

Pastures Bring Profits

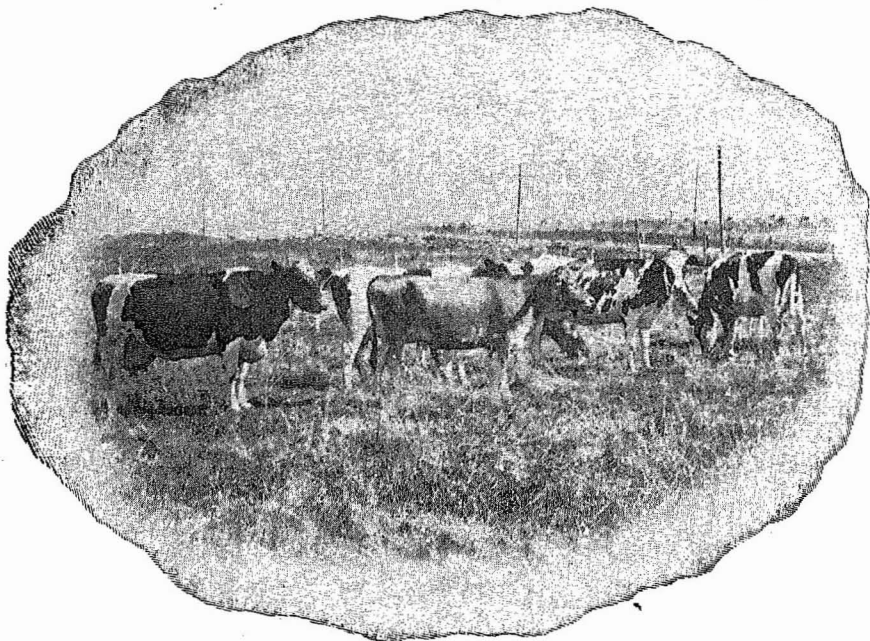
Some Facts About Irrigated Pastures
in Montana

By


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and

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The Pasture Should Be One of the Most Profitable
Areas on the Farm

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Pasture Pointers

Good dairy cows on good pasture brought returns of \$50 to \$100 per acre each year on Montana irrigated farms.

Livestock is necessary on irrigated farms and pastures are necessary for successful livestock production.

Good pastures are equally valuable for hogs, cattle and sheep. Pastures on even the best land will return a good profit.

To determine size of pasture necessary estimate about one acre for two mature cows. Level the field carefully so that it may be properly irrigated.

Work the soil into a firm, well-pulverized seed bed and use the best seed obtainable.

Plant pasture grasses in the spring. A nurse-crop may be used but harvest the nurse crop early.

Seed shallow with a grain drill after seeds have been thoroughly mixed.

Frequent, light irrigations will insure a thick stand and rapid growth during the first season.

Do not put stock on pasture the first year unless absolutely necessary and then graze very lightly.

Do not turn stock on pasture too early in spring and avoid over-grazing.

A Good Pasture Mixture

A mixture of grass and clover seeds that has given good results in many parts of Montana is made up as follows:

Kind	Amount Per Acre
Smooth brome grass.....	3 to 4 lbs.
Kentucky blue grass.....	4 to 6 lbs.
Orchard grass.....	4 to 6 lbs.
Meadow fescue.....	3 to 4 lbs.
White clover.....	1 to 2 lbs.
Alsike clover.....	1 to 2 lbs.

Total amount of seed per acre....16 to 24 lbs.

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Livestock is necessary for a permanent and successful agriculture on the irrigated farms of Montana. The kinds of livestock and the method of handling depend upon conditions.

Livestock provides a practical means for marketing feed crops grown on irrigated farms and furnishes profitable employment. The manure from livestock is an important factor in maintaining the productive capacity of the soil. On farms where livestock is kept throughout the year, success depends upon an abundance of cheap grass pasture. Information on how to secure the best results from Montana irrigated pasturing is presented in this bulletin.

Irrigated Valleys Favorable to Good Pastures

The irrigated lands of Montana are particularly favorable for the growing of crops used in pastures. In most instances, sufficient irrigation water is available to keep the grasses and clovers green and succulent throughout the grazing season. Rich soils combined with long days of almost continuous sunshine favor the production of high yields of nutritious forage.

Good Land May Be Used for Pastures

The best land on the farm may be used to advantage for the irrigated pasture and, if properly managed will return substantial

profits. In 1900 a three-year old irrigated pasture on the Montana Experiment Station farm at Bozeman carried three young steers per acre for the grazing period of four months. The steers used in this trial gained 4560 pounds on 5.04 acres. Another irrigated pasture which had been in continuous use for 16 years, gave returns over cost of grain of approximately \$51 per acre in 1921 and \$74 per acre in 1922 when pastured with dairy cows.

Experiments conducted at the Huntly Branch Station* since 1913, which have resulted in the development of practical methods of establishing and managing pastures on irrigated land, have clearly demonstrated that good land devoted to irrigated pastures, when properly managed, will return a net profit fully equal to that from many other irrigated crops. It has been found that good irrigated pastures will carry from one and one-half to two and one-half dairy cows per acre for four and one-half months and that the returns generally range from \$50 to over \$100 per acre.

Almost every farm has a small acreage of land which is non-tillable and suitable only for pasture. As a general rule, it is land on which the soil is shallow, stony, or low in natural fertility and too rough for proper irrigation, yet it will produce excellent pasture if properly cared for. Generally such areas do not provide adequate grazing for all the livestock which logically should be kept on the farm. In such cases good tillable land may be profitably used to increase the pasture acreage.

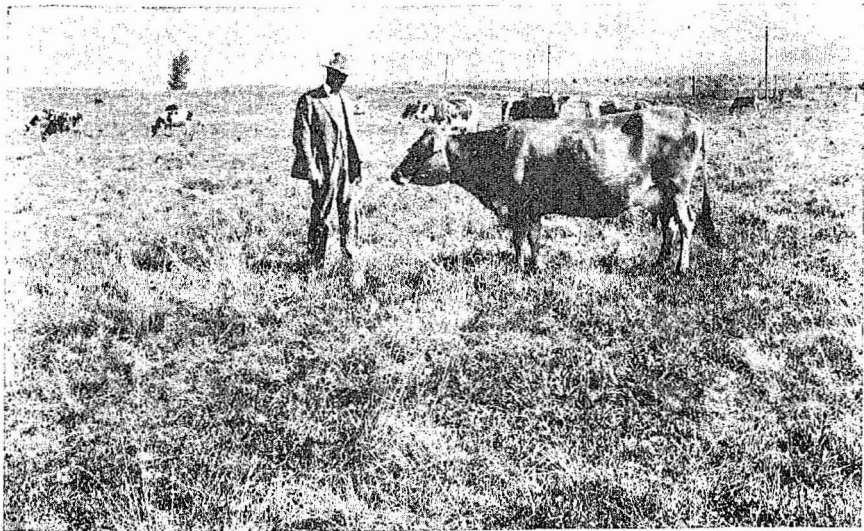
Advantage of Irrigated Pastures

While an irrigated pasture makes it possible to keep more livestock and thus adopt a more diversified and permanent type of farming, there are other advantages to be derived.

Nutritious feeds make better livestock: With good irrigated pastures there will be better livestock as well as more livestock. It is a well recognized fact that cattle grow faster, pigs make greater gains, and dairy cows produce more butterfat when grazing on good succulent pasture than when fed on dry feeds. No class of feeds will keep the animals as thrifty as will a good mixture of grasses and legumes. Not only are essential minerals supplied but grasses are rich in the vitamins needed for normal growth and good health.

Economical production: Green grass not only is Nature's best feed for livestock but it also is the cheapest. The experienced dairyman has found that a good irrigated pasture properly managed will prolong the flush milk season over most of the summer

*See Montana bulletin No. 166—"Irrigated Pastures" by Dan Hansen, Superintendent, Huntley Branch Station.



Climate and soil conditions in the irrigated valleys of Montana are favorable for the production of high yields of nutritious forage.

and that little if any grain feeding is necessary. Records of the Yellowstone Dairy Herd Improvement Association, covering a three-year period, show that members who had good pastures for their cows had a return above cost of feed, exclusive of the pasture, of \$24.65 per cow greater than their neighbors who had little, if any, pasture. This difference in returns was due largely to the saving of grain and dry roughage. Since good irrigated pastures will carry approximately two cows per acre, the average cash returns amounted to \$49.30 per acre.

While proper management of irrigated pastures is highly important, dairymen cannot obtain maximum returns from ordinary cows. The results with dairy cows given in this circular have been obtained with high-grade animals systematically handled, with plenty of good water and salt always available. Shade was provided during the warm days of summer.

The irrigated pasture mixture makes very economical feed for sheep, beef cattle and horses. Good pastures, particularly alfalfa and clover, also play an important part in the production of pork.

Labor is reduced: No labor is involved in harvesting, storing or feeding crops which are pastured by livestock. With conveniently arranged pastures, the dairy herd may be kept near

the barn and thus time and labor is saved in bringing them in to be milked. A well established irrigated pasture may become a permanent improvement on the farm. Some irrigated pastures have been in use in Montana for more than twenty years without reduction in carrying capacity. Such pastures require proper management, but result in saving much labor and expense in connection with fencing, plowing, seeding and leveling for irrigation.

Planning the Pasture

Enough land should be devoted to the pasture to furnish grazing for all of the livestock that will be kept on the farm. Good irrigated pastures will carry from one and one-half to two and one-half large cows or the equivalent per acre for a period of four to five months. Since it is essential to irrigate several times during the season, the pasture should be located where it may be irrigated to the best advantage, and the land leveled and ditched so that water may be applied uniformly. On farms where dairy cows are kept, at least part of the pasture should be located near the barns thus being handy for the cows at night and for such other livestock as may be kept near the buildings. On some farms, it may be advisable to include a portion of the pasture as a regular part of the crop rotation. The increase in the amount of organic matter in the soil and the fertility resulting from manure of animals grazed on the pasture aid materially in building up the productive capacity of the soil for other crops. If there is some untillable land on the farm, or land that is difficult to cultivate it should be seeded to permanent pasture. Under proper management such land may be made to yield fair to good returns.

What To Sow

Mixed pastures: Pastures seeded with a mixture of grasses and legumes generally produce larger yields and more nutritious forage than pastures seeded to a single crop.

While mixtures of grasses and clovers are preferred, there are no hard and fast rules to follow in mixing seed for an irrigated pasture. Grasses should be selected which produce a leafy growth and a compact sod that is not easily injured or destroyed by the tramping of animals. A mixture of several grasses and a legume are preferred to a single crop for several reasons. It gives variety to the feed, produces a higher yield, makes a more economic use of the soil conditions and due to the seasonal variation in growth of the various grasses, furnishes more uniform pasturage throughout the grazing season. The addition of legumes such as white and alsike clover gives variety to the pasture and increases the protein content of the feed. However, in those localities where bloat is a serious problem clover may be omitted from the pasture

mixture. The mixture should include crops which are adapted to local conditions and will provide a succession of growth throughout the seasons. Whether purchased "ready mixed" or separately and mixed on the farm before planting, the seed should be of the highest grade available.*

Cost of seed: At average prices, the cost of seed is usually from \$4 to \$6 per acre, depending upon the amount, kind, and quality of seed used. However, it is poor economy to use anything but the best grades of seed, for when once seeded down the land is usually kept in pasture for many years.

The Huntley mixture: A pasture mixture which has given very satisfactory results at the Huntley Branch Station and on several farms on the Huntley Project will serve as a guide to those who desire assistance in planning mixtures.

Crop	Amount of seed per acre
Smooth brome grass.....	3 to 4 pounds
Kentucky blue grass.....	4 to 6 pounds
Orchard grass.....	4 to 6 pounds
Meadow fescue.....	3 to 4 pounds
White clover.....	1 to 2 pounds
Alsike clover.....	1 to 2 pounds

Total amount of seed per acre....16 to 24 pounds

Permanence of crops under grazing: In 1904, the Montana Experiment Station seeded a small tract of land to permanent pasture, using the following mixture: Alsike clover, 3 pounds; red clover, 4 pounds; alfalfa, 3 pounds; orchard grass, 4 pounds; tall oat grass, 2 pounds; meadow fescue, 3 pounds; English rye grass, 4 pounds; brome grass, 4 pounds, and Kentucky blue grass, 4 pounds; a total of 31 pounds per acre. In May of 1928, after 24 years of continuous use as a pasture, an inspection was made to determine what grasses had survived. While it was not possible to determine accurately the amount of each grass, the inspection showed that Kentucky blue grass constituted nearly one-half of the stand, white clover about one-third, and the balance was orchard grass, brome grass, meadow fescue and timothy in the order named. It is interesting to note that the alfalfa, red clover and alsike clover had entirely disappeared.

The oldest irrigated pasture at the Huntley Branch Station

*The Montana Grain Inspection Laboratory at Bozeman will test samples of seed for purity and germination free of charge. A sample consisting of one or two handfuls is sufficient, providing it is truly representative of the entire lot of seed being considered.

was seeded in 1912. After 16 years continuous use, Superintendent Hanson finds that Kentucky blue grass predominates, probably constituting 75 per cent of the mixture, while the remainder is orchard grass, brome grass, meadow fescue, and white clover. Mr. Hanson reports that alsike clover, seeded at the rate of one to two pounds per acre in the mixture, goes out after three or four years.

Sweet clover for irrigated pastures: A considerable amount of sweet clover has been seeded for pasture on irrigated land during the past few years. A good stand of sweet clover has a higher carrying capacity than the mixed grass pastures and, in addition, it will grow on soils not well adapted to other crops. Furthermore, there is probably no other crop that will increase the fertility or improve the physical condition of soils as rapidly as will sweet clover. For this reason, sweet clover pasture deserves some consideration in planning the crop rotation, particularly on heavy soils.

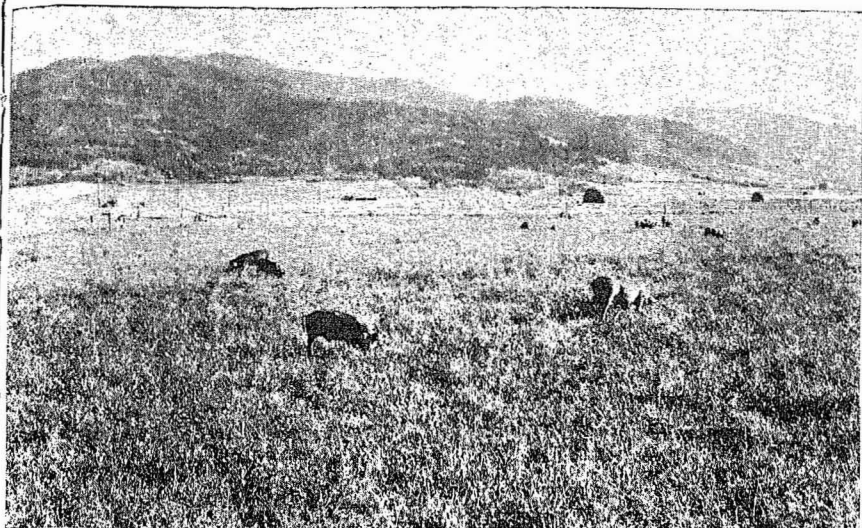
The yellow biennial variety seems to be the favorite among the farmers using sweet clover for pasture. The leaves and stems are fine, and, because of the spreading habit of growth, reseeding is more certain. While a biennial, some farmers have used sweet clover pastures for several years in succession with good results. A few men have found it advantageous to make a light seeding of unscarified seed in the late fall of the first season and to regulate grazing so as to insure reseeding as a means of maintaining good stands after the second year. Twelve to fifteen pounds of sweet clover seed per acre is sufficient under ordinary conditions.

On some farms, both mixed grass and sweet clover pastures are used to advantage, thus insuring the dependable qualities offered by the mixed grass pasture and the benefits of higher carrying capacity and crop rotation resulting from the sweet clover pasture. Sweet clover also furnishes early spring grazing while the grass pasture is making a good start.

Caution: Sweet clover pasture sometimes causes bloat. Cattle should be watched carefully when first turned on to sweet clover. See page 12 for a discussion of bloat.

Prepare the Seed Bed Thoroughly

Because of the relatively high value of good irrigated land, the high cost of seed per acre, and the fact that a pasture usually will occupy a field for several years, great care should be used in leveling the land for irrigation and in preparing the seed bed. The seed bed should be well pulverized and firm, to insure prompt germination and a vigorous, uniform growth which can compete with weeds. Two or three thorough cultivations in the spring before seeding will assist materially in obtaining a good stand.



Young pigs are more healthy, grow faster and make more economical gains if they have access to a good pasture.

Seeding: Time, Method and Rate

Spring seeding without a nurse crop probably is the most certain method of obtaining a stand under Montana conditions. Pastures may be planted with a light seeding of wheat, oats, or barley as a nurse crop, in which case the grain harvest may pay for the expense of seeding. However, small grain often lodges badly on irrigated land, thus smothering the grass seedlings. If a nurse crop is used it should be harvested as early as possible. Pastures have been seeded in small grain stubble in the late summer without disking or other preparation but the land must be irrigated immediately after planting. The stubble should be left for winter protection. Late summer seedings sometimes are resorted to in case spring seedings have resulted in poor stands.

Seeding is done best with a grain drill. Care should be used not to cover the seed too deeply, especially in heavy soil. The grass seed should be thoroughly mixed and seeded through the grain hopper, while the clover seed may be put through the alfalfa or "grass seeder" attachment. If the drill is not equipped with an agitator, it may be necessary to use a home-made device to keep the seed thoroughly mixed and insure uniform feeding.

The amount of seed to use depends somewhat upon the condition of the seed bed and the cost of the seed. If prices are so

high as to be a factor in limiting the acreage to be seeded to pasture, the rates of seeding suggested on page 7 may be reduced. However, it is important to use sufficient seed to insure a thick stand and a good sod.

Good Pastures Require Good Care

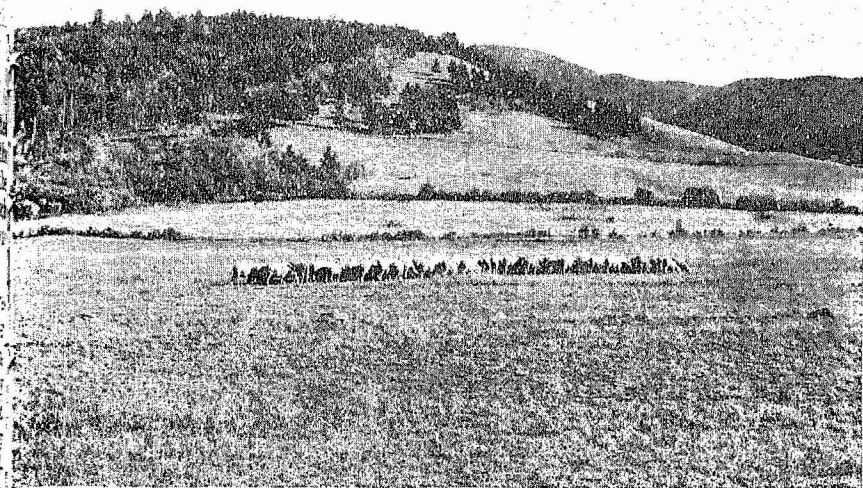
First season's care is important: The success of the irrigated pasture depends largely upon the care which it receives during the first season. Frequent, light irrigations are desirable since the surface soil must be well supplied with moisture at all times. Such conditions practically insure thick stands and strong vigorous growth, two essentials of high carrying capacity.

Where a nurse crop is grown, it should be harvested and removed from the field as early as possible, so that irrigation water may be applied. Pastures seeded in the spring without a nurse crop may require frequent clipping to prevent smothering by weeds. It is desirable to raise the sickle bar of the mower to avoid close clipping the new seeding. It is not desirable to graze a newly seeded pasture during the first year. However, under exceptionally favorable conditions, such pastures may be grazed lightly but **over-stocking and late fall grazing are especially to be avoided.** Stock should not have access to new pastures when the ground is wet from rain or irrigation.

Alternate grazing and irrigation give increased returns: Maximum carrying capacity is possible only by a systematic plan of alternate grazing and irrigation. Each irrigated pasture should be divided into at least two fields so that one field can be grazed while the other is being irrigated and the grass allowed to recover. After ten days or two weeks, the stock is shifted to the second pasture while the first is being irrigated and given a rest. It is absolutely impossible for an irrigated pasture to produce maximum returns under constant grazing and with little or no attention to irrigation.

Frequent irrigations are best: Frequent light applications of irrigation water will produce more grazing than a large amount applied once or twice during the season. A fairly uniform supply of moisture provided by frequent irrigation induces continuous growth and results in heavier carrying capacity throughout the season.

Avoid early spring grazing: Pasture plants need rich soil for maximum growth, but it is possible to have poor grass even on rich soil. The plant foods absorbed from the soil and the air must undergo certain changes within the leaves before this food may be used by plants in making growth. Plants which are grazed closely from early spring until late fall do not have an opportunity to build



A farm flock on an irrigated pasture. Close grazing is reducing the carrying capacity of this pasture.

up the strong root system necessary for vigorous growth of leaves and stems since all of the energy is used in making new growth. Consequently the plants reach the end of the season in a more or less lifeless or inactive condition. A storage battery in constant use without recharging soon "runs down" and does not function properly. Likewise, pasture plants under constant heavy grazing and in a more or less "run down" condition need plenty of time in the spring for "recharging" or an opportunity to recover the reserve energy used during the previous grazing season. Pastures which are allowed to make a vigorous growth in the spring maintain a heavy carrying capacity throughout the remainder of the season.

Premature or early spring grazing, an all too common abuse of irrigated pasture, may be avoided by extending the winter feeding period.

Avoid close grazing: Since leaves are absolutely necessary for the proper growth of pasture plants, close grazing at any time during the season is to be avoided. The larger the amount of leaf growth, the greater the amount of pasture.

Late fall grazing injurious: Heavy grazing late in the season is not desirable. Plants should have ample time to produce a good growth of leaves for winter protection and to store reserve food

in the root system for an early and vigorous start the following spring.

Barnyard manure increases returns: Unless the soil is maintained at its maximum productive capacity, pastures will not produce maximum returns. Top-dressing with well-rotted barnyard manure at the rate of 10 loads per acre applied every year increased the carrying capacity of pastures 14 per cent at the Huntley Branch Station.*

However, on most irrigated farms, it is not advisable to apply manure to pastures every year since there are other fields which need manure as much, if not more than the pasture. Top dressings are best made at the close of the pasture season or during the winter months. The pasture then should be thoroughly harrowed early the following spring to distribute the manure evenly and to scatter the droppings of the animals from the previous season.

The Grazing Season

The length of the grazing season depends upon the locality and the care which the pasture receives. At the Huntley Branch Station, where the elevation is 3000 feet and the average period between killing frosts is about 130 days, pastures alternately grazed and irrigated have yielded an average of approximately 140 days of grazing. At the Montana Experiment Station at Bozeman, with an elevation of nearly 4800 feet and an average frost-free period of 120 days during the past 12 years, irrigated pastures properly managed have provided an average of 125 days of grazing. These pastures are allowed to make a fair amount of growth in the spring before grazing commences and the livestock is taken off in the fall in time for the pastures to make some recovery before cold weather. Pastures grazed continuously and poorly irrigated usually provide grazing for a much shorter period.

Danger From Bloat

Cattle and sheep are subject to bloat at any time of the year, but it is much more prevalent during the flush of the pasture season and particularly when the animals are first turned on succulent pasture that has made considerable growth. For reasons not understood bloating of livestock on pasture is much more prevalent in some seasons than in others. The animals may bloat on any kind of good succulent pasture grass, though there seems to be more danger when the pasture contains a high percentage of clover or alfalfa.

*Montana Bul, 166—"Irrigated Pastures."

The amount of bloat occurring on sweet clover pasture varies greatly with the season and perhaps with the locality. Occasionally the losses are quite high while on the great majority of farms little, if any, trouble is experienced.

As there is considerable danger from bloat when the animals are first turned into good pasture the careful farmer will keep close watch of his animals until they become accustomed to the grass. It is advisable to keep emergency remedies for bloat available for immediate use.

Some Crops for Montana's Irrigated Pastures

Brome Grass: Also called Smooth Brome, Awnless Brome, Hungarian Brome, Russian Brome and Austrian Brome. A long-lived perennial with remarkable winter hardiness and drought resistance. It is very leafy and by means of underground roots, forms a tough sod which will withstand tramping. Starts growth early in the spring and continues well into the fall. One of the most palatable of all grasses. (Insist on brome grass which is free from quack grass.)

Meadow Fescue: A long-lived perennial. Leafy, grows in tufts or bunches but produces a fairly good sod. Begins growth early in the spring and continues late in the fall. Palatability equal to blue grass. Gives way to the more aggressive grasses after four to six years.

Kentucky Blue Grass: Also called blue grass or June grass. A standard grass found in practically every irrigated pasture. Leafy, palatable and winter hardy. Provides good pasturage in both fall and spring but makes little growth in mid-summer unless irrigated frequently. Grows slowly at first but is aggressive, establishes a tough sod and will eventually replace the weaker grasses.

Orchard Grass: Orchard grass is a typical bunch grass, never forming a complete sod. It is very leafy and succeeds well under heavy grazing. Will produce the earliest and latest grazing of the season. Grows well in shade; a long-lived perennial.

Perennial or English Rye-grass: A short-lived, rapid-growing perennial. When grown in mixtures, will largely disappear after a few seasons, due to the crowding of the more aggressive grasses. Of value principally in supplying grazing during the period when the slower growing grasses are becoming established.

Timothy: Timothy, a perennial grass, is a useful crop in pasture mixtures. The seed is cheap, germinates well and a stand is usually obtained easily. It will furnish considerable grazing during the first two or three years but gives way to the more aggressive grasses.

Red Top: Grows best on moist or wet soils, hence is frequently included in pasture mixtures to be sown on poorly drained and seeped land. Also will withstand considerable drought. Shallow, vigorous rootstocks enable red top to make a dense turf. Unfortunately, red top is not particularly palatable and in pasturing experiments, cattle have shown a preference for all other cultivated grasses.

White Clover: White clover, also known as Dutch clover is found in practically every irrigated pasture. It is a long-lived perennial and will grow in almost any soil providing moisture is abundant.

Some people object to white clover if present in large amounts, since under certain conditions it causes horses to "slobber" and occasionally may be the cause of bloat in cattle and sheep.

Alsike Clover: A long-lived perennial which thrives even where soil is waterlogged, hence is well adapted to growing under irrigation, or on low wet lands. While Alsike clover is palatable, precautions must be taken to avoid bloating of cattle and sheep. Grows well for four or five years but gradually disappears from a mixed pasture.

Alfalfa or Red Clover: These crops produce nutritious forage but in Montana they are seldom used in pastures which are to be grazed by cattle and sheep due to the danger of loss from bloat. However, mixed pastures are much less likely to cause bloat than either alfalfa or red clover grown alone.

What Farmers Say About Pastures

Two head per acre with proper management: "By 1924 I had twelve acres with a fine stand in permanent irrigated pasture. The soil is a stiff clay with very little humus. In 1924, when the 12 acres came into maturity I had only 13 cows besides the calves and was unable to make full use of the pasture. I cut about twelve tons of hay in addition to the pasturage. I fed no grain at any time, depending on pasture alone for the six months and then on alfalfa hay for the rest of the year. The cows were grade Jerseys and good producers, averaging 295 pounds of fat. I have come to the conclusion that a well established, irrigated pasture under our conditions will safely carry two producing cows per acre from spring until the end of July and one from that time until the end of the season, or an average of one and one-half to the acre. This is a very conservative estimate and might easily be increased to two cows per season, with proper attention to the irrigation so as to never allow the grass to become stunted."—F. C. BECKER, Lake County.

Every irrigated farm should have pasture: "I have been using a pasture of timothy for three years and also sweet clover pasture and have had very good results with both. The tame grass mixture will not carry as much stock at a time as the sweet clover but will hold out longer in the fall. They will carry on an average two cows per acre and I have done much better, up to three cows on sweet clover. Our pasture season is a little over four months, sometimes five. Figured on the basis of hay replacements you get about six tons of hay to the acre. When you figure you don't have to cut and stack, which equals a third of the cost of hay, you can see that pasture land pays better than hay to the dairyman, for he would have to get nine tons of hay to the acre to equal a good pasture in returns. I think every dairyman, and you might say any irrigated farm, should have at least one-half as much land in pasture as in hay."—C. P. HOUSER, Sanders County.

Wishes he had more: "Two years ago I seeded the Huntley mixture with barley. The barley went 55 bushels per acre. I think the irrigated pasture is fine and regret that I don't have more of it."—C. E. PINNICK, Yellowstone County.

Fifteen cows on 8½ acres: "Twelve year ago I seeded 8½ acres of irrigated land to permanent pasture with the Huntley mixture. I have kept approximately 15 cows on this pasture per season, though even better results might have been obtained when I divided the pasture so as to alternate irrigating and grazing. The pasture consists largely of blue grass and white clover at the present time."—F. E. HUDDLESTON, Yellowstone County.

Saved grain and increased milk: "I noticed an increase of five pounds of milk per cow daily from the use of mixed pasture. We save about seven hundred pounds of grain and hay per month when cows are on pasture."—L. R. STURM, Lake County.

Excellent results: "I have five and one-half acres of mixed pasture. The second year it carried three head of cattle per acre. We get excellent results from this pasture and can highly recommend it."—J. J. CORRIGAN, Lake County.

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