) was also present. All native grasses listed in Table 1 occur in limited quantities in the climax vegetation of the locality involved. Tanglehead (*Heteropogon contortus*) is included with the exotic species. This grass is native to Texas but does not occur na-

FIGURE 2. Silky bluestem at late seed maturity.

Table 1. Basal cover and percentage composition in 1953 of grasses on three fields planted in 1944 to Australian-grown rhodesgrass

	Field 1		Field 2		Field 3	
	Basal cover	Comp.	Basal cover	Comp.	Basal cover	Comp.
	percent					
Australian	9.1	76.5	9.7	87.4	16.5	93.2
Silky bluestem	9.1	76.5	9.7	87.4	14.3	80.8
Other species*	—	—	—	—	2.2	12.4
Native	2.8	23.5	1.4	12.6	1.2	6.8
Red threeawn	2.6	21.9	1.4	12.6	0.6	3.4
Texas wintergrass	0.2	1.6	—	—	—	T
Silver bluestem	—	T	—	T	0.6	3.4
Total Grasses	11.9	100.0	11.1	100.0	17.7	100.0

* Consisting of *Andropogon intermedius*, *A. spicigerus* and *Heteropogon contortus* (native of Texas but not occurring locally).

tively in the local area. However, it does occur in the area of Australia from which the seed was collected so it is inferred that this seed was also introduced. The form noted also was not typical of the grass on Texas rangelands. Neither bermudagrass nor rhodesgrass were encountered on any of the transects.

As observed in a 50-mile radius of San Antonio, the establishment of silky bluestem is usually limited to fields, but it is not always confined to them. A pasture dominated by an overstory of mesquite (*Prosopis juliflora* var. *glandulosa*) and a dense grass sod of buffalograss (*Buchloe dactyloides*) and Texas wintergrass has colonies of silky bluestem established along an intermittent stream for approximately one-half mile. The colonies are arranged in narrow wedge with its head closest to the seed source and the edge accordingly lying down-stream. The seed source is an old field adjoining the pasture.

Establishment of Seed

Stockmen aware of the identity of the grass have become interested in silky bluestem because of the good stands on old fields that have become established without recognition or encouragement. Harvesting and planting of the seed were carried on in 1950 and 1951 by some of those ranchers. The abnormal heat and drought of the past few years have caused high seedling mortality and resulted in poor stands. Breakwell (1915) indicates that drought might result in poor stands but that good germination may be secured only by planting in a warm soil.

One field of 11 acres was sown with seed taken from the food caches of the harvest ant (*Pogonomyrex barbatus*)! The ants stripped the ripe seed from a 3-acre field of silky bluestem immediately prior to harvest time. The rancher promptly poisoned the ant beds (74 in all), ripped open the pocket-watch sized caches and saved his seed! The germination of this seed was 27.5%, despite testing immediately upon harvesting. Another Comal County field of 100 acres was established, more prosaically, from a seed source of 19 acres by raking seed hay across the remainder of the field. This field was the source of 3-pound packets of silky bluestem seed distributed by the local Soil Conservation District for trial under all conditions. No records are as yet available as to the results.

Summary

An Australian range grass has been introduced into a widespread area of South Texas primarily through impurities of Australian-produced seed. This grass, silky bluestem or Queensland bluegrass (*Andropogon sericeus*) is of major importance on eastern Australian ranges, especially in the Provinces of Queensland and New South Wales. It is held in high esteem in its native land.

Silky bluestem seems well adpated to that portion of the United States (South Texas) that approximates the climatic and edaphic conditions of Australia wherein it reaches its greatest importance. The palatability is relatively high both here and in Australia. Palatability is related to vegetative characteristics which are exceptionally varied.

In fields where it has been accidentally established the grass has become dominant. In the vicinity of San Antonio, Texas, interest has been aroused in the species and seed harvesting and planting have been done by ranchers.

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The Llanos—A Neglected Grazing Resource

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THE Llanos are unique in being grasslands lying within 10 degrees of the Equator and at elevations nowhere exceeding 1,000 feet above sea level. The region is covered by a variety of plant associations broadly termed savanna. The word was apparently first used in 1535 by Oviedo in referring to the Venezuelan Llanos. In this paper savannas are regarded as plains whose dominant vegetation is grass. However, when the rainfall is greater or the soils collect and hold more moisture, the savanna may support trees growing close enough to form woodland. In some savannas the grasses are tall, in others short, corresponding apparently to zones of greater or lesser moisture.

In this huge natural landscape bounded by the Andes Mountains and the Orinoco River, the population of both man and domestic animals is small and the region is not of great import. This is puzzling, for superficial consideration of the map indicates that the Llanos should be a truly great cattle country. It consists largely of grassland, it is relatively near the sea, from its first occupation by white men it has been used primarily for cattle raising, it is served by the Orinoco—one of South America's major rivers, and the populations of both Colombia and Venezuela are badly in need of meat produced at home. Further study, however, discloses that neither country is realizing the potentialities of the Llanos for cattle production. It is the purpose of this paper to present the highlights of this great grassland, to point out the reasons for its economic neglect, and to suggest ways in which the region could support more cattle in the future.

Perspective on a relatively undeveloped grazing resource in the Tropics of South America—the Llanos of Venezuela and Colombia. Dr. White is Head of the Department of Geography at Stanford University and a student of Latin America for many years. Mr. Thompson was born in South America and lived part of his life there.

Regional Features

Terrain and Drainage

The Llanos comprise a huge level to undulating alluvial plain, sloping south and southeastward from the Andes to the Orinoco. As considered here, the region is divided into the Eastern, Central and Southern Llanos (Fig. 1).

The region is traversed by a number of streams having their sources in the highlands to the north. Starting as swift mountain torrents, they flatten out into sluggish, muddy streams, with the reduction in gradient in the lowlands.

During the season of high rainfall these rivers swell tremendously, overflow their banks and inundate huge areas along their lower reaches. There is a difference of 43 feet between high and low water in the Orinoco. During the latter part of the heavy rainy season, it is believed that more than a third of the Llanos is inundated. The flooded lands have every appearance of swamps, being soon clothed with a rank vegetation and with water-plant growth (Fig. 2).

Flooded for months at a time, travel by land becomes impossible and human beings must move about in dugouts.

During the dry season the flow of water is so drastically reduced that many of the rivers dry up into pools and swamps. Some dry up completely.

Climate

Rhythm in the rainfall is the outstanding characteristic of the climate, the year being divided into two seasons—the dry referred to locally as *verano* lasting from June to March inclusive and the wet—

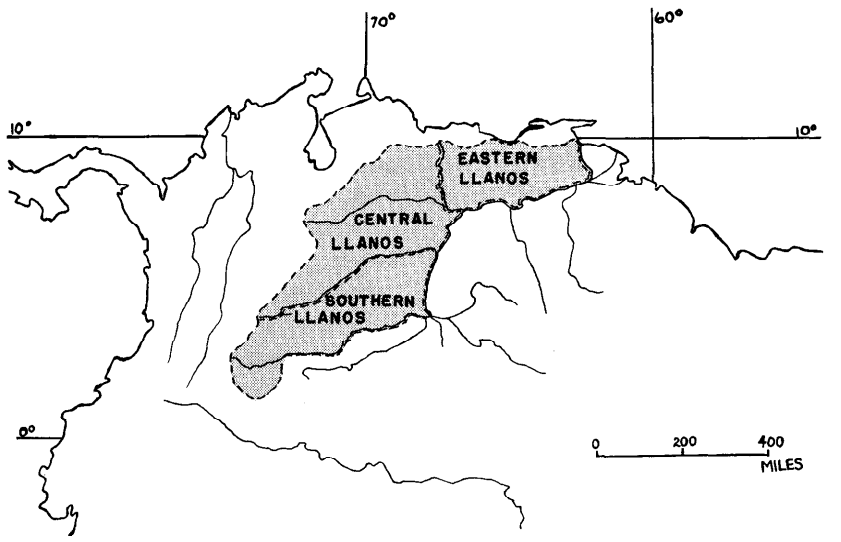

FIGURE 1. Map of northern South America showing the subregions of the Llanos.

invierno—lasting from June to October inclusive. April and May, November and December are transition months. The arrival and duration of the seasons varies from year to year and from place to place. In general the wet season shortens and the annual rainfall diminishes northward. Annual precipitation varies from 39 inches at Ciudad Bolivar to 52 inches at San Fernando de Apure. Nearly all of this rain falls during the six months May to October inclusive.

During the dry season the shade temperatures approach maximas in the middle and low 90's. Monthly averages are 10° to 20°F. lower. During this season the northeast trade winds blow almost constantly making the period more bearable to man than the wet season. In the latter season, though monthly averages are 4° to 9°F. lower, the combination of higher relative humidity and of reduced air movement results in higher sensible temperatures. Even during the brief spells of dry weather that interrupt the wet season, there is little relief from its discomforts.

FIGURE 2. Criollo cattle caught on flooded land during the rainy season in Apure, Venezuela (Central Llanos). Vast areas become covered with water and livestock losses are large during this season. (*Photograph by Consejo de Bienestar Rural*).

Natural Vegetation

The variations in climate, soils and terrain along with man-induced fires have yielded a wide variety of plant associations over the Llanos (Fig. 3). However, uniformity does not characterize the region; never should the Llanos be regarded solely as "a great monotonous sea of waving grass". Grass does hold sway in some parts but trees do in others. The grass is of the bunch type and is not matted as are our prairie and steppe grasses. In the Central Llanos where the water table is sufficiently high, as along the Apure and Portuguesa rivers, the grasses are green and palatable for stock the year round. Green meadows also may be seen as concentric rings of vegetation about an evaporating flood or seepage-created lagoon, but the shallow-rooted plants dry up quickly as the water recedes. However, the coarse, hardy grasses are able to endure the severe conditions.

Scattered throughout the grassy area are such trees as chaparro, merey, alcornoque and copaiba. Streams are almost always bordered by gallery forests. In places occur small forests called "matas" by the natives and belts of moriches which follow streamlets and which the inhabitants call "morichales".

Much of the Eastern Llanos is clothed with a sparse, short-grass vegetation of low nutritional value. Here *Trachypogon* appears to be the most common form of vegetation. Palms, trees and shrubs are thinly scattered in the eastern mesa country, while a considerable area of monte or chaparral or open scrub forest overlies the northern half of these plains.

Generalizing on the Llanos grasses, it may be said that they have low nutritional value. While the succulent green new growth at the beginning of the wet season and following fires is eaten by the stock, the large, coarse mature grasses become hard and unpalatable with progression of the dry season. Because the llaneros believe that firing improves the vegetation, they burn off large areas during the dry season. Actually this practice is partly responsible for the poor quality of the forage, particularly in the Eastern Llanos. Here inferior grasses which are more resistant to elimination by fires, are replacing the better grasses.

One of the biggest hurdles to range improvement to date has been the difficulty in finding grasses other than the native variety that can stand the extremes of climate.

Causes of the Llanos

There is no agreement among botanists, ecologists and geographers regarding the origin and causes of the Llanos cover. One school of thought considers the savanna vegetation to be a climatic climax formation; another as an edaphic climax dependent on special soil conditions. Both views, however, agree that the savanna landscapes were pre-Columbian, but that the grasses grew much taller then than now.

Schimper (1903) defines the climatic requirements of a savanna to be an annual precipitation of 35 to 59 inches (90–150 cm.), an effective 4- to 5-month dry season and a range in the monthly mean tem-

peratures up to 14°F. Under this regime, according to Schimper, there is a struggle between savanna and forest vegetation, the outcome of which is decided largely by the amount of rainfall during the growing season.

Another view on the distribution of savannas holds that we do not know whether their occurrence corresponds to the real ecological conditions. This school asserts that man, through periodic burning and grazing, is the cause. A. Aubreville (1949) doubts that there is a specific savanna climate in the tropics. Myers (1933) regards the Llanos vegetation as a fire-climax, although he believes soil conditions may also be involved. However, so little is known scientifically regarding South American soils that it is unsafe to speculate regarding this factor.

The authors believe that the chief determining factors for the savanna cover of the Llanos are not always the same; the evidence of climatic dominance is not everywhere decisive. The range of climatic conditions under which the savanna occurs in this part of South America, the abrupt boundary between forest and savanna, and the presence of savanna pockets between zones of forest all tend to challenge the thesis of climatic theory. It would seem that human interference, particularly fire, has been a major causal factor on this relatively flat, wind-swept (dry season) landscape. There can be no doubt that the savanna vegetation has been much modified by fire. According to Myers (1936):

> "I have never seen in South America a savannah however small or isolated or distant from settlement which did not show signs of more or less frequent burning."

Fires undeniably play a dominant role in giving sharp boundaries to the savannas and have thus favored grasses and herbaceous vegetation at the expense of woody plants.

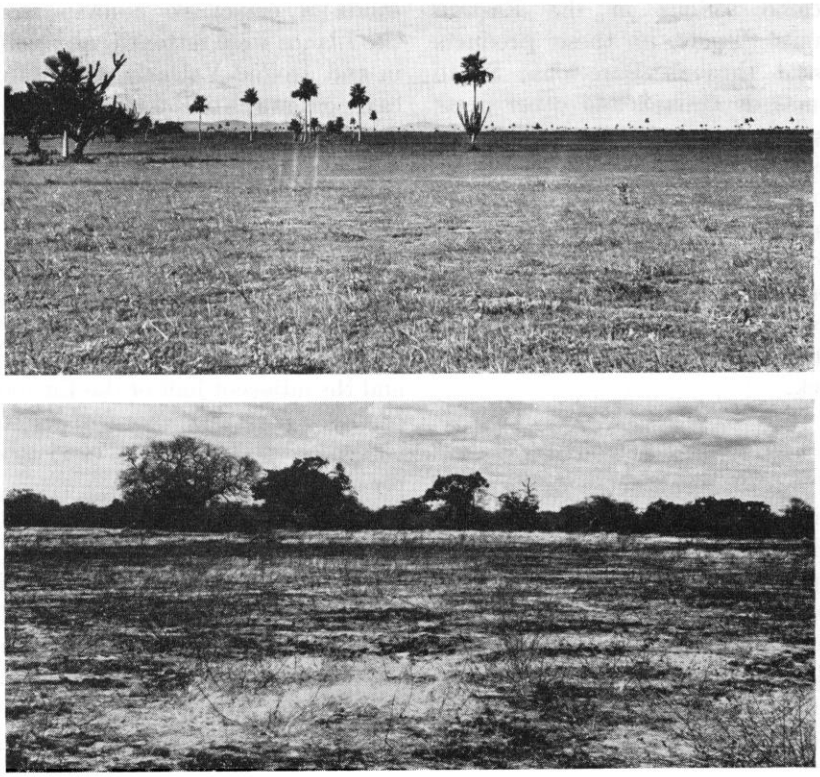

FIGURE 3. *Upper.* Vegetation in the northern part of the Central Llanos in the State of Cojedes near El Baul. *Lower.* Vegetation in the Eastern Llanos in Anzoategui at the end of the dry season. (*Photographs by James H. Kempton*)

Occupancy of the Llanos

Colonial Period

When the Spaniards arrived in this part of the New World, they found the Llanos (particularly the eastern half) occupied by small numbers of Indians engaged in patch farming, hunting, fishing and gathering. Lacking any large herbivorous animals, however, they made virtually no use of the great grassy expanses. Even the close grazing effects of the small Llanos deer and, on river margins, of the capybaras, scarcely had any effect ecologically. The Spaniards introduced close-grazing horses and cattle. According to reasonably accurate reports, the first livestock were taken into the Central Llanos about 1550 when a small herd of horses and cattle became the nucleus of a ranch in the Guárico watershed. A decade later the Guárico-Apure watershed was supporting some 12,000 to 14,000 cattle and half as many horses.

Missionaries first entered the Llanos near the end of the sixteenth century. They encouraged the Indians to grow native and introduced crops, to raise livestock and to develop crafts. Their success is attested to by the results—the Capuchins had herds numbering 50,000 head of cattle in the Eastern Llanos by 1759, the Jesuits 80,000 head by 1767.

The comparatively small effort attendant upon animal husbandry resulted in expansion of secular ranching. As white and mestizo (mixed blood) settlers moved into the Central and Eastern Llanos, the missions and Indians gradually disappeared. Many ranches had from 10,000 to 12,000 cattle in the early 1700's as well as many horses and mules. Herds in the Guanare area became so large that their owners knew not how many animals they owned.

Rustling and illicit slaughtering for hides, tallow and dried beef

became serious in the Eastern Llanos. Trade in these products passed through Barcelona, Santo Tomas de Guiana and other ports destined for the Lesser Antilles and the Guianas. Livestock and their products from the Central Llanos destined for the Greater Antilles moved through Puerto Cabello, Coro and Maracaibo. La Guaira, though an active port, had too rough a roadstead for loading livestock.

Nineteenth Century

In 1812, Venezuelan cattle were estimated at 4,800,000 and horses and mules at 430,000 and 270,000 respectively. The herds were seriously reduced in size, however, during the bitter campaigns for independence from Spain when private ownership of Llanos livestock was to all intents and purposes disregarded. After Bolivar established himself at Angostura (now Ciudad Bolivar) the livestock on the Llanos were largely rounded up by his agents and sent to the West Indies to pay for the exorbitantly priced war supplies purchased on credit from American, British and Dutch merchants. The cattle population dropped from 4,800,000 head in 1812 to a mere 250,000 eleven years later. From the termination of this struggle to the beginning of the Five Years' War (1866–1870), the number of cattle rose to 6,000,000 head only to toboggan to 3,500,000 head as a result of hostilities. In the 1880's the number climbed to 8,500,000 only to fall again as a result of frequent revolutions. A major factor affecting cattle production in Venezuela was General Juan Vicente Gomez, who *was* Venezuela from 1908 until his death in 1935. While the number of cattle on the Venezuelan Llanos increased during his regime, he controlled the industry. He and his friends and family gradually gained possession of the lands where tens of thousands of emaciated animals from the Llanos were fattened, especially in and around Valencia and Maracay—gateways to the Llanos. When Gomez began his political career he was in comparative poverty; when he died his personal fortune was valued at $200,000,000.

During recent years cattle numbers in Venezuela have been estimated at 5,000,000 head, divided equally between the Central Llanos and the adjacent half of the Eastern Llanos. The estimate for all of Colombia is 14,500,000 head and for the Llanos 750,000.

Present-day Ranching

The plains were gradually divided into vast estates—cattle ranches known as *hatos*. To this day most of the *hatos* remain unfenced and are so huge that the half-wild cattle roam over them almost without care. Boundary lines between grants are "notoriously vague". These holdings were organized as feudal units. Since population was sparse, towns few and transportation with the outside world almost lacking, the *hatos* had to become as nearly self-sustaining as possible. Therefore, besides cattle and horses, the lands were made to provide crops such as plantains, corn, beans, yuca (cassava) and native fruits. Some villages, usually little more than "crossroads," and a small number of towns sprang up at strategic points. Several of these are today small cities of considerable regional importance.

Cattle ranches on the Llanos are large, averaging around 3,000 acres. For the most part proprietors take little interest in improving their property, pastures or stock. Some have installed wells, windmills and watering troughs but many have done nothing; it is by no means a rarity for some animals to walk as many as six miles in search of water.

Reference was made earlier to the frequent burning of the vegetation on the Llanos. Burning is an annual affair and the llaneros do it to improve the quality of the vegetation (they believe burning results in palatable young grass) and to kill ticks. There seems to be some grounds for both theories. According to Bennett *et al.* (1942), new grass appears within 10 or 12 days following a fire and the cattle head out of the old grass towards the tender grass in the burns.

Llanos cattle face more than their share of hardships and dangers. During floods the herds must be driven to higher ground—to the margins of the foothills and to the low mesas that stand like islands above the flood. Obviously the area available for grazing is restricted since so much of the region is flooded. Alligators, electric eels and the ferocious and voracious little fish, the Caribes, all exact their toll. During the dry season, the tall grasses virtually become inedible, water is scarce and the cattle have to move southward to the damper areas near the Orinoco. At this time insects are at their worst. The jaguar takes his toll and countless vultures prey on new-born calves. Thus Llanos cattle are forced to wander far and wide, just to remain alive.

Annual and biannual round-ups interrupt the independent existence of the cattle to permit branding and castration. Many steers are set aside for trailing to pre-market fattening pastures. Sometimes the stock are rounded up into manageable groups every week or so and brought into corrals for salt. This practice, together with dipping, is quite recent.

Most of the cattle of the Venezuelan Llanos are raised in the states of Apure and Guárico, the two accounting for about two-fifths of the total. The Colombian Llanos is much less important to the country's total cattle production than is the case with Venezuela,

for Colombia has several much better regions—the Caribbean Coastal Plain, the Sabana de Bogotá and the Cauca Valley.

The Livestock

The early Spaniards brought with them to the New World their European livestock. The descendants of these European cattle as found today in the Llanos are known as "native" or "criollo" (Fig. 2). These early importations soon reverted to a semi-wild state but they throve and reproduced rapidly. Some authorities believe that the stock has degenerated over the past several hundred years because of the marked seasonal changes, the many pests and diseases, interbreeding and the lack of scientific care and feeding. The early cattle industry here amounted to little more than the periodic rounding up and slaughtering of a certain number of animals mainly for hides and tallow.

Actually the criollo cattle have adapted themselves quite effectively to the physical environment, becoming relatively resistant to the pests and local diseases that flourish largely uncontrolled. They have learned the ways of the wild animals that prey upon their calves. They appear to sense the appropriate time during floods to leave the lowland for high ground. And they are able to subsist wholly on what nature provides. Possession of such self-reliance and hardiness is a genuine asset in a region where survival is as difficult as it is in the tropical Llanos.

Mature criollo cattle are small, long-horned, slow-maturing and vari-colored (Fig. 2). Crossing with Zebu stock is resulting in larger, hardier and generally more vigorous animals. Zebu cattle have a higher heat tolerance than European cattle and this characteristic carries over to the progeny. They also show greater resistance to insect pests. Imported Zebu bulls should be of the very highest quality rather than the leggy, late-maturing, weak-hipped type introduced by many stockmen in recent years.

The criollo is an excellent foundation animal upon which to build crossbred types. The cross-breeds yield a higher percentage of edible meat when dressed. This is important, for the reproductive efficiency (the number of calves raised annually per 100 cows) of Llanos cattle is extremely low—less than 50 percent.

Unlike the Argentines of the Pampas, the Colombians and Venezuelans of the Llanos have shown no interest in Herefords, Shorthorns or Aberdeen-Angus breeds.

Marketing Activities

There is considerable variation in the age, weight and size of marketed cattle. Most animals ready for slaughter are 4 to 6 years of age and carcass weights average 375 pounds.

Most llaneros, not yet convinced that it is wise to slaughter younger animals, fail to realize that by so doing they would reduce the number of cattle on *hatos* thereby enabling the youngest animals to get more feed, gain weight faster and render greater profit to their owners.

The animals destined for slaughter come from the Llanos without any special fattening. They are lean, their dressing percentage is low and their meat is of low quality —tough and fibrous.

Changes are taking place, however, in the manner of marketing cattle. Some animals are hauled by truck from points where good highways meet the trails and some are shipped by river steamer on the Orinoco. One-fourth of the meat consumed in Caracas is now flown in as sides of beef. The cost of living in this boom city is the highest in the world and many of the people living there can afford to pay a high price for beef. In general, consumption of meat, in both Colombia and Venezuela, is limited chiefly by high prices. The masses of the people in neither country can afford costly meat.

Trails and market centers of today are largely those of the past. Herds from as far away as the Orinoco, Arauca and Apure rivers may be driven for many weeks over the braiding grassland trails that lead in Colombia to Villavicencio and lesser pasturing centers at the foot of the highlands and to Valle de la Pascua, Calabozo, San Carlos, Barinas, San Fernando de Apure, Valencia, Maracay and elsewhere in Venezuela (Fig. 4). In the streets of Villavicencio one sees herd after herd of emaciated cattle which have just finished their gruelling march and are resting before being driven to Bogotá over a mountain range approximately 10,000 feet high. Annually some 35,000 head, perhaps 3 percent of the national annual slaughter, make the six-day climb to Bogotá. Feed is so scarce along the way that as much as 20 percent shrinkage occurs. Similar results occur with the smaller annual flow of cattle which enters more northerly areas from the Llanos.

A similar situation holds for Venezuela. Depreciations in weight resulting from difficult drives into the Venezuelan highlands result in 20 percent weight loss. These losses are in addition to the estimated 5 percent through straying and drowning. Some animals are lost to alligators, jaguars and electric eels as the herds cross rivers. Another 10 percent of the herd possibly reaches the end of the trail lame or sick. It is little wonder that such inroads occur, for the treks are made over rough and dusty trails where forage is meager and water in short supply.

Not only are the drives costly in terms of depreciation in the animals but a number of men must be employed for a week or more before

the market is reached. On the Llanos herds are managed in groups of 300 to 400 head but those driven over the mountains are broken up into units of 80 and 100 head. A mounted corporal and three or four *peons* on foot are required to handle each of the smaller groups (Fig. 4). These cattle may be given a chance to fatten near market towns but a 1- or 2-day wait before killing is common. Cropland and dairy requirements near urban centers are tending to eliminate some of the beef-fattening areas, particularly in the Valencia Basin of Venezuela. One of the principal fattening areas in Venezuela is the area south of Lake Maracaibo in the State of Zulia.

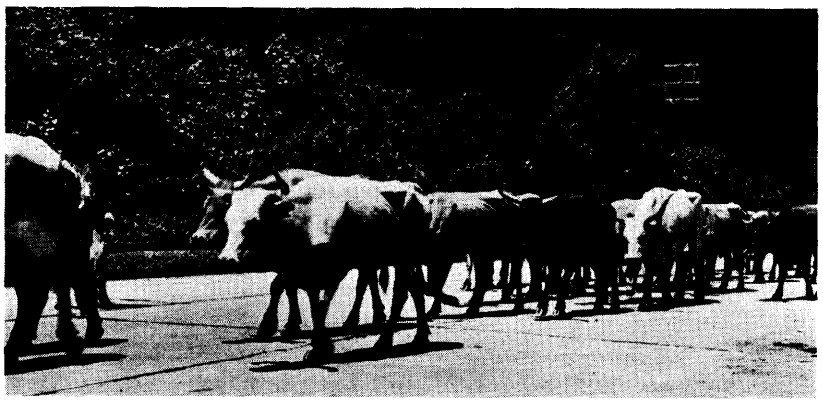

FIGURE 4. Criollo cattle arriving in Maracay, a principal fattening area, after the long drive from Apure in the Central Llanos. They have travelled only a short distance on a hard surface road. (*Photograph by James H. Kempton*)

Large, modern meat-packing establishments are lacking. In fact, few facilities for refrigeration exist except in the large cities. In Venezuela the largest number of animals handled at one point in a 24-hour period is 200. The bulk of the beef is killed, cooled and quickly delivered to market in ventilated trucks. In both countries the consumer prefers fresh-killed beef. Wastage obviously is appalling.

Current Problems Affecting Llanos Economy

Ranchers claim that government price-fixing and regulations so interfere with the movement of stock to market as to have almost killed the incentive for producing meat. On the other hand, the ranchers seem to share a traditional disinterest in stock and range improvement. This is indeed unfortunate in countries characterized by rapidly growing industrial and urban populations with increasing requirements for beef. It is believed that both Colombia and Venezuela have sufficient cattle to supply domestic needs; the big problem is to get the animals from the remote Llanos to the consuming centers.

The government road-building programs and the work of experiment stations and agricultural colonies are steps in the direction of greater production and improved quality of beef. However, there could be and should be more vigor in the governments' efforts. The creditable campaign that has been waged against aftosa (foot-and-mouth disease) might be extended to the elimination of other common infections and the control of pests. The governments could assist greatly in improvement of watering facilities (ponds and wells) in ranching areas, particularly along the cattle trails. Many cattle die of thirst during the dry season and yet water could be had at a reasonable depth by drilling. Perhaps the enforcement of fencing laws will lead to required forage conservation, pasture and stock improvement, for control then would be possible.

The incidence of diseases and pests in the Llanos of Colombia probably is somewhat higher than in Venezuela. Control of infestations such as aftosa and tick fever and general improvements of range and stock will occur as the government restores order to the region. Here, as in Venezuela, improved roads, trails and watering facilities would be beneficial to the beef cattle industry.

Improvement of the transportation network would also be a real benefit to commercial agriculture along the margins of the Llanos. Improved irrigation facilities in certain favored areas and the preparation of new cropland would facilitate commercial agriculture. However, the costly mechanized operations required are beyond the means of the private land holders. Then too, the llanero's preferred position astride a horse will be hard to exchange for a job behind a mule or on a tractor.

Conclusions

It has been shown that though the Llanos do furnish forage for a considerable proportion of Colombian and Venezuelan cattle, the number supported is relatively small considering the size of the region. The authors do not foresee a bright future for the cattle industry for a long time, if ever. The main reasons for this pessimism are: (1) the tropical location and low altitude of the region; (2) the marked rhythm in drought and rainfall which imposes a serious handicap by forcing cattle to the higher areas during floods and to water holes and river banks during dry seasons; (3) the pestiferous insects which, at times and in certain areas, make life almost unbearable to man and beast alike; (4) the widespread distribution of the cattle tick, screw worm and *gusano de monte*; (5) the poor transportation facilities

(there are few good roads, no railways, and even the Orinoco was not a good highway until recently dredged to Puerto Ordaz); (6) the inferiority of native grass pastures and the difficulties encountered in planting such introduced grasses as Guinea, Para, Napier, Guatemala and Natal, which can be grown only on fertile, well-watered soils of small valleys; (7) governmental interference and civil strife; (8) the un-scientific methods of handling the range and cattle with consequent unsatisfactory results; (9) the uncontrolled fires which annually destroy the better soils and vegetation, fences and houses; (10) the difficulty of securing credit on livestock; (11) the antiquated methods of handling meat; and (12) the llanero himself—his individuality, his philosophy of accepting what comes and making the best of it, and his lack of progressiveness.

What improvement in the situation is possible? The cattle industry could be made more productive and profitable by: (1) improving pastures (difficult and costly but not impossible); (2) supplying nitrogen and other essential minerals to the soils; (3) introducing more fencing; (4) installing more windmills; (5) reducing fires, particularly in the Eastern Llanos; (6) growing feed crops adapted to local conditions for fattening the range animals; (7) building more and better highways into the Llanos; (8) improving the quality of the livestock and giving the animals better care; (9) constructing more slaughter houses in the vicinity of strategically located towns. Should these hurdles ultimately be surmounted, cattle raising on the Llanos might become a business enterprise rather than just a way of life.

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An Approach to the Study of grasses, the "Tribal Triangle"

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AGROSTOLOGY, the science of grass classification, is an essential prerequisite to the study and practice of range management. Of prime importance to the range manager is a basic understanding of the kinds, characteristics and qualities of important range grasses. For proper assimilation and retention of information about grasses, it is advisable that the range manager undertake more of a study of agrosoology than the mere memorization tf names and recognition of specimens. He should become well acquainted with the basic framework of grass classification and should obtain satisfactory concepts of tribes, genera and species, and the interrelationships of these groups.

The Gramineae not only is one of the largest of the families of flowering plants, but it also is one of the most highly specialized in floral characteristics. The familiar grass spikelet is a greatly reduced and contracted flowering branch bearing minute, reduced flowers protected by scale-like floral bracts. The nature of the spikelet and of its parts, and the arrangement of the spikelets in the inflorescence are the principal bases for classification of grasses.

As a systematic science, the study of range agrostology includes three phases: (1) the recognition of vegetative and reproductive structural units; (2) the learning of names and characteristics of the important taxa (tribes, genera, and species); and (3) the knowledge of the distribution, habitat preference and economic importance of the major range grasses.

This paper is concerned primarily with the second phase, specifically, the taxonomic relationships of the subfamilies and tribes. According to the system of the great American agrostologist, Dr. A. S. Hitchcock, the genera of grasses are grouped into 14 tribes. Ten of these tribes are placed in the subfamily Festucoideae and four in the subfamily Panicoideae. The tribes are comprised of morphologically similar and supposedly closely related genera. Due to lack of knowledge of actual relationships, and because continuous evolutionary processes have produced grasses that do not fit nicely into any taxonomic niche, the placement of some genera in one or another tribe is controversial. Dr. Hitchcock realized that his system was not entirely natural nor com-

pletely satisfactory. In the publication "Genera of Grasses of the United States", Hitchcock (1935) noted,

> "Most of the genera of grasses fall naturally into one of the two series of subfamilies. The remaining few are rather arbitrarily assigned to one or the other series. In the same manner, most of the genera may assemble into distinct and well-marked tribes, but several are not closely allied to the other genera in the tribe to which they are assigned but are so placed for convenience in classification."

The "Tribal Triangle" (Figure 1) has been developed to show relationships between the grass tribes of Hitchcock, and to minimize the memorization of series of characters in learning the tribes. Two sides of the Tribal Triangle, the lines separating Area 1 from Area 3 and Area 3 from Areas 2a, 2b and 4b, are based on the major lines of evolution in the grass family:

(1) the reduction in the spikelet from several perfect florets to one.

(2) the modification of the inflorescence from a panicle to a spike or a series of spicate branches.

The third side of the triangle represents the principal difference between the subfamilies: the reduction in the spikelet of the Panicoideae to a single perfect floret with a single reduced (staminate or sterile) floret below it. The placement of tribes on the division lines between areas indicates the occurrence of grasses in these tribes with the characteristics of both areas.

Needless to say, although the majority of our range grasses fit well into this scheme, there are exceptions such as tall oatgrass (*Arrhenatherum elatius*), in which the spikelets are 2-flowered with a perfect floret above and a staminate floret below.

In Area 1 of the Tribal Triangle are grouped the most unspecialized and thus hypothetically the most "primitive" tribes, namely the Bambuseae, Festuceae, and Aveneae. The distinguishing features of these tribes are:

Bamboo tribe, BAMBUSEAE. Culms woody; plants not flowering and fruiting annually.

Oat tribe, AVENEAE. Culms not woody; plants flowering annually; glumes exceeding the lowermost floret; lemmas awned dorsally.

Fescue tribe, FESTUCEAE. Culms not woody; plants flowering annually; glumes not exceeding the lowermost floret or if so the lemmas not awned dorsally.

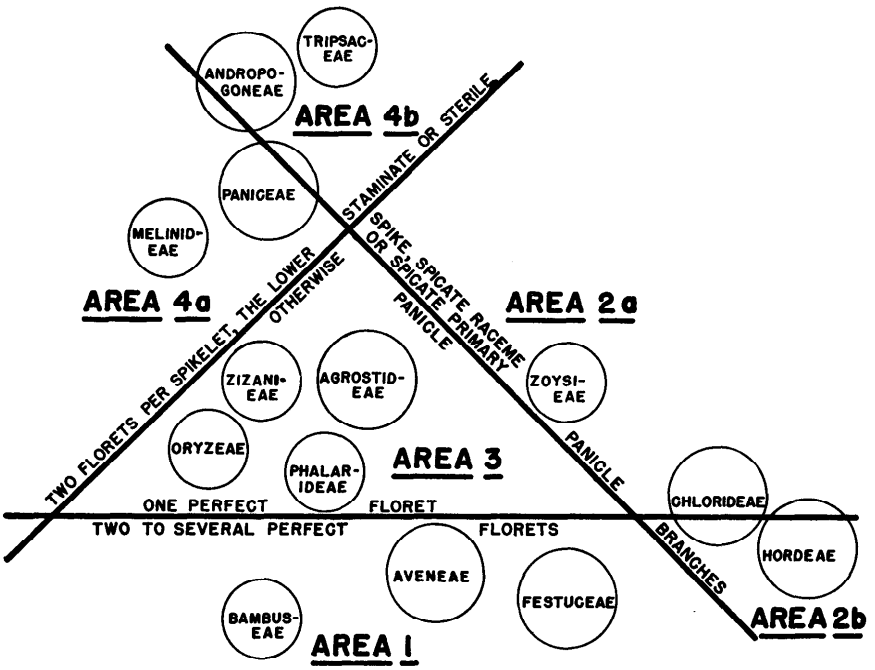

FIG. 1. The Tribal Triangle.

In Areas 2a and 2b are those grasses of the Subfamily Festucoideae in which the inflorescence has been reduced to spike, spicate raceme or a series of spicate branches. As this type of evolutionary reduction apparently has taken place independently in a number of relatively unrelated groups, the tribes in this area are not altogether natural, that is, they probably are comprised of both closely related and distantly related genera. Grasses of the tribes Chlorideae and Hordeae are interrelated with certain groups of the tribe Festuceae. The Zoysieae is a highly "artificial" tribe of tropical and subtropical grasses whose affinities are mainly with the Chlorideae and the Festuceae. The concept of the Zoysieae as herein treated is based on the genus *Hilaria*. The distinguishing features of the three tribes of Areas 2a and 2b are:

Curlymesquite tribe, ZOYSIEAE. Inflorescence a terminal bilateral spike or spicate raceme; spikelets disarticulating in clusters from the continuous inflorescence axis.

Barley tribe, HORDEAE. Inflorescence a terminal bilateral spike or spicate raceme; spikelets falling separately or with joints of a disarticulating inflorescence axis.

Grama tribe, CHLORIDEAE. Inflorescence of two or more (occasionally one) lateral, unilateral spicate branches.

In Area 3 are those grasses of the subfamily Festucoideae with paniculate inflorescences and with a single fertile floret per spikelet. With the exception of the small tribe Phalarideae, the spikelets of these

grasses do not have reduced florets above or below the fertile one. The four tribes of Area 3 may be distinguished as follows:

Canarygrass tribe, PHALARIDEAE. Reduced florets (staminate or sterile) present below the perfect one.

Timothy tribe, AGROSTIDEAE. Reduced florets not present below the perfect one; spikelets bisexual; glume well developed.

Rice tribe, ORYZEAE. Reduced florets not present below the perfect one; spikelets bisexual; glumes reduced.

Indian rice tribe, ZIZANIEAE. Reduced florets not present below the perfect one; spikelets unisexual; glumes absent.

The two principal tribes of Areas 4a and 4b, the Paniceae and the Andropogoneae, are relatively "good" tribes, both in respect to morphological characteristics and genetical relationships. The small tribe Tripsaceae, well known for its cultivated maize or corn, *Zea mays*, has close affinities with the Andropogoneae. Grasses of the subfamily Panicoideae are remarkably uniform in the principal spikelet character—that of the single perfect floret with a single sterile or staminate floret below. The distinguishing features of the tribes in Areas 4a and 4b are:

Millet tribe, PANICEAE. Glumes thinner and less firm than the fertile lemma.

Bluestem tribe, ANDROPOGONEAE. Glumes thicker and firmer than the fertile lemma; spikelets usually in pairs of one perfect and one staminate or sterile.

Corn tribe, TRIPSACEAE. Glumes thicker and firmer than the fertile lemma; male and female spikelets on separate parts of the inflorescence or plant.

Molassesgrass tribe, MELINIDEAE. Glumes and fertile lemma about equal in thickness and firmness.

The Tribal Triangle is presented as an aid to the learning of critical subfamily and tribal characters. No attempt is made to completely summarize the characteristics of these groups as they are treated thoroughly and adequately by Agnes Chase in her excellent introductory grass study "First Book of Grasses" (1922), and by A. S. Hitchcock in the Manual of Grasses of the United States (1951). The Tribal Triangle follows Hitchcock's classification system and is based on morphological characteristics and lines of morphological evolution. Structural characters, although not always reliable indicators of genetical relationships, provide the best practical basis for grass classification.

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FIRST KODACHROME SLIDE CONTEST

Eighth Annual Meeting of the American Society of Range Management

San Jose, California, January 25–28, 1955

Society members are invited to enter Kodachrome slides that they have taken in two classes:

1. Range condition class
2. Wildlife of the range

Kodachrome slides may be 2 x 2, or larger, mounted or unmounted. Contestants may enter one slide in each class. Slides will be projected at an evening session. Thereafter, they will be displayed for competition, with awards for the three slides placed highest in each class and the top slide of the display.

Rules of the photograph contest shall prevail with regard to typed description, contestant's name and address, and his responsibility to take the slides to and from the display booth.

—*Les Albee*, Chairman, Slide Contest

Fertilization of Mountain Meadows in Eastern Oregon

CLEE S. COOPER and W. A. SAWYER

Agronomist and Superintendent, Squaw Butte-Harney Range and Livestock Experiment Station[1], *Burns, Oregon*

NATIVE flood meadows occupy nearly one half million acres of land in eastern Oregon and about three and one half million acres of land in the western United States. These lands serve as the wintering grounds for cattle in the sagebrush-bunchgrass country and provide the major portion of hay for feeding. Hay production from these lands is vital to the welfare of the livestock industry and has a profound influence on all phases of the livestock operation.

Hay production from mountain meadows has a direct influence on the management of rangeland. Many operators are forced to turn their cattle onto the range too early in the spring, due to a shortage of hay and due to the flooded condition of the meadows. Heavy spring use is thought to be a major contributing factor in the deterioration of our sagebrush-bunchgrass rangelands. Longer spring hay feeding could furnish one form of relief for this critical period.

Hay production also has a direct influence on livestock nutrition which may indirectly influence range management. As little regrowth is made after hay harvest, cattle grazing on meadow aftermath in the fall are on a low plane of nutrition and it is often necessary to provide bunched hay during this period. During the winter feeding period the low quality meadow hay does not provide an adequate wintering ration. These periods of low nutrition may cause low calf crops and result in unproductive dry cows being carried on the range. Higher calf crops resulting from better nutrition would allow more beef to be produced from the same number of cows and thus allow more efficient use of available range forage.

Ranchers have become increasingly concerned over an apparent decline in hay production. Yields have declined to an average of approximately one ton per acre and the quality of hay is low enough to make the winter feeding of a protein supplement advisable.

Because of the importance of native hay meadows to range cattle operations, trials were conducted to find the value of fertilizer applications to yield and quality of the crop and to the occurrence of regrowth forage.

Description of the Area

The meadow on which the experiment was conducted lies in Harney Valley, seven miles south of Burns, Oregon, at an elevation of 4,100 feet. This meadow is typical of the major portion of native flood meadows in eastern Oregon.

Soils of the area are medium or fine textured. They are generally mildly calcareous and slightly to moderately alkaline.

The vegetation is composed of sedges (*Carex* spp.), rushes (*Juncus* spp.), water loving grasses and forbs. These species form a complex plant community. The distribution of the plant population is extremely variable with salt grass (*Distichlis stricta*) dominant on alkaline knolls and wire rush (*Juncus balticus*) dominant in the deeper swales. Areas between these extremes are composed of varying amounts of sedges, rushes, grasses and forbs. Most of the sedge and rush species are of a rhizomatous nature and form a compact sod with root penetration seldom exceeding twelve inches.

Meadows are irrigated by wild flooding in the spring for a period of from six to twelve weeks. The period of flooding is dependent upon rate, time and amount of spring runoff and usually begins in April and terminates in mid-June. Active growth ceases within two to three weeks after the recession of the flood.

Harvesting begins in the forepart of July and little regrowth is made after harvest. Cattle are grazed on the aftermath stubble in the fall and are fed on the meadowlands throughout the winter feeding period.

Experimental Procedure

Four levels of nitrogen and of phosphorus fertilizer were applied alone and in combination to plots 45 feet long and 12 feet wide. Each of the sixteen resulting treatments was replicated four times. Nitrogen levels, applied as ammonium nitrate, were 0, 20, 40 and 60 pounds of actual nitrogen per acre. Phosphorus levels, applied as treble super phosphate, were 0, 40, 80 and 120 pounds of P_2O_5 per acre. The fertilizers were surface applied with a three foot Gandy fertilizer spreader in early November of 1951 and 1952.

Samples for yield determinations were taken by mowing one swath 38 inches wide through the length of each plot. The field weight of each plot was recorded and samples were taken from each plot for oven drying. Yields were calculated on

[1] *Squaw Butte-Harney Range and Livestock Experiment Station is jointly operated by the Bureau of Land Management, U. S. Department of the Interior, and Oregon Agricultural Experiment Station, Oregon State College, Corvallis, Oregon.*

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Table 1. Relationship of nitrogen and phosphorus fertilization to yields of meadow hay

Year	Pounds of N applied per acre					Pounds of P_2O_5 applied per acre				
	0	20	40	60	Avg.	0	40	80	120	Avg.
	tons/acre									
1952	1.61	2.04	2.18	2.54	2.09	1.81	2.18	2.22	2.17	2.09
1953	1.89	2.17	2.70	2.95	2.43	2.21	2.49	2.60	2.42	2.43
Avg.	1.75	2.11	2.44	2.75		2.01	2.33	2.41	2.30	

L.S.D. at 5% level of probability for comparison of:
Avg. rate yields, 0.27 tons
Avg. year yields, 0.19 tons

an oven dry basis plus 10% moisture. Samples taken for moisture determinations were analyzed for crude protein content.

Results

Yields

Nitrogen, phosphorus and years were all significant sources of variation in this experiment. Interactions between nitrogen and phosphorus, or between nitrogen or phosphorus and years were not significant.

Nitrogen fertilizer increased yields of hay one ton per acre at the 60 pound per acre rate of application (Table 1). There is no indication that rate of application was high enough in this study to result in reduced efficiency of nitrogen utilization by this forage. Residual yield effects from nitrogen fertilizer were not apparent one year after application.

Phosphorus increased hay yields one third of a ton per acre (Table 1) with no significant benefits occurring from applications above 40 pounds P_2O_5 per acre.

Yield increases from phosphorus fertilization are mainly due to stimulation of the annual white-tip clover (*Trifolium variegatum*). On phosphorus-fertilized plots this clover attained a maximum height of 30 inches as compared to 5 inches or less on unfertilized plots. Indications are that by proper management and fertilization this clover may be increased to occupy a position of dominance in the vegetative composition.

Residual yield increases from the 1951 application (Table 2) are of importance in considering phosphorus fertilization. As in the initial yields there was no significant increase from rates of application above 40 pounds P_2O_5 per acre.

Yield increases were higher in the first year than in the second year following fertilization. As first year yields were taken prior to seed dissemination of white-tip clover, it is believed that the decrease in response is due to a reduced clover stand rather than to decreased availability of phosphorus. It is now believed that delaying harvest, until about one half of the seed heads of white-tip clover have turned brown, will allow for ample seed dissemination and will materially increase clover production and residual response to phosphorus.

Yields averaged .34 of a ton higher in 1953 than in 1952. This difference may be attributed partly to the selection of a more productive site for the 1953 trials. Two main factors influencing productivity were the absence of salt grass knolls on the 1953 site and a longer flood period. The 1953 site was submerged for a period of 105 days as compared to 75 days for the 1952 site. Apparently, for this water-loving type of vegetation, long flood seasons are advantageous.

FIGURE 1. Fertilizer boosts meadow hay yields. The area right of stake received 60 pounds of N and 120 pounds of P_2O_5 as compared to no fertilizer on the left. (Note stimulation of clover in lower right foreground.)

Fertilizers did not stimulate regrowth on plots after harvesting. However, on an area on which white-tip clover has been increased through proper fertilization and harvest practices a stimulation of regrowth has been observed.

Crude Protein Content

The crude protein content of meadow hay was not affected by

Table 2. Initial and residual yield increase* from phosphorus applied in November 1951

Year	Pounds P_2O_5 applied per acre			
	0	40	80	120
	lbs./A.			
1952 Initial	0	750	821	724
1953 Residual	0	402	332	476
Total	0	1152	1153	1200

L.S.D. at 5% level of probability for comparing total yield increase, 416 lbs.

* Each value is the average yield increase from that treatment at four levels of nitrogen fertilization, applied November 1951.

fertilization in this experiment; however, on an area where the clover composition has been increased to 80 percent through fertilization and delayed cutting the crude protein content was 12.99 percent on August 1, 1953, as compared to 6.50 percent for untreated rush-sedge meadow hay.

Discussion

Site Selection

Observations of fertilized plots indicate that care must be used in selecting sites for fertilization. On plots located on alkaline knolls and in the deeper swales in which water was standing at a depth of one foot or more during the growing season, response to fertilizers was poor. Maximum response was obtained on areas intermediate to these two extremes.

Table 3. Yield increase and nitrogen efficiency of four levels of nitrogen fertilization applied in November 1951 and 1952

Application Rate, Pounds N per acre	Yield Increase, Pounds hay per acre	Nitrogen Efficiency, Pounds hay increase per pound of N applied
0	0	0
20	710	35.5
40	1375	34.4
60	1988	33.1

L.S.D. at 5% level of probability, 538.

Clover Production

The stimulation of clover production from phosphorus fertilization is of major interest and importance. The legume component of meadow hay at present is so small that is has little effect on the quality of hay. Ranchers state that in earlier years there was a larger proportion of clover in their meadow hay. Declining fertility and earlier cutting may be the main causes for the decline in clover production.

The phenomenal response of white-tip clover to phosphate fertilization suggests the need for special management and fertility practices to increase this component of meadow hay.

nitrogen per acre, and phosphorus as treble super phosphate at 0, 40, 80 and 120 pounds of P_2O_5 per acre.

Nitrogen increased hay yields at all rates of applications with an increase of one ton per acre occurring with the 60 pound per acre rate of application. There were no additional benefits from nitrogen fertilization one year after application.

Phosphorus increased hay yields one third of a ton per acre in the year of application, and one fifth of a ton per acre in the year following application. No additional benefits were obtained from phosphorus application rates higher than 40 pounds P_2O_5 per acre.

Phosphorus stimulated the growth of white-tip clover. Increased clover production, through the use of phosphorus and management practices, resulted in an increase in crude protein content of hay of 6.49 percent.

Table 4. Initial and residual yield increases and P efficiency of four levels of phosphorus applied in November 1951

Application Rate, Pounds P_2O_5 per acre	Yield Increase in Lbs./Hay Per Acre			P Efficiency, Pounds of Hay Increase per Pound of P_2O_5
	1951 Application	Residuals of 1951 Application	Total	
0	0	0	0	0.0
40	750	402	1150	28.8
80	821	332	1153	14.4
120	724	476	1200	10.0

Economic Benefits of Fertilization

With nitrogen valued at 15 cents a pound and hay at $20.00 per ton, 15 cents expended for nitrogen produced 35 cents worth of hay (Table 3).

Residual yield increases should be considered when calculating returns from phosphorus application (Table 4). With phosphorus at 10 cents per pound and applied at 40 pounds per acre, and hay at $20.00 per ton, 10 cents expended for phosphorus produced 28 cents worth of hay.

Summary

Nitrogen and phosphorus fertilizers were applied on native hay meadows in eastern Oregon in November 1951 and 1952. Nitrogen was applied as ammonium nitrate at 0, 20, 40 and 60 pounds of actual

Site selection was important as response was poor on alkaline knolls and in the deep swales which were submerged to a depth of more than one foot.

Additions of both nitrogen and phosphorus were an economical means of increasing hay production.

Acknowledgment

The authors wish to make acknowledgment to Dr. J. R. Haag, Head, Department of Agricultural Chemistry, Oregon State College, and his staff, for their splendid cooperation in conducting the crude protein analyses in this experiment

Grazing–Past and Present in my Locality

KENT WHIPPLE

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IMAGINE yourself viewing this dramatic picture in the year 1929, one mile north of a prosperous western cattle ranch: A well-dressed cattle man is talking to a camp tender standing at the camp watching his boss's sheep, which are grazing for miles around on this beautiful ranch—two herds consisting of 4,000 head. You hear the cattle man say, "When are you moving on?" The tender says, "No speak English." The rancher says, "This is the second time I have told you to leave. You have been here for a week. Now I mean it! Move on! Get out of here!" The tender replies, "No speak English." Turning away, the cattle man states "You'll be arrested!" The tender replies, "No speak English."

The rancher immediately calls the Sheriff who says he will be out as soon as possible. In the meantime, the Sheriff contacts the owner of the sheep, who lives in another state. A week passes before the authorities take any direct action to remove the sheep. When they finally do, the sheep man gladly pays the $200 fine for violating the law which prohibits anyone from grazing livestock within one mile of a spring. He has had 15 days grazing for 4,000 head of sheep at a cost of only $200.

This incident happened year after year, until the rancher was provoked into using his horse whip on a camp tender, who for weeks had postponed his departure by the phrase, "No speak English." This white sage flat was used by the cattle rancher for spring grazing and calving. The feud between this rancher and the sheep men almost led to murder, many times.

County, state and federal officials were very much aware of the fact that something had to be done. In 1930, Henry Wallace, later Secretary of Agriculture under Pres. Roosevelt, published an article in the *Saturday Evening Post* on "The Western Open Ranges." His was the first suggestion for federal control.

In 1934, Senator Taylor from Wyoming, and Senator Isaacs from Idaho proposed the bill which is now called the Taylor Grazing Act. Its purpose was "to stop injury to the public grazing lands by preventing overgrazing and soil deterioration; to provide for their orderly use, improvement and development; to stabilize the livestock industry dependent upon the public range."

NEVADA CONTEST WINNER

This article won first place in an essay contest sponsored in 1954 by the Nevada Section of the Society for high school students. The contest topic was "Grazing–Past and Present in My Locality".

In 1936, my dad was running cattle in what is now White River and Cave Valley units of Taylor Grazing District #4. The area was crowded with 30,000 and 40,000 out-of-state sheep every winter. Naturally, the cattle were suffering. My dad talked with other cattle men and encouraged and urged them to join us in petitioning to be taken into the Taylor Grazing District #4. We were accepted. We realized that this wasn't exactly what we wanted; nevertheless many sheep were eliminated from this area and very quickly. However, the shoe started to pinch us. It was seven or eight years after the act had become a law, that all livestock owners in District #4 were called into an important meeting.

My mother was representing the Murry Whipple Estate at the meeting. She, with all the other livestock owners, was amazed at the statistical data of every individual spread, mapped in full scale on a large wall. For several years prior to this meeting, qualified government officials had quietly gone about the district making a survey of facts. They got information from the county auditor, clerk and assessor's offices, and they actually lived on and studied the open range.

Much of this information led to protests and heavy arguments—even to the pulling of coats in the meetings. However, democracy proved invulnerable—people could disagree without becoming enemies. There were many, many hearings and protests, but eventually a ten-year permit was granted to users of the range. Each year a group of officers would be elected to a governing grazing board known as the Advisory Board of the district. Much power lies in their hands. The board would comprise representatives of sheep and cattlemen from the sub-divisions within the district. The grazier would sit as a member of the board, with no power to vote, but could act with a veto. Each permittee must make application for a designated pattern on which to run each year. He must pay a grazing fee for cattle and sheep. Each permit is measured in terms of A. U. M.'s or animal unit months. The amount of A. U. M.'s owned was broken into seasonal use in percentages.

All this government control was aggravating to men who had operated with a free hand heretofore.

But something had to be done, and the livestock men agreed that although government control had a long way to go before perfection, it had bettered the situation.

Range control in this locality has been a gradual process. At first, only people who desired and petitioned for it were placed under Taylor Grazing. Some in, and some out, did not prove successful, however, so the government took a firm hand. They demanded that every owner of water rights or operator on open range belong to Taylor Grazing or take a rental lease on the open range. There was much adverse reaction, but it was a government demand.

At first, our area—just north of Hiko and the Coal Valley area, with a line extending northeast of Hiko to the six mile area—belonged to Taylor Grazing. After the new law, "Taylor Grazing—or lease", all the range south of Hiko was admitted and designated as Grazing District #5. The offices for this district were located at Las Vegas. Immediately, range development progressed: The expenses were shared equally between the government and the permittees. Many water holes, wells, reservoirs and pipe lines were installed. Brushing, reseeding and fencing followed. There was a real program of utilization and progression in these first years.

Everything with the sheepmen and cattlemen went smoothly till the drought of 1952–53—then the common expression "old dog eat dog" was recognized everywhere. The government, however, came to the rescue of livestock owners with the drought feeding program.

The Bureau of Land Management in District #4 has used the funds of grazing fees collected from its district for improvements within the district. This improvement program, aided by private contributions from licensed livestock operators, has been carried on since June 30, 1953, with extensive range reseeding and fencing. One 6,800 acre field, which formerly supported big sage and other low-value livestock feed, has been plowed, seeded and fenced. Other benefits have been carried out on a regular program basis such as: cattleguard construction, spring developments, reservoir construction and construction of water spreader systems.

A twelve-year range conservation and improvement plan has been formulated for different sections of Grazing District #4. The plan has been worked out with the U. S. Soil Conservation Service for the planning and treatment of private lands located within the 637,000-acre major portion of the watershed. Also, private allotments are being worked out. My brother and I are young, but we look forward to reaping the benefits of our grazing and soil conservation practices.

In the past, our forefathers reaped all the value from the free, open ranges, but due to the abuse of overgrazing and climatic conditions, government range management became a necessity. Many problems arose by its acquisition, but government control, which at first horrified the free operator, has the prospect of beginning the "Golden Age" of grazing in my locality.

PHOTOGRAPH CONTEST

Eighth Annual Meeting of the American Society of Range Management

San Jose, California, January 25–28, 1955

Members of the Society may enter photographs that they have taken under any of the following six classes:

1. Range types.
2. Range condition (including fence line scenes).
3. Individual plants.
4. Seeded ranges.
5. Grazing scenes showing utilization of particular range plants by livestock or wild life.
6. Color pictures.

The first five classes are for black and white photographs, 8 by 10 inches or larger, with non-glossy surface. The color prints should be 3 by 4 inches or larger. All entries should be mounted with borders at least 3 inches wide, but without frames. A description, 50 words or less in length, typed on a separate sheet should be attached to the photo mount to be visible. Also, the contestant's name and address should be attached but not visible to the voters until after the competition.

Entries will be numbered and voted upon by members attending the meeting to determine three highest placing within each class and three highest for the entire exhibit.

Photographs are to be taken to and from the display booth by the contestant or someone he has designated who attends the meeting. An individual may have a maximum of six entries.—*Donald R. Cornelius*, Chairman, Displays and Contests Committee.

Supplemental Feeding of Range Cattle in Longleaf-Slash Pine Forests of Georgia[1]

B. L. SOUTHWELL and L. K. HALLS

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For many years cattle grazing has prevailed in the longleaf-slash pine forest ranges of Georgia and contributed greatly to the beef supply of the region. The limiting factor in beef production on these ranges is quality of forage rather than quantity. Except for two or three months during the year, the forage is generally deficient in protein, phosphorus and calcium. Beef cattle can subsist without supplemental feeding but calf crops are very small, death losses high, and replacement requirements large (Biswell, *et al.* 1942; Brasington 1949; Campbell and Rhodes 1944; Shepherd, *et al.* 1953).

Increased cattle production as measured by larger calf crops and reduced death losses of cows is primarily dependent upon better nutrition. It has been customary to get by with as little extra feeding, fencing and general care as possible. Burning is a common method of increasing the value of native herbage for grazing. Winter burning increases the availability, palatability and nutritive value of the native "wiregrass" the next spring, and as a result spring and summer livestock gains are two to three times greater on burned than on unburned areas (Halls, *et al.* 1952). Too often, however, burning has been used to increase grazing values at the expense of potentially greater timber values. Some think grazing should be only one of several factors, such as reduction of fuel and improvement of pine regeneration, in determining when and whether to burn (McCulley 1950).

Even with burning, livestock production is limited unless additional required nutrients and minerals are made available. These may be supplied by improved summer pastures, protein concentrates, annual winter pastures, field gleanings, hay, sugarcane and grain. Mineral mixtures may be self-fed separately the year round.

Experiments were conducted near Alapaha, Georgia, from 1948 through 1952, to investigate the effect of year-round supplemental feeding as compared to fall and winter supplemental feeding of range cattle, and to compare improved pasture with high protein meal as supplements to forest range. Results apply in particular to the Lower Coastal Plain but in general to forest lands characterized by an overstory of longleaf and slash pines and herbaceous understory of "wiregrass."

Description of Area

Approximately 60 percent of the 22.5 million acres in the Coastal Plain of Georgia is classified as forest land. Topography of the Coastal Plain varies from gently rolling to nearly flat. Soils are sandy in texture, mildly to strongly acid and low in fertility. The frost-free period averages 245 days and annual precipitation is about 48 inches. Grazing is most prevalent on upland areas which support variable stands of second growth longleaf (*Pinus palustris*) and slash pine (*Pinus elliottii*). Areas which have light to medium stands of timber produce abundant grazable herbage, whereas it is negligible under dense stands. Major species of grasses on upland which contribute the greater portion of the forage, include pineland threeawn (*Aristida stricta*), Curtiss dropseed (*Sporobolus curtissii*), bluestems (*Andropogon* spp.), carpetgrass (*Axonopus affinis*) and various panicums (*Panicum* spp.). Broad-leaved herbs are relatively unimportant both as to extent and contribution to the forage supply. The two main shrubs, gallberry (*Ilex glabra*) and sawpalmetto (*Serenoa repens*), are relatively unpalatable and undesirable because they increase the fire hazard and reduce herbage production.

FIGURE 1. Abundant herbage is produced on upland portions of longleaf-slash pine forests. Cattle concentrate on such areas when grazing conditions have been improved by winter burning.

[1] *Cooperative investigation by the Forest Service and Agricultural Research Service of the U. S. Dept. of Agriculture and the Georgia Coastal Plain Experiment Station; considered by the Georgia Coastal Plain Station as Journal Series Paper No. 28.*

Swamps and lowland areas, periodically under water, are characterized by cypresses (*Taxodium* spp.), various hardwood trees and shrubs which provide only limited herbage. Although quantity of herbage produced is small, this browse herbage may be relatively high in certain minerals which help to balance the animal diet.

Previous Investigations

Previous studies conducted on this area (Shepherd, *et al.* 1953) substantiated two earlier surveys (Biswell, *et al.* 1942 and Brasington 1949) by showing that supplemental feeding was necessary to prevent severe winter death losses of cattle. Shepherd, *et al.* further reported that a minimum acceptable level of supplemental feeding to avoid starvation losses was about 1 pound of protein concentrate per head daily from October 15 to January 31 when cows were on forest range, and a ration equivalent to 20–25 pounds of sugarcane plus 2 pounds of protein concentrate from February 1 to March 15 when cows were off the range and in dry lots. Under this supplemental feeding practice, dry cows gained consistently in the dry lot and on range through spring and summer, and were in good enough condition to breed successfully. Wet cows, however, usually failed to conceive. They generally barely maintained their weight or lost slightly during the breeding period and continued to lose weight during the late summer, fall and winter. The supplemental feeding met the minimum requirements for dry cows but was inadequate for wet cows. A further inference was that additional supplementation at other seasons might raise the wet cows to breeding condition and thereby increase the calf crop.

Experimental Procedures

Year-round and fall and winter feeding of protein concentrates to grade Hereford cows, as supplements to range forage, was studied from 1948 to 1952. Additional comparisons were made from 1950 through 1952 by providing limited amounts of improved pasture in addition to forest range. Grazing schedules and supplemental feeding practices are illustrated in Figure 2.

There were two groups involved in the protein supplement comparisons. Each of these groups was divided into two small herds. The two herds in group 1 were fed 2 pounds of cottonseed meal per head per day from April 10 to June 30, and 1 pound from July 1 to October 15. During these same periods the two herds in group 2 were on the 15 through January, then in dry lot with 2 pounds of cottonseed meal and 20–25 pounds of sugar cane per cow per day (Fig. 2).

Improved pasture plants included Louisiana white clover (*Trifolium repens*), Dallisgrass (*Paspalum dilatatum*), and carpetgrass. Annual fertilization was at the per-acre rate of 56 pounds each of phosphate (P_2O_5) and potash (K_2O).

The cottonseed meal which was fed three times per week in open troughs had a protein content of 41 percent. A mineral mixture of two parts steamed bone meal (7 percent crude protein, 33 percent calcium and 15 percent phosphorus) and one

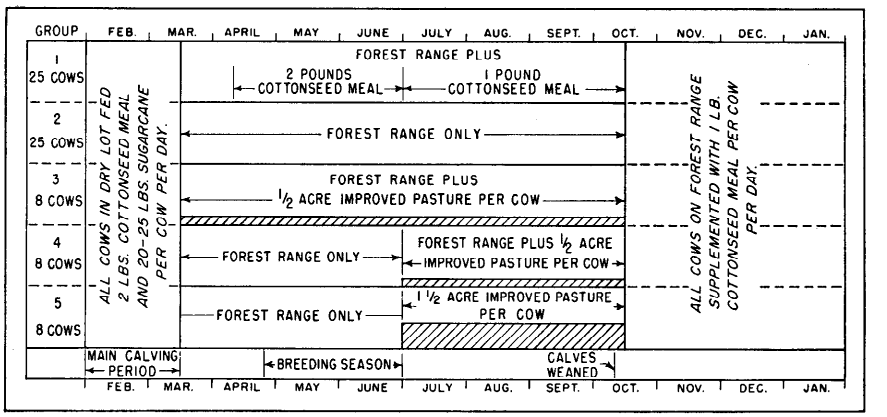

FIGURE 2. Grazing schedule and supplemental feeding practices. Groups 1 and 2 were on test from 1948 through 1952, groups 3, 4 and 5 from 1950 through 1952.

range without supplemental feed. They were allotted 7 acres of burned upland range, 7 acres of unburned upland, and 6 acres of lowland and swamp per cow for the first two years, and 10, 5, and 7 acres, respectively, the last three years.

Three groups of eight cows each, groups 3, 4 and 5, were furnished ½ acre during spring and summer, ½ acre during the summer, and 1½ acres during the summer, respectively, of improved pasture in addition to 10 acres of burned upland range and 3 acres of unburned lowland and swamp per cow.

All five groups were on forest range with one pound of cottonseed meal per cow per day from October of salt, by weight, was available to cows at all times.

Grade Hereford cows, bred to Brahman bulls during an April 25 to July 1 season, were used in this experiment. Grazing began about March 15 each year when the major grasses, pineland threeawn and Curtiss dropseed, had made approximately 6 and 4 inches growth, respectively. Supplemental feeding stations were located to encourage uniform grazing of the range.

Results

Effects of Feeding Protein Concentrates

On Calf Crop

Feeding cottonseed meal year round tended to increase the calf crop generally over the period of the

Table 1. Calf crops weaned by cows run on native range under two supplemental feeding practices

Year	Cows fed cottonseed meal year-round Group 1	Cows fed cottonseed meal during fall and winter only Group 2
	Percent of cows weaning calves	
1948	96	84
1949	16	16
1950	80	80
1951	68	28
1952	60	68
Average (1949–1952)	56	48

study (Table 1). Good calf crops were obtained in all herds during 1948 because all cows had been dry the previous year. The unusually good 1948 calf crop in group 1 (cows on range with cottonseed meal during spring and summer) does not reflect the effect of increased supplements because supplemental feeding did not start until October 1947, and all cows were treated alike until March 15, 1948. Inability of wet cows to breed on unsupplemented native range is illustrated by the low calf crop in 1949. In group 2 (cows on unsupplemented forest range during spring and summer), the only cows that calved were those which had not produced calves the previous year. The fact that three cows in group 1 calved in both years perhaps indicates a slightly higher level of nutrition for this group. Over the 5-year period, two-thirds of the cows in group 1 produced calves in two successive years and some calved three years in succession. This repeat calving was most prevalent the last two years, probably because of the cumulative effect of better treatment and ability of older cows to make more efficient use of the low quality roughage. Only one-fourth of the cows in group 2 produced calves in two successive years, this occurring mostly during the last two years.

On Calf Weights

The most pronounced effect of extra feeding during the spring and summer was the 65-pound per calf increase in weaned weight (Table 2). Over the period of the test this accounted for a larger portion of the increased beef production than the greater number of weaned calves in the group supplemented year round on the range. Also, the better condition of calves at weaning added to the benefits of supplement feeding.

Cows on year-round supplemented range weaned calves which on the average were five days older than calves on unsupplemented range. However, this had only minor influence on the weaning weights. The greater daily gains of calves during the suckling period were apparently due to increased milk production by cows and direct cottonseed meal consumption.

On Cow Weights

Differences in cow weights that developed during the study were relatively small. The initial weights of 709 and 657 pounds per cow in groups 1 and 2, respectively, had increased to only 774 and 685 pounds five years later. Large individual yearly weight losses occurred when the cows raised calves, and this prevented pronounced increases in weight over the test period. Because cows in group 1 produced more calves, they were subject to more frequent yearly losses in weight. Even so,

Table 2. Average weaning weights and age of range calves in relation to two supplemental feeding practices, 1948 to 1952

Supplemental feeding practice	Weaning weights		Age
	Actual	Adjusted	
	lbs.		*days*
Cows fed cottonseed meal year-round (Group 1)	360	356	229
Cows fed cottonseed meal fall and winter only (Group 2)	295	299	224

they were heavier by nearly 90 pounds than the cows in group 2 at the end of the experiment.

Seasonal changes in weight varied considerably between treatments and according to the numbers of wet cows in each group. On the average, cows with calves lost approximately 130 pounds over a period of a year even though fed supplements during the fall and winter. This yearly loss was reduced to 83 pounds on wet cows by feeding cottonseed meal the year round (Table 3).

During the calving period, February 1–March 15, weight losses averaged from 60 to 70 pounds, the cows in best condition losing slightly more weight. After the cows were put on the range in March, those fed cottonseed meal rapidly regained nearly all of the weight lost in calving. Because of this ability to gain during spring and early summer, wet cows fed cottonseed meal obtained an advantage over those

Table 3. Average seasonal gain or loss in weight for wet and dry cows. Main calving period, February and March; calves weaned October 15

Season	Wet cows		Dry cows	
	Group 1	Group 2	Group 1	Group 2
	pounds per animal			
Feb. 1–Mar. 15	−71	−60	58	77
Mar. 16–Apr. 25	18	−3	42	30
Apr. 26–June 30	50	−3	110	79
July 1–Oct. 15	−9	−33	69	47
Oct. 16–Jan. 31	−71	−31	−95	−53
Average net	−83	−130	184	180

on range without supplemental feed. These, on the average, continued to lose weight. This advantage was mantained through October even though all cows lost some weight during late summer. Weight losses continued during the fall and early winter even though the calves were weaned in October.

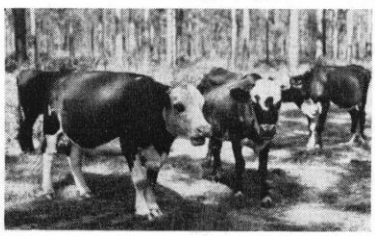

FIGURE 3. These cows were fed cottonseed meal year-round (group 1). Cow on left was dry, others had calves. (Photo taken in October).

Dry cows gained 180 pounds through the course of a year on the average (Table 3). These cows gained in the winter dry lot and continued to do so when placed on the range in March. As much as 1½ pounds per cow per day were gained during this spring grazing period. As forage quality and palatability decreased during the late summer, the rate of gain declined. During this range grazing period, dry cows fed cottonseed meal made better gains than dry cows on range without meal and by October they averaged approximately 45 pounds heavier. After October, all cows lost weight. The dry cows that were in the best condition at the beginning of the October-January period lost the most weight; thus the net year-long gains for dry cows were about the same regardless of spring and summer treatment.

Effects of Supplementing Forest Range with Improved Pasture

Free access to forest range supplemented by one-half acre of improved pasture per cow from March to October resulted in extremely heavy use of the pasture. This also favored invasion of the low-producing carpetgrass at the expense of the more desirable Dallisgrass. Unequal use of the native range also resulted because the cattle tended to graze heavily near the improved pasture and lighter as the distance from pasture increased. Increased utilization of native herbage and better maintenance of Dallisgrass and white clover were accomplished when the cattle were excluded from pasture until July. This permitted a considerable buildup of grass herbage in the improved pasture, but with such a schedule most of the white clover grazing was lost.

On Calf Crop

Calf crops, as shown below, were similar for all three groups that had improved pasture as a supplement to native range.

	Calf Crop (Percent)		
	Group 3	Group 4	Group 5
1st year	88	88	88
2nd year	25	25	38
3rd year	86	100	80

These calf crops were slightly higher than those of the protein supplemented groups (Table 1) during the first three years they were on test. In general, however, the performance was similar in that most cows were able to calve the first year of the test, because they had been dry the previous year, but only a few calved the following year. The tendency remained for most wet cows not to breed.

On Calf Weights

Weaned weights of calves were greatly increased by supplementing the range with improved pasture. Weights were in proportion to the amount of pasturage furnished during the summer when calves were old enough to obtain a considerable portion of their feed from grazing. Weaned calf weights averaged 456 pounds when improved pasture was supplied during the summer at the rate of 1½ acres per cow (group 5). Reducing this pasture to ½ acre per cow during the same period also reduced weaning weight to 407 pounds per calf (group 4). Where pasture herbage had largely been removed in early spring and was thus scarce during the summer, calf weaning weights were only 386 pounds.

On Cow Weights

Wet cows lost an average of approximately 64 pounds through the course of a year (Table 4). The net result was approximately the same for all herds although

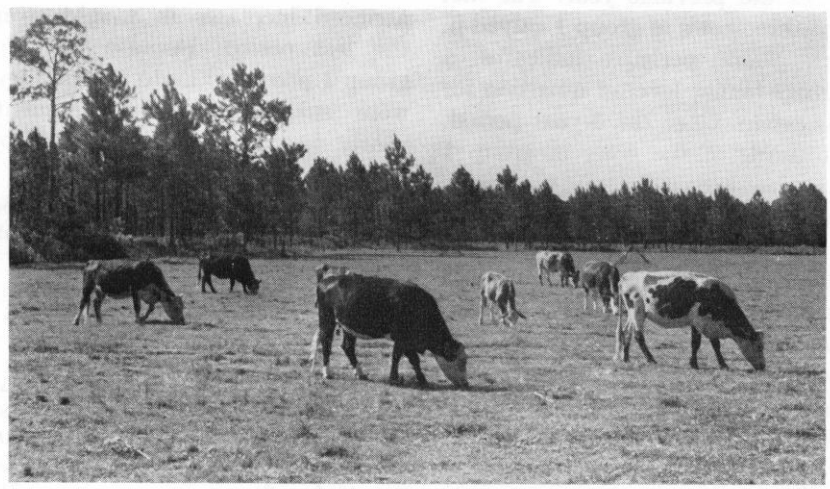

FIGURE 4. Limited improved pasture during the summer increased cow and calf gains but failed to increase calving percentage when a low level of nutrition was supplied during the fall and winter.

weight changes fluctuated throughout the year according to the amount of improved pasture furnished.

During the dry lot period, February 1–March 15, cows which calved lost from 50 to 65 pounds. Those restricted to forest range from March 15 to July 1 just about maintained their weight. Others provided with ½ acre of improved pasture made gains of 50 pounds per animal. These were comparable to gains made on protein supplements during the same period.

Small allowances of improved pasture provided in this study were closely grazed during the spring. As a result they were very unproductive during the summer, and cattle were forced to obtain the greater portion of their feed from the range. Consequently, cows with calves in this group barely maintained their weight during the summer. When improved pastures were not grazed until July (groups 4 and 5), grass growth was allowed to accumulate; therefore, a large amount of good quality herbage was available. Access to this improved herbage, and the fact that cows had previously been on a near maintenance ration on forest range, enabled them to make very good gains from early July to mid-October. These gains were largely nullified, however, by large losses in weight which occurred when cows were again confined to range from mid-October to late January. These losses occurred even though the calves were weaned and the cows were fed cottonseed meal.

Dry cows gained an average of 130 pounds or better through the course of a year (Table 4). Good performance was noted for all periods except when cows were on range in fall and winter. Gains made during spring and summer were closely related to the amount and time when improved pasturage was supplied.

Discussion

In order to produce a good calf crop, wet cows must be able to maintain or even increase their weight throughout the year. Losses in animal weight may be permissible at certain times of the year, particularly during the calving period, but this weight should be regained at other times, preferably during the spring and summer, when forage quality and grazing conditions are best. Since wet cows do not gain during this period on range without supplements, it appears necessary to provide additional forage or nutrients. Presumably, such cows should breed and conceive when they receive sufficient supplements during the breeding season to make gains of 50 to 70 pounds. Although several of the wet cows in this study did rebreed under such conditions, most of them which made similar gains failed to do so. This indicated the need for a higher year-round level of nutrition. Increasing the rate of supplemental feeding during the spring and summer would help to raise the nutritional level and enable more cows to produce calves, but this extra feeding does not appear justified when excessive weight losses are allowed to take place at other seasons. Also, extra supplements can be used most efficiently when quality of native herbage is lowest, rather than in the spring when it is highest. Presumably, the calving percentages could have been increased most efficiently by preventing large losses in weight during the fall and winter when native forage quality was extremely low.

The failure of cows supplied with limited improved pasture during spring and summer to produce calves each year further indicates that excessive weight losses during fall and winter may be a major factor in restricting the number of calves born. Gains made by cows during and after the breeding season were not sufficient to counteract the effects of weight losses during fall and winter. Thus, little benefit was realized from extra improved pasture during summer as measured by the number of calves weaned.

Table 4. Average seasonal gain or loss in weight for cows with and without calves (1950–1952)

Season	Wet cows			Dry cows		
	Group 3	Group 4	Group 5	Group 3	Group 4	Group 5
	pounds per animal					
Feb. 1–Mar. 15	−52	−53	−65	69	72	79
Mar. 16–June 30	50	10	−5	144	61	89
July 1–Oct. 15	−1	81	135	56	124	137
Oct. 16–Jan. 31	−58	−102	−131	−100	−125	−127
Average net	−61	−64	−66	169	132	178

There is little reason for feeding protein concentrates or furnishing improved pasture during spring and summer to dry cows which are to be kept in the herd. They breed successfully without it. Dry cows, of course, make better gains when furnished with additional feed but this weight advantage is offset by the big losses which take place during the fall and winter. If management facilities are available, wet cows should be separated from replacement heifers and dry cows. Wet cows would make most efficient use of supplemental feeds; whereas the dry cows and heifers would make satisfactory gains and breed successfully on range without supplements during the spring and summer.

The benefits from year-round feeding of cottonseed meal, as

practiced in this study, are small. An extra 1621 pounds of cottonseed meal per cow produced approximately 375 pounds more beef over a 5-year period than when cows were fed meal only during fall and winter; or 4.3 pounds of extra cottonseed meal were required to produce an extra pound of beef. This was primarily a result of the increased 338 pounds of calf weight produced per cow. The 37-pound increased gain in weight of cows fed supplements year round was of minor importance.

Table 5. Net returns per weaned calf are increased by supplementing native range during the spring and summer with improved pasture, as compared to cottonseed meal

Supplement feeding schedule	Cattle group	Calf weaning weight	Value at 20¢/lb.	Cost of extra feed during spring and summer[1]	Return per calf
		pounds	*dollars*	*dollars*	*dollars*
Adequate pasture (July–Oct.)	5	457	91	21	70
Limited pasture (July–Oct.)	4	407	81	7	74
Limited pasture (Mar.–Oct.)	3	386	77	7	70
Cottonseed meal (Apr.–Oct.)	1	360	72	12	60

[1] Cost per cow and calf, March 16–October 15. Based on yearly pasture maintenance of $14.00 per acre (including establishment prorated over 10 years) and cottonseed meal at $70.00 per ton.

The economics of year-round supplemental feeding would, of course, depend upon the relative price of cottonseed meal and beef. During the course of this study, the average selling price of beef was 20 cents per pound, cottonseed meal 3½ cents. At this ratio the practice would apparently be justified. Increased labor costs of getting supplements to cattle would detract from this; but a closer check on animals, better control of insects and disease, and ease of handling and rounding up cattle may partially or even fully compensate for this extra labor.

The limited comparisons of this study indicate that improved pastures may be more economical than protein concentrates for supplementing range during spring and summer (Table 5). Wet cows that had access to limited improved pasture made equal or better gains from March 15 to October 15 than those on protein supplement. Net returns per weaned calf were 17 to 23 percent greater. These increases in weight more than offset the additional cost of providing pasture as compared to protein concentrates. Supplementing the range with improved pasture has one distinct disadvantage in that cows tend to overgraze the improved pasture and nearby range. Moving the feed boxes of protein concentrate helps to overcome this condition by causing cattle to graze farther out.

Summary

In the longleaf-slash pine forests of the Coastal Plain of Georgia, grade Hereford cows were grazed on the native range except for a 6-weeks' period in February and early March. During this off-range period the cows were dry-lot fed a maintenance ration of chopped sugarcane and cottonseed meal. While on the range, some of the cows were fed a supplement in the spring and summer consisting of cottonseed meal (1948–1952) or limited improved pasture (1950–1952). Others were given range only during this period. All animals were treated alike on range from October 15 through January 30.

Cottonseed meal supplement fed during the spring and summer increased weaned calf crop from 55 to 64 percent and the calf weaning weights by 65 pounds. Over a 5-year period, an extra 1621 pounds of cottonseed meal per cow resulted in approximately 375 pounds more beef than when cows were fed meal during the fall and winter only. Dry cows benefited some from supplements fed during the spring and summer, but this advantage was largely lost the following fall and winter when cows lost excessive weight. These losses were apparently a major factor in preventing cows from calving each year.

Cows furnished limited amounts of improved pasture weaned heavier calves but calf crop was similar to that for cows fed cottonseed meal. Indications were that improved pasture was more economical than protein concentrates for supplementing forest range but less flexible in management.

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TECHNICAL NOTES

PROPANE-POWERED LOW-VOLUME SPRAYER AND WEED BURNER

E. H. JENSEN AND W. C. ROBOCKER

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It is often difficult to apply small amounts of spray solutions uniformly over experimental plots, and the difficulty is increased when working with brushy range weeds which prohibit the use of a plot sprayer mounted on wheels.

A number of sprayers designed to apply small amounts of solution to experimental plots have been described in the 1951 Research Report of the North Central Weed Control Conference and by Buchholtz (1950), Robinson and Dunham (1950), Shaw (1950) and Ries and Terry (1952). These sprayers use compressed air or carbon dioxide. In experiments where both burning and spraying treatments are employed, it would be necessary, in using such a sprayer, to have a separate unit for the burning treatments.

A back-pack, propane-powered sprayer (Figure 1) was used successfully in Nevada this past season for spraying low-growing weeds such as halogeton (*Halogeton glomeratus*) and tall-growing shrubs such as big sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus* spp.) at rates of 3 to 10 gallons of spray solution per acre.[1] Possible herbicidal effects of propane which may have become dissolved in the spray solutions have not been determined. Since the gas is in contact with the solution for only an instant, it is believed to be slight.

A measured quantity of solution is sprayed over the plot through a siphon-type paint gun. The problem of drift which is encountered in airplane spraying also applies to this sprayer, so that it is necessary to spray during hours of low wind movement. It has been found advantageous to have a two-man team in spraying operations, one to operate the sprayer and the other to locate plots and measure solutions.

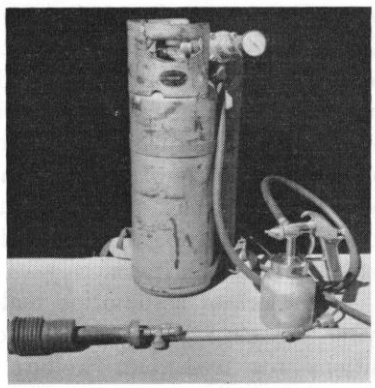

FIGURE 1. Back-pack, propane-powered unit with low-volume paint-gun sprayer and interchangeable weed-burning torch.

The propane tank may be easily filled in the field from cylinders containing 100 pounds of liquid propane. Since the propane is also carried in the back tank in a liquid state, the continuity of operation possible with a two-man crew sometimes results in lowering of the temperature of the propane to a point where the pressure falls below that set on a reduction valve. This leads to eventual freezing, particularly if a water solution is being applied on a cold morning. It has been necessary in these cases to stop at intervals to allow the temperature of the gas to rise. This can be hastened by setting the sprayer in the heated truck cab for a few minutes.

A unique feature of the apparatus is its ready convertibility to a weed burner. The paint gun and hose are replaced with a burner attachment which is available from a commercial supply source.

The weight of the empty sprayer is about 20 pounds, and the tank holds 10 pounds of propane. With the price of propane at $6.50 per 100 pounds, the cost of applying one gallon of water solution, if the sprayer were run continuously, has been calculated at approximately 30 cents. The initial investment in equipment was $60.50, and was itemized as follows:

Container	$17.50
Regulator and pressure gauge	10.50
Paint gun	16.00
Hose, clamp and backboard	3.00
Weed-burning torch	13.50
Total	$60.50

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[1] *This sprayer is a modification of one used by E. H. Sutliff of the Bureau of Reclamation, Department of the Interior.*

ECONOMICS OF WESTERN RANGE RESOURCE USE[1]

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The central economic problem relative to range resource use is the allocation of all scarce resources

[1] *Abstract of dissertation submitted in partial fulfillment of the requirements for the Ph.D. degree, Department of Economics and Sociology, Iowa State College, Ames, Iowa.*

available to the Western Range Area so as to obtain a maximum of the goods and services desired by all individuals and groups concerned. The resources considered were: (1) all land resources west of the eastern boundary (placed near the 100th meridian), including climate as well as physiographic features; (2) all labor resources available to the area, including the skills, productivity and mobility of the workers; and (3) all capital and management resources available to the area.

The primary purpose of this study was to develop a logical framework for economic analysis of western range resource use. The basic deductive theorems of the framework were taken from general equilibrium theory and welfare economics adapted to dynamics.

The marginal conditions underlying the theoretical models were enumerated, their limitations to specific situations were pointed out, and the policy and research implications of the maximizing solutions were discussed.

In general, the economic problems of range resource use fall under four main types of theoretical solutions: (1) optimum factor combination and use; (2) optimum scale of firms; (3) optimum product combination; and (4) the pricing of factors and products. The latter set of problems arises out of the environment in which some of the factors and products are rationed and their respective prices are administered.

The marginal conditions governing the optimum combination of factors of production specify that factors be so allocated that the ratio of the discounted expected marginal value of product to the discounted expected price of the factor be equal for every resource. This ratio should also be equal for every possible alternative use for each factor. (In absolute equilibrium this ratio would be 1.00.) The physical input-output relationships needed for making maximizing solutions come from the science of range management. However, the logic of the maximizing principles is not a part of the theories and principles of range management as currently defined, but comes from the science of economics.

Optimum scale of firms occur when it is impossible to increase or decrease the size of firms and thus obtain a lower cost of production for the same products or increase the amount of products from the same resources. There is strong evidence that substantial scale maladjustment occurs with the smaller firms. The extent of conflict between resource efficiency and income distribution criteria for determining optimum scale adjustment depends on the real nature of the economies of scale. There are conflicts in the kind of recommendations one makes based on each criteria.

An important assumption underlying the necessary marginal conditions for maximum welfare is that the factors and products are priced so that the market is cleared of all factors and products that are offered at that price and that no demand at that price goes unsatisfied. This assumption was found to be invalid for several instances of federally owned forage resulting in pressures tending toward malallocation. A general procedure was presented for evaluating the forage in terms of: (1) the quantity and quality of forage and the production coefficient rate at which grass was transformed into animal product; (2) the price of livestock products; and (3) the cost of resources other than forage associated with range-livestock production.

The marginal conditions specifying an optimum combination of enterprises (products) were explored for three different types of allocation problems. The first was that of determining the type of agricultural production for areas that are marginal between range-livestock production and dryland cropping. A part of this problem for some regions is the integration of irrigation into range and dryland farming operations. The existing economic criteria for determining the feasibility of irrigation development was appraised.

The second type of product combination to which the marginal conditions were applied was that of determining the optimum rate of of product (resource) use over time. This is the general problem of conservation.

A theoretical model for determining optimum intensity of grazing over time was developed and adapted to conditions of weather uncertainty.

The third type of product combination pertained to the optimum combination of the products of multiple-use resources, *viz.*, livestock, wildlife, timber, recreation and hydrological products. The general solution to this problem was approached through a series of partial solutions.

In each case the solution was a function of the physical marginal rates of product substitution between the two alternatives in question for a specific range site and the relative preferences of society for the products being considered. The general nature of several physical transformation functions was suggested, and procedures for estimating others were outlined.

The relative preferences of society for alternative products are usually expressed in terms of market prices. Not all products are allocated through the market mechanism, however. In some cases individuals express their preferences for alternatives by voting. Many of the allocation decisions pertaining to range resource use have been delegated to elected and/or appointed representatives. The complex and interrelated allocation decisions that are made by the several different

elected and appointed representatives (Congress, the President and the bureaucracy) can be improved by the use of: (1) a central planning and coordinating board; and (2) a professional sampling staff to estimate the preferences of individuals relative to alternatives by means of statistical sampling.

Where the information needed for a decision is known, the theoretical models lead directly to the maximizing solution. Where the information is not known, the models direct the search for the needed facts. In the meantime they furnish the only logical basis for decision making in the absence of information.

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An Introduction to Climate. By Glenn T. Trewartha. *McGraw-Hill Co., N. Y. 402 pages. 1954. $7.00.*

Commerce of the Prairies. By Josiah Gregg, edited by Max L. Moorhead. *University of Oklahoma Press, Norman. 480 pages. 1954. $7.50.*

Methods of Crop Forecasting. By Fred H. Sanderson. *Harvard University Press, Cambridge, Mass. 254 pages. 1954. $5.00.*

Our American Weather. By George H. T. Kimble. *McGraw-Hill Co., N. Y. 320 pages. 1954. $4.50.*

Raising Livestock. By George P. Deyoe, W. A. Ross and W. H. Peters. *McGraw-Hill Co., N. Y. 540 pages. 1954. $5.75.*

Readings on Agricultural Marketing. By Frederick V. Waugh (editor). *American Farm Economic Association. 456 pages. 1954. $5.00.*

Reclamation in the United States. By Alfred R. Golze. *McGraw-Hill Co., N. Y. 451 pages. 1952. $8.50.*

Sampling Theory of Surveys with Applications. By P. V. Sukhatme. *Food and Agricultural Organization, Rome, Italy. 491 pages. 1954. $6.00.*

Statistics and Mathematics in Biology. By Oscar Kempthorne *et al. Iowa State College Press, Ames. 640 pages. 1954. $6.75.*

The Schooling of the Western Horse. By John Richard Young. *University of Oklahoma Press, Norman. 376 pages. 1954. $4.95.*

BOOK REVIEWS

Edited by Hudson G. Reynolds, Rocky Mtn. For. & Range Exp. Sta., Box 951, Tucson, Arizona.

North American Prairie. By J. E. Weaver. *Johnsen Publishing Co., Lincoln, Nebraska. 348 pages. 1954. $5.00.*

This book is a comprehensive summary of some 40 years of study of the North American Prairie by the author, his students and other workers in the field of plant ecology. It is designed to tell the story of the Prairie to the layman and technician alike.

As a synthesis of some 205 citations and Dr. Weaver's interpretation of the Prairie as a complex society of living organisms, the book is organized to this end. The opening chapter on the nature of grasslands and grasses sets the background for understanding the Prairie. Next, plant species and communities are described in detail. Herbaceous plants are treated as important members of the prairie community.

Descriptions of roots and other underground parts of various species are well done, as one would expect from Dr. Weaver, who has been long known as the outstanding student of underground parts of plants. The rate of root development, extent of root development and longevity of roots of prairie species are considered important in the maintenance of the prairie as a closed community. The seasonal aspect of the prairie is described in a personal and intimate way which reveals the beauty of the prairie. It is almost subjective.

The stability of the prairie is indicated as an equilibrium which allows for some variation but which is self contained as to its species. The longevity of dominants, their control of light and water, their effects on temperature and humidity of the immediate environment, together with their capacity to adjust to the climate and biota, are the major elements of this stability.

Considerable space is devoted to reports of historical observations. For example, in early Illinois and Kansas big bluestem made such growth that a rider had to stand in the stirrups to see over the prairie. Range technicians concerned with brush control will be interested in the studies on the prairie inclusions and the forest border.

The chapters on the great drought of the nineteen thirties is an exhaustive record. The impact of an extreme environmental condition—the drought—and its subsequent effect on species and communities reveals the strength and capacity of the prairie to adjust to severe conditions.

The process of degeneration and regeneration of the prairie completes the story of the prairie. Plowing has destroyed a major portion of the Prairie with little chance of its recovery because of economic demands. Excessive grazing has caused the prairie to give way to Kentucky bluegrass and much of the sod is no longer prairie but pasture. Fire due to lightning or started by Indians is considered a natural factor of the environment. Annual fall burning for pasture improvement, a common practice after settlement, is considered a contributing factor in the degeneration of the prairie.

The rancher and technician alike will both find this book enjoyable and informative reading. The excellent illustrations, particularly of the herbs, will appeal to the layman. The book will become a frequent reference for those who deal with the prairie. As a record of a major plant community it will be a landmark in the field of plant ecology and a standard on plant community analysis for years to come. It could have been written only by a man who devoted a lifetime to intimate living with the prairie.—*Melvin S. Morris*, School of Forestry, University of Montana, Missoula.

Plant Regulators in Agriculture. Compiled and edited by H. B. Tukey, Michigan State College. *John Wiley & Sons Inc., New York. 269 pages. 1954. $5.50.*

As the numbers of chemicals used in agriculture increase and the published reports of research and testing pile up, well organized, timely reviews are invaluable. Particularly is this true for those of us who devote a part or all of our time to agricultural service. This book, written by 17 experts, "is prepared for the many who have been puzzled and were annoyed at their seeming inability to grasp the significance of plant regulators, what they are, how they operate, and where they belong in agriculture." The writers have done an excellent job in describing the various chemicals that have plant regulating properties, and in explaining the principles of their action, and the results obtained from their use.

Subject matter for the 16 chapters has been well chosen so that all practical uses of plant regulators are covered. The first two chapters present a brief review of general botany, the physiology of growth and reproduction, and the discovery and development of plant regulators. Included is a report on Nomenclature of Chemical Plant Regulators, prepared by a committee of the American Society of Plant Physiologists. This report presents a series of definitions covering terminology in the field of regulator physiology that should go a long way toward clearing away the confusion that exists in the literature with respect to plant regulators.

Chapter 3 considers the chemical nature of plant regulators. This is an excellent presentation. Though, at first glance, it may seem unduly technical because of the chemical formulas included, one must realize that intelligent use of such compounds requires our understanding of their chemistry.

The remaining chapters of this book take up the use of plant regulators in induction of rooting, the control of flowering and fruit set, control of abscission of leaves and fruits, maturation of fruits, inhibition of sprouting, setting of seeds and weed control in its various aspects. The final chapter describes equipment and methods of application of plant regulators.

From the standpoint of range management it is unfortunate that there is so little information given on the control

of trees, brush, poisonous plants and range weeds, particularly on western ranges. However, most such methods are new and still undergoing rapid development.

This is a readable book that brings together most of the practical knowledge in the use of plant regulators. The language is simple, illustrations are clear, and a plant science background sufficient for comprehension. It should be emphasized that this is not a reference volume for research workers. It is written for "the county agricultural agents—advanced high school students, college students, and a considerable sprinkling from the business and professional world." It will prove to be valuable to a wide group of readers including many interested in range management.—*A. S. Crafts*, Department of Botany, University of California, Davis.

Nothing but Prairie and Sky. By Walker D. Wyman from the original notes of Bruce Siberts. *University of Oklahoma Press, Norman. 217 pages. 1954. $3.75.*

Many a rancher in the early livestock days on the Dakota range, hard pressed by severe winters, summer droughts, insects and low prices, would have given his right arm for the opportunity of reading about those days, as we can now, rather than have had to go through them. Few of us realize or can imagine the incredible hardships experienced in that era, the complete lack of even basic facilities. For us now it would have made life miserable at best and wretched at other times.

Men were men in those days. Civilization had not progressed to our present status of physical mollycoddling, nor had spoon-feeding of our intellect yet begun, so these early scions of the range were actually pretty tough hombres. Their friendships were fast and their enemies received no mercy.

Bruce Siberts takes you back with him to his one room shack on Plum Creek, 90 weary miles from Pierre, South Dakota. You follow him as he rides his herd, hires his ranch hands, chases rustlers and horse thieves, eats his own cooking and sourdough bread, and occasionally rides to Pierre to "get the alkali water" out of his system and to "bleach out."

Siberts started out in the cattle business in a small way, building up his herd gradually. Two hard winters just about broke him. It was then he changed to horse ranching. Again he built up stock numbers, only to again suffer heavy losses from the weather. Disheartened, he sold out "lock, stock and barrel" and moved to Oklahoma.

In recalling past experiences for author Wyman in remarkably clear images, Siberts decided his life had brought his reward enough, stating. . . . "it was horses that gave me my start. If I had stayed in cattle, I might still have been drinking alkali water and living with a mortgage in South Dakota. But it wasn't a bad place for a young man to start out—even if there was nothing but prairie and sky."

Unfortunately, Bruce Siberts did not live to see his life's story in print, for in 1952 at the age of 84 "he passes on to a new frontier where, it is said, there are no rustlers or blizzards." We can, however, receive inspiration and encouragement from him in this book, his memorial.—*John M. Fenley*, Clark County Agent, Las Vegas, Nevada.

Grasses and Grassland Farming. By Hi W. Staten. *The Devin-Adair Co., New York. 319 pages. 1952. $5.00.*

This book contains a wealth of information applicable throughout the United States. More readable than the 1948 Yearbook, Grass, the book by Staten covers much of the same material in brief form and includes similar information on individual grasses. The crop calendars show at a glance seasonal growth of the species which are adapted to the various sections of the country.

The author has written the book because as he says, "The country is running out of grass." He points out the deterioration in our grasslands, deplorable plow-ups creating future dust bowls and gullied waste lands, and the disastrous effect of overgrazing and repeated burning on grasslands over the country.

An earnest plea is made for better management of our remaining grassland. Professor Staten points out that grass and legume pastures are the cheapest form of livestock feed that can be produced. Grassland farming offers a practical, economical means to protect our remaining soils and return millions of acres to productivity before erosion has gone too far.

Professor Staten has in terms readily understood by the lay reader described what is happening to our grasslands, why it is happening, and the long process nature takes to build back to grass through successive stages. He explains the practices necessary to successful establishment of productive, nutritive pastures; cites numerous examples of improved farms built up with pastures; and presents comprehensive charts outlining the grasses and legumes and their combinations adapted throughout the United States.

This book should appeal to friends of the land, progressive ranchers, range managers, county agricultural agents, students of agronomy, conservationists and technicians in all branches of agriculture who wish to broaden their knowledge in the field of cultivated grasses and legumes and pasture management. Individuals concerned with application of good range management and those who design the patterns to be applied should read this book and profit from the personal experiences of the author and the many ranchers whose stories he tells in an interesting and forceful manner.—*L. P. Hamilton*, In Charge, University of Arizona Soil Conservation Nursery, Tucson, Arizona.

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Edited by Arnold M. Schultz, School of Forestry, University of California, Berkeley, California

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WITH THE SECTIONS

COLORADO

Forty members of the Colorado Section had a field meeting on August 27 and 28, touring the Mountain Meadows and Hatchett Cattle Company ranches with M. T. EVERHART, owner, and his livestock manager, LOUIS DRAPER, as hosts.

The first day was spent viewing the management and improvements on the Mountain Meadows Ranch southwest of Wetmore. Mr. EVERHART has owned this ranch since 1935 and has made range improvements for the past 18 years at an annual cost of approximately $3,000. The improvements viewed on the tour were gulley plugging, contour spreader ditches, rehabilitation of plowed fields, reseeding, water development, roads and fencing. Steers have made an average gain of over 3 pounds per day, even during the current dry year. Supplemental feeding of crushed cake and salt is practiced when necessary.

The next day the group toured the Hatchett Ranch south of Pueblo. The range improvements and practices observed were similar to those at the Mountain Meadows Ranch but were designed for low elevation, short grass range. The highlight of the tour on the Hatchett Ranch was the series of large, water-impounding and spreader developments which have furnished adequate stock water and forage in an area with flash storms the major source of precipitation. The spreading and distribution of water in the valleys has increased the livestock feed on an otherwise very dry range and provided adequate and properly distributed stock water.—*Warren J. Gray.*

Colorado Section officers Charles Terwilliger, Jr., Vice Chairman, Warren J. Gray, Secretary-Treasurer and Fred H. Kennedy, Chairman, at the field meeting on the Hatchett Ranch near Pueblo, August 28th.

INTERNATIONAL MOUNTAIN

Another successful meeting of the International Mountain Section was held in the Lethbridge-Medicine Hat area of southern Alberta on September 1st to 3rd with about 70 members present.

Activities got underway on the evening of September 1st with a banquet in Lethbridge at which DICK PAINTER was the guest speaker. His discussion on "Insects and Man" indicated the importance of competing insects in our everyday life. Dick emphasized the need for study of the effects of insects on yield and quality of our range grasses as well as on the grazing animal.

On September 2nd a short business meeting was held at the Dominion Experimental Station at which new officers were introduced or announced. The group then toured a series of experimental irrigated pastures from which yields up to 700 pounds of animal products per acre are obtained.

After a picnic lunch at the Experimental Station, the group drove to Medicine Hat and saw the irrigated pasture and feedlot set-up belonging to the S and T Ranching Company. Management practices in use were explained by DICK SHOLTEN. A demonstration was given of a motor-driven sprinkler irrigation system.

On September 3rd, the group toured the Cypress Hills area south and east of Medicine Hat. This area figured largely in early Alberta history and many of its historical aspects had been discussed by Senator GERSHAW the previous evening. A. W. MURPHY, of the Prairie Farm Rehabilitation Administration, discussed water conservation in the area and showed a dam used for maintaining stock-watering facilities downstream. Water released from the dam during dry periods fills up potholes in the creek bed for several miles downstream.

At a stop overlooking the Medicine Hat country and the geological formation of the Cypress Plateau, WALLY HANSON and JIM MCARTHUR led a discussion covering some of the vegetational types of the area and management practices used by ranch operators. MCARTHUR also reviewed his work with the "cattalo" and other research at the Manyberries Range Station.

A lunch at Elkwater Park, followed by short talks from the outgoing and incoming chairmen completed the program. RON PEAKE acted as master of ceremonies throughout the meeting.—*Robert L. Ross.*

Incoming officers for 1955 are:

Chairman: JOHN CROSS, Nanton, Alberta
1st Vice-Chairman: M. J. REED, Missoula, Montana
2nd Vice-Chairman: ALEX JOHNSTON, Lethbridge, Alberta
Secretary-Treasurer: E. A. CHISHOLM, Calgary, Alberta

KANSAS-OKLAHOMA

The Fall Roundup of the Kansas-Oklahoma Section was held October

13 and 14 at Ashland, Kansas. The meeting was scheduled immediately following the Annual Range Improvement Field Day at the U. S. Southern Great Plains Field Station at Woodward, Oklahoma to allow members to attend both affairs.

A banquet, program and business session were held at the 4-H Building in Ashland in the evening of October 13. Dr. JERRY SOTOLA, Associate Director, Livestock Bureau, Armour & Co. of Chicago gave the principal address entitled "Advances in Ruminant Nutrition".

On October 14 the group participated in a tour featuring reseeding, sagebrush spraying and range management practices, arranged by Bennie Bird, Clark County Extension Agent of Ashland and the program committee headed by W. H. PAINTER. Inspections were made of native grass seedings on the Snake Creek Ranch, Caucasian grass seeding on the V. W. MCMINIMY ranch, switchgrass on the PAUL RANDALL ranch and of sagebrush spraying and deferment practices at the DEL RANDALL ranch. DEWITT ABBOTT, State Soil Conservationist, was principal speaker at the luncheon in Ashland. FRANCIS ARNOLD of Hays led a discussion on range management during the afternoon session.

NEVADA

The Nevada Section enjoyed an exceptionally good year as far as range management was concerned, but the year also had its sorrows. It saw the passing of WILLIAM N. WHITE, one of our charter members. BILL WHITE began his official contribution to the Nevada Section two years ago when he served as secretary-treasurer. In 1953 he was elected Vice Chairman and was the main coordinating force of the 1954 Field Tour and Annual Meeting. At this meeting he was elected to the position of Chairman, but before he could take over these duties, death overtook him in an automobile accident near Ely on June 8.

Cattlemen and sheepmen all over Nevada, as well as we in the Section, miss the genial manner and professional integrity that we knew in Bill. His work in the Bureau of Land Management helped put into practice many new range ideas to provide greater benefits from the range. His efforts in working out management plans for entire watersheds of northeastern and east central Nevada were accepted by stockmen and were considered the most workable plans every devised for those areas.

To reorganize the official roster of the Section following White's death, the following actions were taken by the Council:

NED SMITH, elected Vice-Chairman at the Annual Meeting, was moved to Chairman.

GEORGE ZAPPETTINI, previously appointed Secretary-Treasurer, was moved up to Vice Chairman.

Chairman SMITH selected JOHN L. ARTZ for Secretary-Treasurer, this action being approved by the Council.—*John M. Fenley.*

NEW MEXICO

The New Mexico Section held a successful meeting at Ruidoso, September 24 and 25, with about 50 members and guests attending.

The tour scheduled for the Upper Hondo Watershed Project during the first day was cancelled because of rain. All agreed that the rain was better than the tour. The group joined the Supervisors of the Upper Hondo SCD as guests at their noon barbecue in Capitan where slides and a discussion of the projects on the watershed were given. A banquet was held that evening at the Carrizo Lodge in Ruidoso.

On the following day the meeting convened at Carrizo Lodge for a series of four informative talks: Poisonous plants of New Mexico, Dr. J. J. NORRIS, New Mexico A. & M. College; Range feeding of concentrates and nutritional deficiencies in New Mexico, Prof. J. H. KNOX, New Mexico A. & M. College; Principal external parasites of cattle and sheep in New Mexico, Dr. H. O. PETERSON, Livestock Research Section, ARS; and Promising Exotic grasses in New Mexico, J. A. DOWNS, Soil Conservation Service, Albuquerque.

The New Mexico Section sponsored a 4-H Club Grass Judging Contest for which prize money totalling $100 was provided by the Section. A sum of $54 was obtained from voluntary contributions solicited by the committee for this project, J. S. MCCORKLE, Chairman. The remaining funds were supplied by the Section treasury.

The winning team will receive expenses to the New Mexico Cattle Growers' annual meeting where a demonstration will be conducted in behalf of the Society.

In August TRACY L. HEGGIE, SCS, Albuquerque was named Secretary-Treasurer to fill out the term of FLICK HODGIN who was transferred to Williams, Arizona.—*A. V. Steed,* Chairman and *T. L. Heggie,* Sec.-Treasurer.

SOUTH DAKOTA

The South Dakota Section's objective of holding ranch tours in various parts of its range area was expanded in 1954, following three successful tours in 1953. These tours provide each member a better opportunity to attend one or more field meetings, compared to a central meeting. The fact that half our members attended one or more tours indicated the success of this approach. In addition more than 150 visitors attended our seven tours; over half were ranchers.

The first tour was on OTTO WOLFF'S winter sheep range in April, where Wolff showed us his lambing operations in full swing. Plants of the mixed prairie vegetation were identified, and their growth characteristics discussed by LES ALBEE, Soil Conservation Service, in relation to range sites, condition and utilization.

Most of Wolff's sheep range is in excellent condition. His March shearing and the continuous grass cover makes his one of the cleanest wool clips in the United States.

Selenium poisoning of cattle and horses is a perennial problem in parts of South Dakota. Two June tours on consecutive days on the JACK HUNTER ranch, Ardmore, and ALFRED HANSEN ranch, Nisland, helped point out the selenium indicator plants by Kodachrome slides at indoor meetings in the mornings and in the field in the afternoons. ALBEE handled this part of these programs. BOB RADEKE, SCS Soilsman, related selenium occurrence to geologic formations of the area.

OSCAR OLSON and EUGENE WHITEHEAD of the State Agricultural Experiment Station described the acute and chronic stages of the poisoning and how to minimize the bad effects. HENRY HOLZMAN, Extension Animal Husbandman, explained the importance of

adequate protein in the diet on selenium ranges.

These two selenium tours were the best attended of the seven, indicating the interest in this special-purpose type of tour.

Another June tour was held on CARL SUNDALL'S ranch, Kennebec. Highlighted were tame grass-legume pastures, used in the cool season to defer native ranges, and other range management and improvement practices. BOB MYERS, SCS Conservationist, and SUNDALL handled the tour and discussions that took place.

During the heat of July, the section sponsored a range plant identification field day at Roubaix Lake in the Northern Black Hills. HOLZMAN trained the group attending in grass identification. ALBEE discussed identification of forbs and woody plants.

ALLEN SMITH was host to Society members and friends at a tour of his 10,000 acre ranch early in August. He explained his water spreading systems, gully plugs and practices, haying and year around livestock management on the range. The most common range sites, native forage plants, and range condition and utilization were thoroughly discussed by those attending. E. M. STROM, SCS Conservationist, and SMITH made this tour a grand success.

Our seventh tour took place August 31 on the LLOYD GILBERT ranch near Buffalo. This and the other ranch tours were co-sponsored by the local Soil Conservation district and the South Dakota Section. GILBERT, WARD VAN HORN, chairman, Harding County District, and MEL AKIN, SCS Conservationist, lined up an interesting tour and program, and excellent noon luncheon. Discussions throughout the day centered on identification and characteristics of range plants, range sites and condition, training in determining degrees of grazing use and revegetation of sandhill blowouts using the seed-hay method.

—*Les Albee*, Secretary-Treasurer.

SOUTHERN

The third annual meeting of the Southern Section was held on September 3 and 4 at Ona and Fort Myers, Florida. More than 35 men attended the field trips, with delegations from Florida, Georgia, North Carolina and Louisiana. JESUS TORRETA, from the Philippine Islands, was present as a guest. The Section was honored by the attendance of directors of three state experiment stations: Dr. F. F. COWART of the Georgia Experiment Station, Dr. F. P. KING of the Georgia Coastal Plain Experiment Station, and Dr. W. G. KIRK of the Florida Range Cattle Experiment Station.

The first day was spent on the Range Cattle Experiment Station at Ona and the H. D. RYALS Ranch in De Soto County. The Range Cattle Experiment Station is a part of the Florida Agricultural Experiment Station system. It was established in 1940. Under the guidance of Dr. KIRK, research is conducted on forage production, beef cattle breeding and feeding, and management of range, pastures and cattle. Dr. E. M. HODGES, agronomist, showed the pasture work with Pangola grass, Argentine and Pensacola bahias, carpetgrass, Suwannee and coastal Bermudas and such legumes as white clover, hairy indigo, lespedezas and others. The cattle herd and feeding work, were described by F. M. PEACOCK, animal husbandman; and the soils and fertilizer studies by D. W. JONES. Experimental tree plantings in the area were demonstrated by H. W. ELLIS of the Florida Forest Service.

The late afternoon of the first day was spent on the DeSoto County ranch of H. D. RYALS, who makes use of both native range and improved pastures in raising slaughter cattle.

The annual banquet was held in Fort Myers, with K. B. POMEROY as Toastmaster. JOE WOOLFOLK gave his most interesting illustrated talk on range management in Argentina, followed by N. A. HERREN'S presentation of south Florida's agricultural development.

The second day was spent observing forest and range work east of Fort Myers. The studies of the Southeastern Forest Experiment Station were described by GORDON LANGDON and BOB RUMMELL. Then the group was transported in 4-wheel drive trucks through the extensive pastures and cattle grazing operations of the Atlantic Land and Improvement Co. in the Devil's Garden area. The Company, a subsidiary of the Atlantic Coast Line Railway, is developing forestry, range and cultivated agricultural resources on its extensive holdings and is cooperating in research projects. The Company provided a most satisfying lunch at its ranch headquarters. Our thanks to BILL SPARKMAN for a swell day!

Members of the Southern Section admiring Brahman crossbred cattle on Pangola grass pasture at H. D. Dyals' ranch, De Soto County, Florida.

At the business meeting, BOB RUMMELL reported 54 active members in the Section. Chairman BOB CAMPBELL reported for R. E. WILLIAMS that the southern range resources pamphlet is about ready for publication.

The report of the Section Planning Committee, prepared by JOHN CASSADY, showed the Section voted to remain as a single Southern Section until the membership increases further, but to form two chapters.

The group voted to meet at Alexandria, Louisiana, in 1955.

The Section gave a resounding vote

of thanks to Local Arrangements Committee Dr. KIRK and BOB RUMMELL and to the sponsors of the tours for a swell meeting.

A fitting sequel to the meeting was the deep sea fishing trip on Sunday, September 5. The deep sea part didn't work out too well, but the still-fishing in backwaters did. Ask any of the five fellows who hooked into 5-foot tarpon.—*R. S. Campbell.*

UTAH

Fifty-one members of the Utah Section were the two-day guests of stockman CHARLEY REDD, DALE KINNAMAN (BLM) and QUE HANSEN (Forest Service) on September 3 and 4, 1954, for a tour of ranges in southeastern Utah. The tour circled LaSal Mountain where current uranium activity goes forward at an amazing rate.

The group assembled at La Sal Junction between Moab and Monticello, Utah, shortly after noon of September 3. Mr. REDD extended his personal welcome to each of the travelers, hoping that none of them would get uranium fever and drop by the wayside. It didn't take long to convince everyone that there was more than mineral wealth in this land of upside-down mountains. The soil was deep, had good drainage, and reseedings on Mr. REDD's public domain and Forest Service ranges showed remarkably good takes.

Steak, sour-dough biscuits, pan-fried spuds and Green River watermelons featured a big open-pit barbeque feed arranged by the hosts at Redd Ranches Pine Lodge. The night was spent under the stars. Dr. L. A. STODDART, ART SMITH, BEN MARKHAM and some of the others spent the night in an evaucated bull pen acquiring the aroma of true range managers. STODDART reported that his students thought his lectures smelled that way for quite a few years.

Ham and eggs with lots of hot coffee got the gang started again at 7:00 a.m. for Wray Mesa, Paradox Valley and Taylor Flat. Reseeding, natural comeback and some overused areas were visited before lunch was served by members of the Grand County Horse and Cattle Association. Association President LESTER TAYLOR and his wife were on hand to make sure that no one went hungry.

Old-timers JOHN PACE, ANDY RIDDLE and DON TAYLOR gave a run down of land settlement and usage in the area as they had seen it in their lifetimes. This feature was well received and tied to W. L. MCCONKIE's historical tale of the previous night.

After lunch, A. PERRY PLUMMER, Chairman of the Utah Section, thanked the hosts and everyone concerned with making the trip a rousing success. The members could choose their independent routes of returning home—past the Arches National Monument, Natural Bridges, Capitol Reef, Bryce or Dead Horse Point. Driving across that big country they had ample opportunity to witness areas in which progressive stockmen are overcoming the complex ownership pattern of state, private and federal land and rough, raw country by cooperative effort, ingenuity and investment.

Utah Section members at the dedication ceremony for the erection of the first of a series of range type signs, sponsored by the Projects Committee. The Cliffrose Type is featured.

The first of a series of signs designating range types was erected on May 11, 1954 by the Utah Section and land management agencies. Thirty members of the Utah Section participated in the dedication program for the series which is designed to call the attention of the casual observer to the important range types in the state.

The project is a part of the program of the Projects Committee of the Section. Appropriate remarks about the value of type marking, the pride of the Section in participating in the project and the value of the Cliffrose (*Cowania stansburiana*) type were offered by Section Chairman A. PERRY PLUMMER, Project Committee Chairman GRANT A. HARRIS and Supervisor ALBERT ALBERTSON of the Dixie National Forest.

The informal ceremony took place during a range tour of southwestern Utah, one of three such affairs conducted by the Utah Section. LELAND HEYWOOD, CONWAY E. PARRY, and stockman ANTHONY W. ATKIN made the arrangements for the trip.

On August 3, 1954, thirty-six youths from all sections of Utah checked in at the Tony Grove Camp in Logan Canyon to attend the first annual Utah Conservation Summer Camp—a four day experience in wildland management. The camp was one of the projects undertaken by the Utah Section under direction of its Project Chairman, GRANT A. HARRIS.

The young folks were selected from 4-H, FFA and Boy Scout units. The prime requisite was that each of the young people have a good record in conservation work and a real interest in learning technics of forest, range and wildlife management. Recreation in the form of games and an overnight trek to White Pine Lake was also included.

This first attempt at an organized Conservation Camp was a ringing success and drew favorable editorial comment in the Salt Lake Tribune. The Utah section is extremely proud to have been able to join with the Utah Extension Service, School of Forestry and the State Board of Forestry in instituting the program. From all indications it will be a regular annual occurrence.—*Bill Hart.*

SOCIETY BUSINESS

PROGRAM

Eighth Annual Meeting

American Society of Range Management

Sainte Claire Hotel

San Jose, California

January 25, 26, 27, 28, 1955

Tuesday, January 25

AFTERNOON

Meeting of Section Chairmen

Technical Session Meeting

Technical Papers in Range Management

Chairman: Dr. L. A. Stoddart, Head, Department of Range Management, Utah State Agricultural College, Logan, Utah

Use of regression for range research. Arnold M. Schultz, University of California, Berkeley

Botanical composition of the annual grassland as affected by fertilization on two soils near Berkeley, California. A. Kadish, University of California, Berkeley

A capacitance meter for estimating forage. Joel E. Fletcher, Agricultural Research Service, Tucson, Arizona and Max E. Robinson, College of Southern Utah, Cedar City

Field tests using the capacitance forage meter. Max E. Robinson and Joel E. Fletcher

Panel Discussion: *Measurement and Evaluation of Range Condition*

Chairman: Dr. C. H. Wasser, Dean, School of Forestry, Colorado Agricultural and Mechanical College, Ft. Collins, Colorado

Factors to consider in evaluation of vegetation condition. Dr. David F. Costello, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon

Importance of floristic composition. Dr. E. J. Dyksterhuis, Soil Conservation Service, Lincoln, Nebraska

Evaluation and measurement of the California annual type. Dr. Harold F. Heady, University of California, Berkeley

Evaluation and measurement of soil condition. Ralph O. Lewis, Soil Conservation Service, Washington, D. C.

Evaluation and classification of game forage condition.

A range condition score card for rancher use. E. H. McIlvain, U. S. Southern Great Plains Field Station, Woodward, Oklahoma

REGULAR ANNUAL PROGRAM SESSIONS

Wednesday, January 26

MORNING

Range Management in the United States

Chairman: Incoming Vice-President

President's Address—presented by A. P. Atkins, 1954 Vice-President, Guymon, Oklahoma

Public land policy. Orme Lewis, Assistant Secretary, Department of Interior, Washington, D. C.

Where have we been and where are we going in range management. Dr. A. W. Sampson, University of California, Berkeley

Fifty years of change in vegetation in the Central High Plains. Dr. H. L. Shantz, Santa Barbara, California

AFTERNOON

Panel Discussion: *Livestock—Big Game Relationships*

Chairman: Ross Leonard, Director, Idaho Fish and Game Department, Boise, Idaho

Forage requirements, livestock and big game. D. I. Rasmussen, Intermountain Region, Forest Service, Ogden, Utah

Range survey methods used on the Ft. Peck Game Range, Montana. Max Bridge, Bureau of Land Management, Washington, D. C.

New trends in deer management. Richard D. Taber, University of California and Wm. P. Dasmann, California State Game Department

Possibilities of improvement of game forage. M. L. Talbot and A. L. Hormay, California Forest and Range Experiment Station, Berkeley, California

Elk-livestock competition. Mel Morris, Montana Cooperative Wildlife Research Unit, University of Montana, Missoula

A rancher's viewpoint. E. W. Chilson, Rancher, Winslow, Arizona

Population dynamics of big game herds. Dr. A. Starker Leopold. University of California, Berkeley

Plains game and livestock use of Southern Kenya grasslands. (Illustrated) Fred Johnson, Forest Service, Northern Region, Missoula, Montana

EVENING

Kodachrome Slide Contest, in charge of Les Albee, Soil Conservation Service, Rapid City, South Dakota

Colored movie—Sheep Ranch Operation. Otto J. Wolff, Rancher, Rapid City, South Dakota

Thursday, January 27

MORNING

Utilization of Grass

Chairman: Forrest Bassford, Editor, Western Livestock Journal, Los Angeles, California

Utilization and management of crested wheat pastures. Dr. Joseph H. Robertson, University of Nevada, Reno, Nevada

Effects of grazing and climate on grasslands. Dr. G. W. Tomanek, Kansas State College, Manhattan, Kansas

Relationship of utilization to range condition and effective cover. Ben Osborn, Soil Conservation Service, Midland, Texas

The effect of the 1949-53 drought on the ranges of Texas. Dr. Vernon Young, Texas A. & M. College, College Station

Changes in the Desert Grassland—an analysis of causes. Dr. R. R. Humphrey, University of Arizona, Tucson

Proper range use and what it means to the producer. Kenneth Conrad, Rancher, Wray, Colorado

AFTERNOON

Range Forage Improvement in the United States

Chairman: Victor P. Osterli, Agricultural Extension Service, Davis, California

Improvement of native range through new grass introductions. John L. Schwendiman, Soil Conservation Service Nursery, Pullman, Washington

Sulfur fertilization at the San Joaquin Experimental Range. Lisle R. Green, Agricultural Research Service, O'Neals, California; Kenneth A. Wagnon, University of California, Davis; and Jay R. Bentley, California Forest and Range Experiment Station, Berkeley

Improvement through water spreading. Royale K. Pierson, Bureau of Land Management, Washington, D. C.

A rancher's viewpoint of range improvement. J. Kenneth Sexton, Chairman, California Section, ASRM, Willows

Range Forage Improvement Elsewhere

Range improvement and management problems in Argentina. E. J. Woolfolk, Southeastern Forest and Range Experiment Station, Asheville, North Carolina

Development of creeping rooted alfalfa strains for dryland pastures. Dr. Dave H. Heinrichs, Department of Agriculture, Swift Current, Canada

Establishing an irrigated pasture program in Mexico. Albert L. Brown, F.A.O., Mexico D.F., Mexico

EVENING

Annual Banquet

Friday, January 28

MORNING

Brushland Improvement for Grazing Use

Site characteristics as a guide to shrub hardwood control. Hurlon C. Ray, Soil Conservation Service, Fayetteville, Arkansas

Brush conversion by fire and other means. Jay R. Bentley, California Forest and Range Experiment Station, Berkeley

A southwestern rancher's viewpoint of shrub control. Frank Boice, Empire Ranch, Sonoita, Arizona

Symposium on California Grasslands

Chairman: Wm. S. Rosecrans, Chairman, California State Board of Forestry, Sacramento

Historical Backgrounds of Rangeland Use in California. L. T. Burcham, Department of Natural Resources, Sacramento, California

Ecology of California Grasslands. Dr. Harold H. Biswell, University of California, Berkeley

Management and Improvement of California Grasslands. Dr. Merton Love, Dr. W. A. Williams, and Dr. John P. Conrad, Agronomy Department, University of California, Davis

AFTERNOON

Field trip near San Jose. (If weather is inclement, arrangement will be made for visiting an agricultural implement manufacturing plant).

Report of Society Representative to the National Conference on FAO

In recognition of the need to keep the American public informed of the activities of the Food and Agricultural Organization, a National Conference on FAO, consisting of nongovernmenta organizations, held its first meeting September 16, 1954. Functions of the National Conference as outlined in its prospectus are to provide liaison between its organizational members and FAO officials prior to biennial FAO conferences and to arrange public conferences and other facilities for the dissemination of information on the world food and agricultural situation and the work of the FAO of special interest to the U. S.

A 7-member Executive Committee directs the activities of the organization; liaison of the Conference with the U. S. Dept. of Agriculture will be obtained by designation of a staff member as Secretary of the Conference.

As a national nongovernmental organization interested in the objectives of the FAO, the American Society of Range Management was invited to participate in the organizational meeting of the National Conference held on September 16, 1954. The report of Dr. O. S. AAMODT, as delegate to the Conference, follows:

"The morning session was primarily one of review of the present status of the FAO and its work, and discussions of the present status of the world food situation. The afternoon papers centered around the panel discussions on technical assistance programs of FAO and the recent position taken by the Congress of the United States disapproving of some of the modifications in the control of funds in the councils of the United Nations.

"To date the technical assistance funds allocated to the United Nations have been prorated to the various agencies such as FAO, UNESCO, WHO, etc. The change in procedure called for distribution of the funds through a central operating agency in the United Nations with allotments to the individual countries on a portional or agreed basis. U. S. State Department representatives present at the Conference seemed to defend the action taken by the United Nations Council, but representatives of our farm organizations, who had asked Congress to defer making appropriations for 1955 until the whole situation could be studied, seemed to feel that some alternative procedure might be preferable. One of the chief proposals has been the making of direct allotments to each of the agencies without going through the United Nations headquarters or Council."

James T. Jardine, who died in Washington, D. C. on October 24, 1954, was one of the pioneers in range management and an outstanding agricultural leader of the nation. His scientific and administrative contributions have had great influence on agricultural progress during the first half of this century. The nine Bankhead-Jones regional research laboratories, including the Sheep Breeding Laboratory at Dubois, Idaho and the Pasture Research Laboratory at State College, Pa., are lasting monuments to the spirit of close State and Federal relationships in agricultural research and development made effective by Jardine while Chief of the Office of Experiment Stations.

Jardine was the son of a Scottish immigrant and the brother of William M. Jardine, who became Secretary of Agriculture under President Coolidge. He was born at Cherry Creek, Idaho, and spent a large part of his first 14 years riding the range on his father's ranch. He obtained his bachelor's degree in civil engineering at Utah State Agricultural College, and attended the University of Chicago in 1905 and 1906. After returning to Utah State Agricultural College to teach, he became a special agent for the U. S. Forest Service in 1907. In the following 10 years he advanced in the Forest Service from deputy forest supervisor in 1908 to inspector of grazing and in charge of range investigations and surveys from 1910 to 1920. In 1920 he became director of the Oregon Experiment Station, serving there until 1931, when he was named Chief of the Office of Experiment Stations in the U. S. Department of Agriculture. In addition to this assignment, under which he administered the Federal-grant funds to State experiment stations, he was named Director of Research for the Department of Agriculture in 1936, which position he held until December, 1941. He retired as Chief of the Office of Experiment Stations in 1946.

Jardine's contributions and influence on the development of range management and range research are expressed in the following tribute prepared by Dr. W. A. DAYTON *of the U. S. Forest Service.*

Jardine, together with the late Frederick V. Coville, Albert F. Potter and Will C. Barnes, and the still living Leon F. Kneipp and Arthur W. Sampson, was a pioneer in range management and range research in this country. His father, an Idaho rancher, had a flair for the classics, and, as James was his third son, gave him the middle name of Tertius.

After the founding of the United States Forest Service in 1905 the range situation soon appeared as a most troublesome problem facing the new organization. With the initiation of grazing permits and feeds for use of national forest range the need of scientific range research shortly became apparent. Dr. Coville was called on for advice; stockmen suggested the appointment of William M. Jardine, later Secretary of Agriculture. The late Dr. Frederic E. Clements, the eminent authority on plant ecology, suggested his student, Arthur W. Sampson. William Jardine told Coville, "I am a dairy man; the man you want is my brother, Jim." As a result, James Jardine was appointed in 1907 as a special agent of the Forest Service, later becoming a deputy forest supervisor and still later inspector of grazing. In 1910 he became the first Chief of Grazing Studies (now the Division of Range Management Research) in the Forest Service, a position he held until he left the Forest Service in 1920 to become Director of the Oregon Agricultural Experiment Station.

In 1907 Jardine started the Billy Meadows fenced pasture experiments on the Wallowa National Forest, northeastern Oregon, which provided the first statistics on what improved management will do with range and range livestock when provided with protection from predators and also gave birth to a better method of handling range sheep—the "bedding out" or open-herding system, now generally practiced on better managed sheep range.

In 1910 Jardine initiated range reconnaissance, a system of mapping range areas of the national forests by vegetational types, together with obtaining palatability and quantitative data whereby better estimates could be made of carrying capacity, seasons of grazing, adaptation to class of livestock, needs for fencing, water development, salting, etc. From these studies and his depth of experience a stream of publications appeared, including: "Preliminary report on grazing experiments in a coyote-proof pasture," with an introduction by F. V. Coville (1908); "The pasture system for handling range sheep" (1910); "Coyote-proof inclosures in connection with range lambing grounds" (1911); "Meat situation in the United States" (1916); "Improvement and management of native pastures in the West" (1916); "Increased cattle production on Southwestern ranges," with Leon C. Hurtt (1917); "Range and cattle management during drought" (1922), and, what is still a classic in its field, "Range management on the national forests," with Mark Anderson (1919). Unfortunately this last work appeared at a time when Congressional action limited the size of Federal agricultural publications to less than 100 pages and much of the valuable material had to be eliminated. During this period Jardine published many articles in technical and livestock journals, dealing with grazing and timber reproduction, range improvement, grazing sheep without water, pastures and sheds on range lambing grounds, etc.

In addition to his practical range experience and his training as an engineer, Jardine had a keen analytical mind, had specialized in English at the University of Chicago, and had taught English at the Utah Agricultural College. As a result he was a superb critic and editor of range manuscripts and all Forest Service publications in this field during his period of service importantly reflect Jardine's services.

NEWS AND NOTES

Meetings and Conferences

Joint Committee on Grassland Farming

The Joint Committee on Grassland Farming held its annual meeting, November 13 and 14, 1954 at Jacksonville, Florida featuring *Grassland Farming in the Deep South*. Topics and guest speakers included: Potentialities of Coastal Plain grasslands with heavy fertilization, G. W. BURTON, Georgia Coastal Plain Expt. Sta.; Pasture studies in Florida, Iowa and Kansas, GORDON B. KILLINGER, Univ. of Florida; Trace elements in animal nutrition in Florida, G. K. DAVIS, Univ. of Florida; Year-round forage program for Georgia, B. H. HENDRICKSON, SCS, Watkinsville, Ga.; Range cattle industry in Florida, W. G. KIRK, Univ. of Florida Expt. Sta.; and Future of the beef cattle industry in the South, IRLO BRONSON, former president, Florida Cattlemen's Association.

Range Field Day Held at Woodward, Oklahoma

The U. S. Southern Great Plains Field Station at Woodward, Oklahoma held its annual Range Improvement Field Day, October 13, 1954, under the leadership of E. H. (PAT) MCILVAIN, Superintendent. Guest speakers on the program included: J. S. MCCORKLE, Soil Conservation Service, Albuquerque, New Mexico; JERRY SOTOLA, Livestock Bureau, Armour & Co., Chicago, Ill.; and JAY TAYLOR, President, American National Cattlemen's Association, Amarillo, Texas. A ranchers' panel, consisting of A. P. ATKINS, Guymon; KENNETH STARNES, Arnett; and CHARLIE GARDNER, Woodward, featured range improvement programs of Northwest Oklahoma cattlemen.

The field tour included an inspection of the Experimental Range with emphasis on the third year of grazing management and supplemental feeding tests with cows.

Jornada Ranch Day Program

The fifteenth Jornada Ranch Day was held October 11, 1954 under the joint sponsorship of the Jornada Experimental Range (ARS and U. S. Forest Service) and the New Mexico A. and M. College Ranch. Discussions and demonstrations featured range management, recovery from drought, reseeding and livestock management. Guest speaker on the noon program was LEAVITT BOOTH, past president of the Colorado Cattlemen's Association. D. F. BEARD, Head, Forage and Range Section, Agr. Res. Service, Beltsville, Md.; RAYMOND PRICE, Director, Rocky Mtn. Forest and Range Expt. Sta., Fort Collins, Colo.; and JOHN W. BRANSON, President, New Mexico A. & M. College welcomed the visitors and introduced participants in the program.

Soil Conservation Society Meets at Jacksonville, Florida

The ninth annual meeting of the Soil Conservation Society of America was held at Jacksonville, Florida on November 15–17, 1954. Discussion topics included use of woodland resources, economic and social aspects of grassland farming, and water resource management. Session chairmen included R. E. MCARDLE, Chief, U. S. Forest Service; Dr. H. B. SPRAGUE, Head, Agronomy Dept., Pennsylvania State College; D. A. WILLIAMS, Administrator, Soil Conservation Service. The keynote address "The land—source of our strength" was given by Governor H. E. TALLMADGE of Georgia.

FOA Team Reports on Range Improvement in Near Eastern Countries

In the spring of 1954, the Foreign Operations administration requested the Departments of Agriculture and Interior to provide a team of specialists to assist the U. S. Operations Missions and host governments in several Near Eastern countries in evaluating range improvement potential, and to offer recommendations on range management and waterspreading. The team consisting of JOSEPH F. PECHANEC, Chief, Division of Range Management Research, Forest Service; Dr. OLAF S. AAMODT, Plant Scientist, Agricultural Research Service; and FLOYD D. LARSON, Bureau of Land Management spent the spring months in Libya, Egypt, Saudi-Arabia, Iraq, Jordan, Pakistan and Lebanon.

It was recognized that assistance in a well-rounded program of range management can play an extremely important role in improving the welfare of Near East countries. Program recommendations developed by the FOA team stressed the following: increase in number of range management technicians through training and establishment of a Near East short course in range management; recognition of the place of grazing management as a means of improving the range; initiation of applied research studies; emphasis on the use of indigenous equipment for earth moving and seeding; establishment of a national range or forage and fodder development council; and regional interchange of information regarding range management.

Interest and support in the problems of land classification, land use, tenure, settlement, etc. and their solution must be developed in order to implement a national production program in these countries in which a substantial portion of the population is dependent for livelihood on livestock and forage provided from uncultivated lands.

Iowa State Forestry Department Celebrates 50th Anniversary

An estimated 400 forestry alumni and friends gathered at Iowa State College at Ames to help the Department of Forestry celebrate its 50th anniversary on October 15 and 16, 1954. Special awards for meritorious service to forestry and conservation went to the following: I. T. BODE, Director, Missouri Conservation Commission; FRED E. BOECKH, Minnesota and Ontario Paper Co., International Falls, Minnesota; PAUL M. DUNN, Dean of Forestry, Oregon State College; EDWIN F. HEACOX, Weyerhaeuser Timber Co., Tacoma, Wash.; DEWITT NELSON, Director, California Dept. of Natl. Resources; GEORGE J. PECARO, The Flintkote Co., Los Angeles, Calif.; and FRED B. TRENK, Extension Forester, Wisconsin.

Graduation Assistantships in Range Available at Texas A. and M. College

The Department of Range and Forestry at A. and M. College of Texas has four research assistantships available February 1, 1955 for persons qualified for graduate work leading to the M.S. or Ph.D. in range management. The assistantships are on a 12-months basis and require part-time work throughout the year or full summers spent in field research. The positions have stipends of $1550 to $1700 for candidates with a B.S. degree and $1740 to $2000 for candidates with an M.S. degree. An additional teaching assistantship is available on a 9-months basis at $1200 ($1350 with M.S. degree). Interested students should contact Dr. V. A. YOUNG, Head, Department of Range and Forestry, A. and M. College of Texas, College Station, Texas.

Peterson Succeeds Coke as Asst. Secretary of Agriculture

ERVIN L. PETERSON, former director of the Oregon State Department of Agriculture, was appointed Assistant Secretary of Agriculture, November 15, 1954, replacing J. EARL COKE. The new Assistant Secretary will be in charge of the Department's work in the field of Federal-States Relations, in which are included the USDA conservation, research and educational agencies. PETERSON received his education in California and attended the University of California in Los Angeles. He is a dairy farmer and native of North Bend, Oregon.

RANGE MEN ABROAD

Dr. GROVER F. BROWN, head agronomist for the Soil Conservation Service for the past 11 years, has resigned his position to direct the agricultural development work of the Arabian-American Oil Company in Saudi Arabia. Dr. BROWN'S first job will be to design, lay out and direct the experimental work in irrigation, use of fertilizers and cropping practices necessary to learn how to use water most efficiently on the various kinds of soils of the country. He will then supervise demonstrations needed to show the local people how to apply the information. Dr. BROWN left New York on October 20, 1954 and will headquarter in Dhahran, Saudi Arabia.

CLARKE A. ANDERSON, range conservationist of U. S. Forest Service, Intermountain Region, left Washington in late September on a 2-year assignment in Lebanon. Under the technical assistance program of the Foreign Operations Administration he will advise Lebanon officials on revegetation of eroded forest and rangeland and help train Lebanese personnel in the plans of conservation as applied to such lands. He was accompanied by Mrs. ANDERSON and their daughter.

HERBERT E. SCHWAN, originally assigned to Saudi Arabia under FOA's Technical Assistance program, has recently been transferred to Iraq with headquarters in Baghdad. He will serve as chief advisor to the Iraqi Ministry of Agriculture and will help train a staff for a new range unit in the Ministry, as well as assist in the solution of pressing problems involving the people, land and livestock on the badly depleted ranges of Iraq.

H. WAYNE SPRINGFIELD has completed a 2-year technical assistance detail in Iraq under the Foreign Operations Administration. SPRINGFIELD'S work involved studies of vegetation types and range conditions, and the development of plans for the production and distribution of supplemental forage to relieve grazing pressure on deteriorated ranges. During the last several months he was acting in charge of the range program in Iraq for FOA. SPRINGFIELD is returning to a position in range management research with the Rocky Mountain Forest and Range Experiment Station.

RICHARD C. JOHNSON of the Southwest Region, U. S. Forest Service, is in Libya on a 2-year technical assistance assignment in range management under the Foreign Operations Administration. Johnson's work will involve planning and carrying out tests and practical programs of reseeding and management to restore rangelands seriously deteriorated through hundreds of years of overgrazing. He left for Libya in late August, accompanied by Mrs. JOHNSON and their three sons.

TOM DUDLEY, formerly with the Bureau of Land Management office in Miles City, Montana, is in Jordan replacing NORMAN FRENCH as Chief of the FOA Cooperative Department for Range Resources Development. He will continue the range and forestry technical assistance program in that country.

IN THE FIELD

ROSSER A. RUDOLPH, Range Conservationist in the Bureau of Indian Affairs, became head of the Range Management, Fish and Wildlife Section in a new branch of Land Operations, as a result of the reorganization of the Bureau effective August 1, 1954. CHARLES SCHRAMM is assistant head of the section. RUDOLPH had previously headed up the Range Management activities in the former Branch of Forest and Range Management. SCHRAMM was in charge of Fish and Wildlife and Forest Protection in the former Branch of Forest and Range Management. Both men are graduates of the University of Montana School of Forestry.

NEAL D. NELSON has accepted an appointment as Assistant Range Management Officer to JERRY KERR in the Washington office of Bureau of Land Management. For a number of years NELSON was associated with the Bureau of Entomology and Plant Quarantine and the Forest Service in Public Land Administration. He is a veteran of World War II, with three years active service in the Army and presently in the Organized Reserves with rank of Lieutenant Colonel. He is a graduate of the University of Idaho and has a B.S. degree in forestry with a major in range management from the University of Montana.

ROBERT GARTNER, graduate in range management from the University of

Wyoming and recently returned from Army service in Japan, has accepted an assistantship at the University of California at Berkeley, where he will work toward an advanced degree.

HAROLD W. MILLER, Soil Conservation Service, Pleasanton, California was recently awarded a Certificate of Merit by the U. S. Department of Agriculture for superior accomplishment.

Dr. CECIL H. WADLEIGH, formerly with the Salinity Laboratory at Riverside, California, has been named Head of the Soil-Plant Relationship Section of the Soil and Water Conservation Research Branch of the Agr. Research Service at Beltsville, Md.

A. L. "FRED" BAKER, formerly with the Beef Cattle Research Office at Denver, Colorado, is now permanently stationed at the U. S. Southern Great Plains Field Station at Woodward, Oklahoma. BAKER is a graduate of Montana State College at Bozeman and served as assistant superintendent of the U. S. Range Livestock Experiment station at Miles City, Montana. He was subsequently in charge of experiment stations at Ardmore, South Dakota; Jeanerette, Louisiana; and Front Royal, Virginia. In his present assignment he will conduct digestion trials with beef cattle on native and introduced grasses, and carry out research on fattening steers on grass, supplemental feeding of calves prior to weaning and mineral requirements of beef cattle on native range.

ED F. SMITH of the Department of Animal Husbandry at Kansas State College will spend a year's sabbatical leave at the Department of Range and Forestry at Texas A. & M. College working toward the Ph.D. in range management. SMITH is in charge of the livestock phases of range research at Kansas State College and teaches beef cattle courses in the Department of Animal Husbandry.

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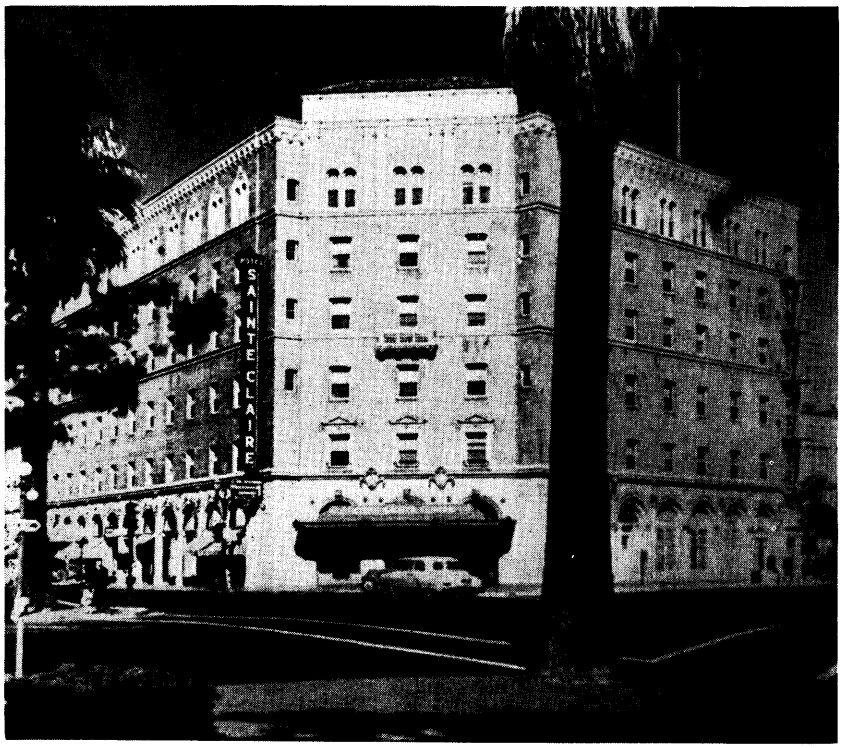

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