Bulletin 360 March, 1930

PASTURES FOR SPRING AND FALL GRAZING

IN MOUNTAINS OF COLORADO

By HERBERT C. HANSON

COLORADO AGRICULTURAL COLLEGE
COLORADO EXPERIMENT STATION
FORT COLLINS

The Colorado Agricultural College

FORT COLLINS, COLORADO

THE STATE BOARD OF AGRICULTURE

E. R. BLISS, Pres.	Greeley	JAMES B. McKELVEY	La Jara
MRS. MARY ISHAM	Brighton	H. B. DYE	Manzanola
J. C. BELL	Montrose	O. E. WEBB	Milliken
W. I. GIFFORD	Hesperus	T. J. WARREN	Fort Collins

Ex-Officio GOVERNOR W. H. ADAMS
PRESIDENT CHAS. A. LORY
L. M. TAYLOR, Secretary VERNER WOLFE, Treasurer

OFFICERS OF THE EXPERIMENT STATION

CHAS. A. LORY, M.S., LL.D., D.Sc. — President
C. P. GILLETTE, M.S., D.Sc. — Director
L D CRAIN, B.M.E., M.M.E. — Vice-Director
L. M. TAYLOR — Secretary
ANNA T. BAKER — Executive Clerk

STATION STAFF AGRICULTURAL DIVISION

C. P. GILLETTE, M.S., D.Sc., Director — Entomologist
WM. P. HEADDEN, A.M., Ph.D., D.Sc. — Chemist
G. H. GLOVER, M.S., D.V.M. — Veterinarian
W. G. SACKETT, Ph.D. — Bacteriologist
ALVIN KEZER, A.M. — Agronomist
GEO. E. MORTON, B.S., M.L. — Animal Husbandman
E. P. SANDSTEN, M.S., Ph.D. — Horticulturist
B. O. LONGYEAR, B.S., M.F. — Forestry Investigations
I. E. NEWSOM, B.S., D.V.S. — Veterinary Pathologist
L. W. DURRELL, Ph.D. — Botanist
RALPH L. PARSHALL, B.S., — U. S. Senior Irrig. Eng., Irrigation Investigations
INGA M. K. ALLISON, E.B., M.S. — Home Economics Investigations
R. E. TRIMBLE, B.S. — Asst. Irrig. Investigations (Meteorology)
EARL DOUGLASS, M.S. — Associate in Chemistry
MIRIAM A. PALMER, M.A., M.S. — Delineator and Associate in Entomology
J. W. ADAMS, B.S., Cheyenne Wells — Assistant in Agronomy, Dry Farming
CHARLES R. JONES, B.S., M.S., Ph.D. — Associate in Entomology
CARL ROHWER, B.S., C.E. — Associate in Irrigation Investigations
GEORGE M. LIST, B.S., M.S. — Associate in Entomology
E. J. MAYNARD, B.S.A., M.S. — Associate Animal Husbandman
W. L. BURNETT — Rodent Investigations
FLOYD CROSS, D.V.M. — Associate Veterinary Pathologist
J. H. NEWTON, B.S. — Associate in Entomology
JOHN L. HOERNER, B.S., M.S. — Assistant in Entomology
J. W. TOBISKA, B.S., M.A. — Associate in Chemistry
C. E. VAIL, B.S., M.A. — Associate in Chemistry
DAVID W. ROBERTSON, B.S., M.S., Ph.D. — Associate in Agronomy
I. G. KINGHORN — Editor
L. A. MOORHOUSE, B.S.A., M.S. — Rural Economist
R. T. BURDICK, B.S., M.S. — Associate in Rural Economics
G. S. KLEMMEDSON, B.S., M.S. — Associate in Taxation and Public Finance
C. C. GENTRY, A.B., A.M. — Assistant in Rural Economics
B. F. COEN, B.L., A.M. — Associate in Rural Sociology
G. W. DEMING, B.S.A. — Assistant in Agronomy
H. B. PINGREY, B.S. — Assistant in Rural Economics
DWIGHT KOONCE, B.S. — Assistant in Agronomy
E. A. LUNGREN, B.S., M.S. — Assistant in Plant Pathology
ANNA M. LUTE, A.B., B.Sc. — Seed Analyst
HERBERT C. HANSON, A.B., A.M., Ph.D. — Associate in Botany
CARL METZGER, B.S., M.S. — Associate in Horticulture
LEWIS R. BROOKS, B.S. — Assistant in Irrigation Investigations
RICHARD V. LOTT, B.S., A.M. — Assistant in Horticulture
D. N. DONALDSON, B.S., M.S. — Associate in Marketing
B. W. FAIRBANKS, B.S. — Associate in Animal Investigations
ALMOND BINKLEY, B.S., M.S. — Associate in Horticulture
MARY F. HOWE, B.S., M.S. — Assistant in Botany
WM. E. CODE, B.S. — Associate in Irrigation Investigations
BRUCE J. THORNTON, B.S., M.S. — Assistant in Botany
LAURA STEWART, B.S. — Assistant in Bacteriology
HERBERT B. OSLAND, B.S., M.S. — Assistant in Animal Investigations
ROBERT GARDNER, B.S., M.S. — Soil Chemist at Rocky Ford
FLORENCE N. SCHOTT, B.S., M.S. — Associate in Home Economics
JULE LOFTUS, D.V.M. — Assistant in Veterinary Pathology
DON CATION, B.S., M.S. — Assistant in Botany

ENGINEERING DIVISION

L D CRAIN, B.M.E., M.M.E., Chairman — Mechanical Engineering
E. B. HOUSE, B.S., (E.E.), M.S. — Civil Engineering
CARL C. CARPENTER, B.S. — Testing Engineer
— Assistant in Mechanical Engineering

PASTURES FOR SPRING AND FALL GRAZING

IN MOUNTAINS OF COLORADO

By HERBERT C. HANSON

One of the chief difficulties facing many stockmen is that of providing grazing land between the time that livestock must be taken off the hay meadows and before it is permitted to enter the national forests. This period varies from 1 to about 3 months. Providing range for fall grazing is usually a less serious problem. The opening of the grazing season on the national forests varies in different parts of the state from about May 15 to about July 1 and the closing dates from about October 1 to November 1.

If pasture land could be provided for early spring grazing there would be less temptation to use the hay meadows so late that the meadows are injured and less spring feeding might be needed (Fig. 1). There would be less loss from poisonous plants and unsuitable feed because fewer head of stock would have to be turned out on the range before the forage plants had developed sufficiently. Stock

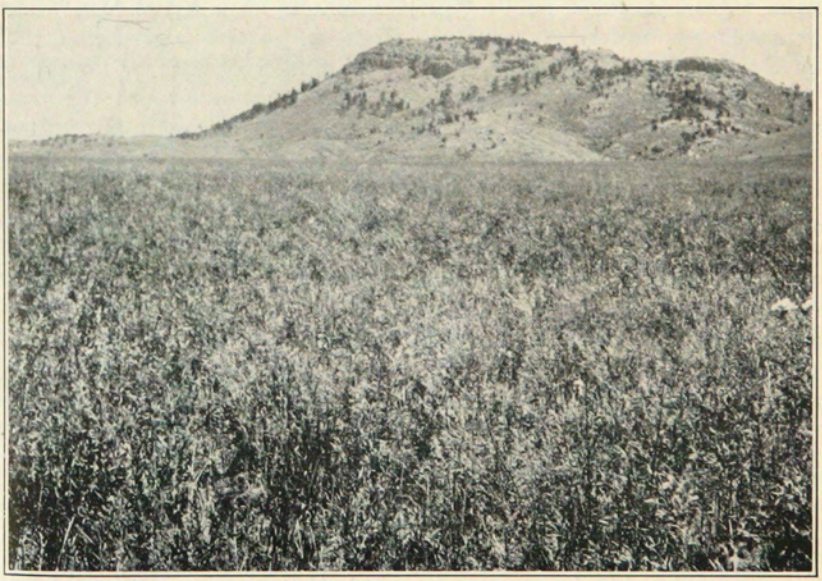

Fig. 1.—Pasture consisting chiefly of smooth brome grass and yellow sweet clover on Table Mountain Ranch, near Virginia Dale, 7,000 feet. Planted in spring of 1925, photograph taken July 19, 1928.

could be maintained in better condition at less expense and because of this there would be higher calf and lamb crops.

Experimental plantings have been conducted during the past three seasons in order to determine if early spring pasture could be developed that might also be used in the fall. Altho the investigations have not been completed, a number of important facts have been learned that help to answer this question. Additional plantings and observations over a longer period of time are necessary, however, before final recommendations can be made. On account of the importance of this problem, of supplying early spring grazing to fill in the gap, it was decided to make the facts that have been found available to all who could benefit from them and to make preliminary recommendations.

The establishment of a pasture for early spring grazing is dependent chiefly upon the location of the area, preparation of soil for planting, seeding methods, kinds of plants and later treatment. If some irrigation water is available, especially during the first season, the chances of success are much greater but in most cases only the natural soil moisture can be depended on.

Location of Pasture

As a rule it is not advisable to plow up areas that are covered with a good stand of palatable native plants such as western wheat grass or porcupine grasses (see Fig. 2). Cultivated fields that have been abandoned, areas supporting plants of little or no forage value as sagebrush or poisonous plants, and areas on which the grazing capacity has been much reduced by rodents or faulty range-management methods should be seeded first. The pasture should be located in more or less of a depression so that the moisture supply in the soil may be increased somewhat by run-off from surrounding slopes and so that some protection is afforded from the drying and erosive effects of the wind (Figs. 1, 2 and 7). The soil should be fairly deep. Seeding will usually not succeed on thin soils or on areas that dry out rapidly as hillsides. The danger of both water and wind erosion should always be seriously considered before plowing up the soil, even if the stand of vegetation is thin. Cultivating the soil may start erosion that might be difficult or impossible to stop later.

Preparation of Soil for Planting

One of the chief aims in preparing the soil for planting is to secure as firm a seedbed as possible. In order to accomplish this it is desirable to plow in the fall, provided that blowing out of the soil during the winter will not be serious. If the soil is left rough, danger from blowing will be reduced. Sometimes very early spring plow-

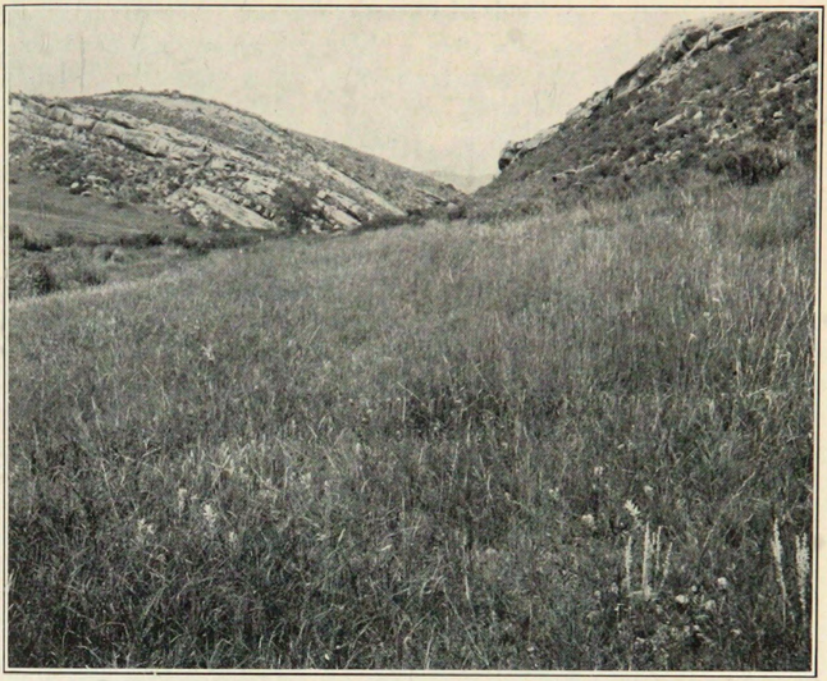

Fig. 2.—Mixed stand of grasses in foothills at elevation of about 5,500 feet. A dryland pasture would succeed here but it is questionable whether the pasture plants would be of greater value than the range plants. August 21, 1927.

ing and leaving the soil rough until seeding time later in the spring, is advantageous. Old plowed fields that have grown up to perennial weeds may be plowed or in places it may be better to get rid of the weeds by thoro disking. Plowing or disking at right angles to the direction of the prevailing winds will often eliminate blowing out of the soil.

Seeding Methods

The most efficient method of seeding is drilling the seed in well-prepared soil. Covering the area with two drillings at right angles to each other results in a better cover of plants than drilling in only one direction. Broadcasting the seed followed by thoro harrowing with a spike-toothed harrow is another, but much poorer, method. Much seed has been wasted in broadcasting when not followed by harrowing or by inefficient harrowing with brush and other make-shifts.

It appears that the best time to sow the mixture given below is as early in the spring as possible.

Kinds of Plants to Sow

The kind of plants to sow depends largely upon local conditions of soil and moisture and upon the uses to which the pasture will be put. Cattle and horses relish some kinds of plants that sheep do not care for. Dryland species particularly well adapted for cattle and horses are slender wheat grass, (Fig. 3), (called western wheat grass or western rye grass by seed dealers), crested wheat grass, smooth brome grass (Fig. 4) and bulbous blue grass. The first two do not appear to be very valuable for sheep, but the latter two are. These species, particularly crested wheat grass and bulbous blue grass, are especially valuable for their early spring growth. Some of them grow well again in the fall. All are adapted to considerable summer drouth. Yellow sweet clover may well be added in many places to increase the amount of summer forage and to have a legume in the stand.

The amount of seed of each species to sow will depend largely

Fig. 3.—Slender wheat grass growing without irrigation near Fort Collins. A good pasture or hay plant for cattle and horses. July 8, 1929.

Fig. 4.—Smooth brome grass growing without irrigation near Fort Collins. It furnishes excellent pasturage for all classes of stock. July 8, 1929.

upon the availability of the seed. A preliminary recommendation of a mixture for a pasture for cattle and horses is: Crested wheat grass 4 to 5 pounds per acre, slender wheat grass 5, brome grass 5, bulbous blue grass 3, yellow sweet clover 2, totaling 20 pounds per acre. The mixture for sheep is less satisfactory consisting of brome grass 12 pounds per acre, bulbous blue grass 5, and yellow sweet clover 3.

Seed of smooth brome grass, slender wheat grass and yellow sweet clover may be obtained from most seed dealers. Bulbous blue grass seed may be secured from Mrs. H. P. Bush, 826 E. Main St., Medford, Oregon. Seed of crested wheat grass may be secured from Oscar H. Will and Company of Bismarck, North Dakota; Fargo Seed House, Fargo, North Dakota; Valker-Christensen Company, Minot, North Dakota.

Descriptions of Grasses

Crested wheat grass was first introduced to the United States from Russia in 1898. It is a native of the steppe region of Russia and southwestern Siberia. Little attention was given to it until 1915. Since then it has been demonstrated that this grass is one of the most drouth-enduring and earliest growing of the perennial grasses. It is reported to be about a month earlier than native grasses and from 1 to 2 weeks earlier than brome grass. It has sometimes yielded more than either brome or slender wheat grass. If planted alone, 10 pounds per acre are recommended. It is an erect bunch grass. During the first season it stools out rather rapidly and usually forms a small amount of seed, (Fig. 5). In later years 200 to 800 pounds of seed per acre may be secured. A fair average yield is considered to be 300 to 400 pounds per acre. Instructions for growing this grass for seed may be secured from the Northern Great Plains Field Station at Mandan, North Dakota.

Bulbous blue grass, also called winter blue grass and bulbosa blue grass, has been introduced into Oregon, California, Colorado and probably other western states, usually, it is believed, with alfalfa seed. It is highly relished by stock and it is very nutritious. In Oregon and California it grows during the winter and dries to the ground in the summer. It is a perennial. In Colorado it grows very early in the spring, blooms in May and then dries up later. In place of flowers or seed, it produces small bulbs or bulblets. It also produces basal bulbs. These bulblets are handled as seeds, sowing at rate of about 10 pounds per acre when seeded alone. This grass is rather slow to become established but it forms a good turf in time.

Slender wheat grass (Fig. 3), also called western wheat grass and western rye grass, is a perennial that is very resistant to both drouth and cold. It is a native of western North America. It is an erect bunch grass. This grass has been used extensively in western North Dakota and in Canada, especially for hay. As forage it is palatable and nutritious especially to cattle and horses.

Smooth brome grass (Fig. 4), also called Hungarian, Austrian or awnless brome grass, is a native of central Europe and Asia. It has been much used in western United States and Canada because of its resistance to drouth, earliness of growth, abundant production of forage thruout the season, palatability to all classes of stock and because of its method of spreading by underground rootstocks. It is a perennial, forming a fairly open turf.

Care After Planting

A good stand of plants may be ruined the first season by improper treatment. It is important to pay especial attention to the surface

the first season in order to secure the best possible stand. Grazing should not be permitted until towards the close of summer when light grazing does not appear to cause any damage if the soil is dry. The weeds should be mowed as soon as they begin to hinder the growth of the grasses. Many pastures have been greatly damaged the first year by failure to mow the weeds in time. If a so-called nurse crop has been used it should also be cut as soon as it begins to hamper the growth of the seedlings, long before the nurse crop begins to bloom. Excessive trampling, especially when the soil is wet, should be prevented. Bulbous blue grass appears to be easily killed by exposure of the crowns by trampling or erosion. Too close grazing should be avoided. After the plants have become established rotation or alternate grazing of two or more pastures will, as a rule, result in greatest forage yields with least injury to the stand.

Report of Experimental Work on Mountain Pastures

Near Fort Collins, elevation about 5,000 feet.—A number of grasses and legumes were planted in rows during the last week of

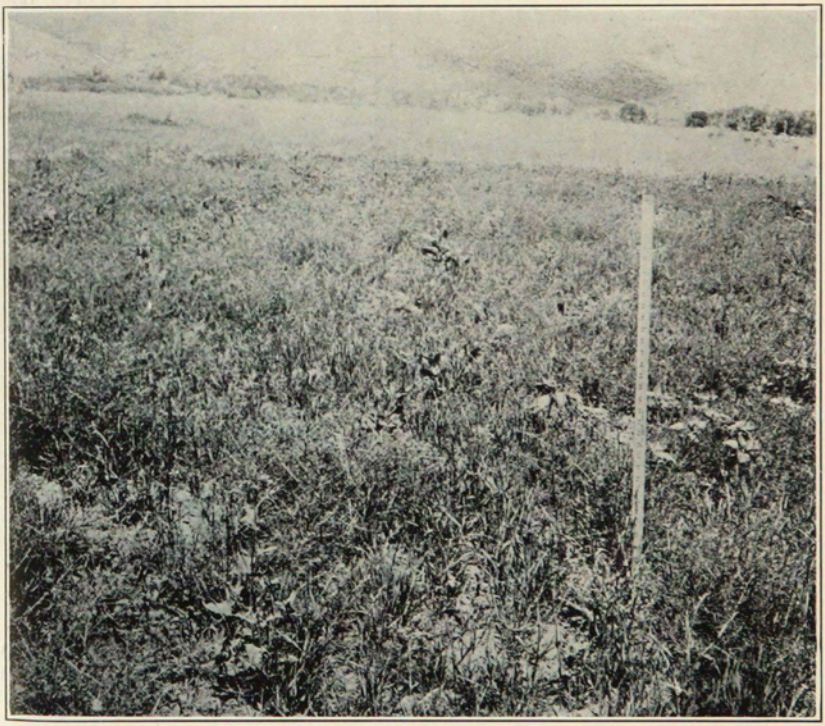

Fig. 5.—First-season stand of crested wheat grass at an elevation of about 6,300 feet near Livermore. July 15, 1927.

April, 1928, on an old plowed area that was rather gravelly. It was located at the base of the foothills and received no irrigation water. The only early species were crested and slender wheat grasses and bulbous blue grass. The two former became nicely established the first year, the last was much slower. All continued to grow very nicely during the second season. On March 6, 1930, the crested wheat grass tufts were dense with numerous green leaves in each tuft. The new growth was 2 to 5 inches tall. Slender wheat grass had somewhat fewer green leaves that were 2 to 4 inches tall. The bulbous blue grass clumps were very dense and mat-like, covered with green leaves 1 to 3 inches tall. The base of the clumps was made up largely of a mass of bulbs pressed closely against each other.

Near Livermore, elevation about 6,300 feet.—An area, (about one-fourth acre) of good soil that had been in dryland potatoes was seeded in the spring of 1927 to 4 pounds of crested wheat grass. The seed was broadcast and then harrowed in. By July 15 it had made a good stand (see Fig. 5). There were up to 10 flower stalks per plant averaging 10 inches tall. On March 8, 1930, this area was being closely grazed by cattle (Fig. 6), the tufts were 2 to 4 inches in

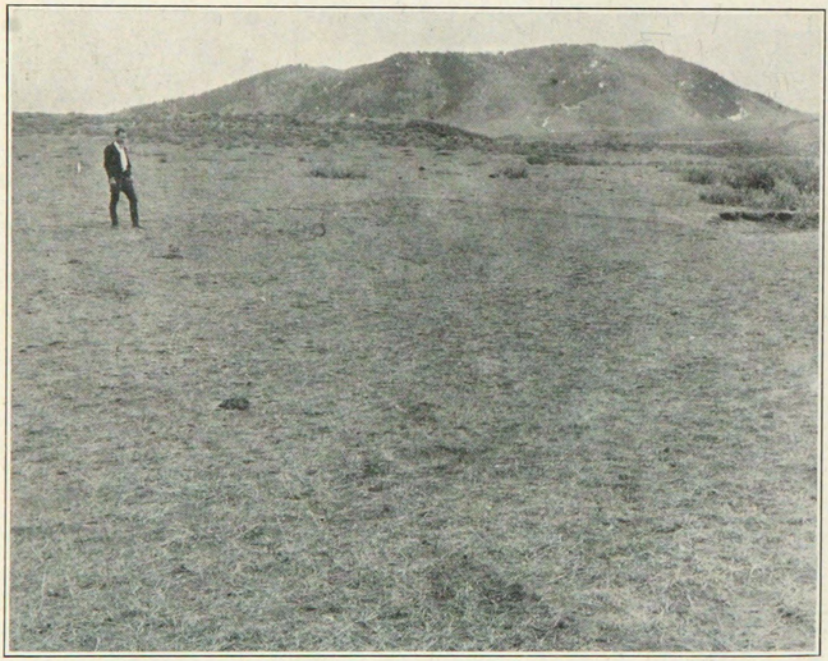

Fig. 6.—A portion of the same crested wheat grass pasture shown in Fig. 5 but taken on March 8, 1930. It is being very closely grazed by cattle.

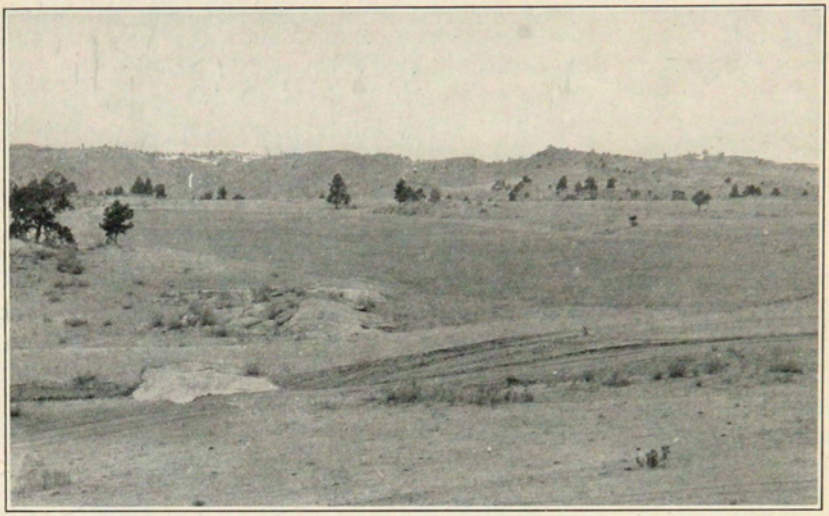

Fig. 7.—An area that had been in grain on which an excellent stand of pasture plants was obtained. Near Virginia Dale, 7,000 feet. March 8, 1930.

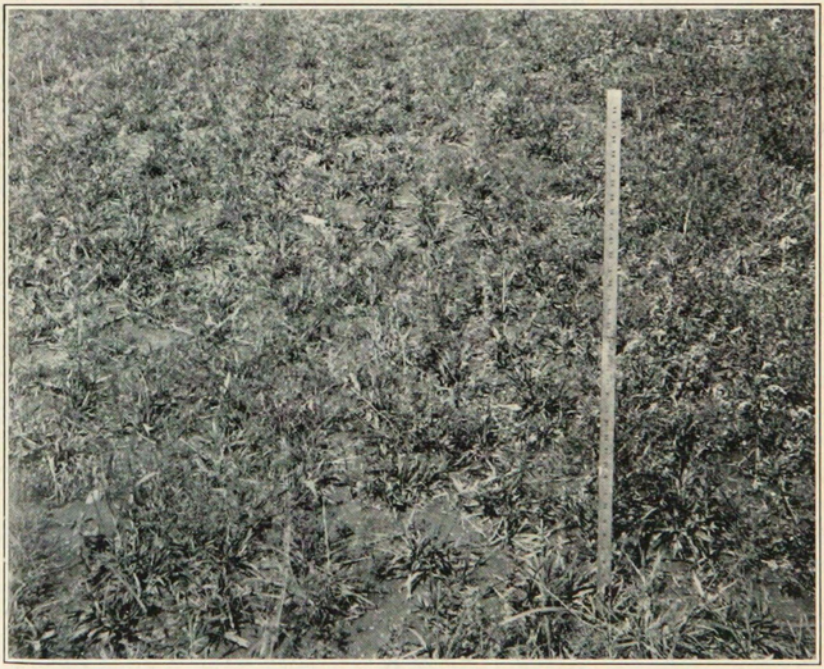

Fig. 8.—Detail on July 19, 1929, of the pasture shown in Fig. 7. The chief plants are smooth brome grass, crested and slender wheat grass, and yellow sweet clover. Seeded in spring of 1928.

diameter and there were numerous green leaves 1 to 4 inches long on each tuft. None of the native grasses, nor Kentucky blue grass and brome grass, were as far advanced.

Near Virginia Dale, elevation 7,000 feet.—In the spring of 1928 several areas were seeded to a few kinds of grasses. On one area (Figs. 7 and 8) that had been in grain an excellent stand was secured. Brome grass was most abundant but yellow sweet clover, slender wheat grass and crested wheat grass were also numerous. On another area of poor, gravelly soil, crested wheat grass was the most successful. It was spreading and gradually killing out the weeds. A third area, which had been plowed, produced good growth of crested wheat grass and bulbous blue grass. Drilling in the seed resulted in better stands than broadcasting. On another area of 12 acres where brome grass, yellow sweet clover and orchard grass had been seeded in the spring of 1925, the first two formed most of the stand. This pasture yields a large amount of forage (Fig. 1).

The earliest grasses were crested wheat grass and bulbous blue grass. On March 8, 1930 when the soil was still frozen below a depth of 4 to 6 inches, crested wheat grass was most developed, having numerous green leaves 2 to 6 inches long; bulbous blue grass also had many green leaves 2 to 6 inches long; brome grass and slender wheat grass had fewer green leaves 1 to 3 inches long and orchard grass had but few green leaves about 1 inch long. The clumps of most of the grasses were 2 to 4 inches in diameter. Most of the grasses, except orchard grass, were being closely grazed by cattle.

Conclusion

There is a distinct need for early pastures in the mountainous parts of Colorado. Experimental work conducted during the past three seasons in a number of areas indicates that certain grasses are valuable for both spring and fall pasture.

A mixture of grasses that are from 2 to 4 weeks earlier than native grasses has been found to meet the need for early pasturage in several places. For cattle this consists of crested wheat grass, 4 to 5 pounds per acre, slender wheat grass 5, brome grass 5, bulbous blue grass 3, yellow sweet clover 2, totaling 20 pounds per acre. Since the first two do not appear to be very palatable for sheep, the mixture recommended for them is brome grass 12 pounds per acre, bulbous blue grass 5 and yellow sweet clover 3.

It is emphasized that considerable attention must be given to the location of the pasture, preparation of soil for planting, seeding and later treatment of the pasture, in order to secure the best possible results.

Because of the importance of this early pasture problem, it appears advisable to publish the available information as a progress report of our observations and experiments to date.