University of Nebraska - Lincoln
DigitalCommons@University of Nebraska - Lincoln

Historical Materials from University of Nebraska-Lincoln Extension

Extension

3-1955

EC55-108 Irrigated Pastures for Nebraska

Donald F. Burzlaff

Follow this and additional works at: http://digitalcommons.unl.edu/extensionhist

Burzlaff, Donald F., "EC55-108 Irrigated Pastures for Nebraska" (1955). *Historical Materials from University of Nebraska-Lincoln Extension*. 3252.
http://digitalcommons.unl.edu/extensionhist/3252

This Article is brought to you for free and open access by the Extension at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Historical Materials from University of Nebraska-Lincoln Extension by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

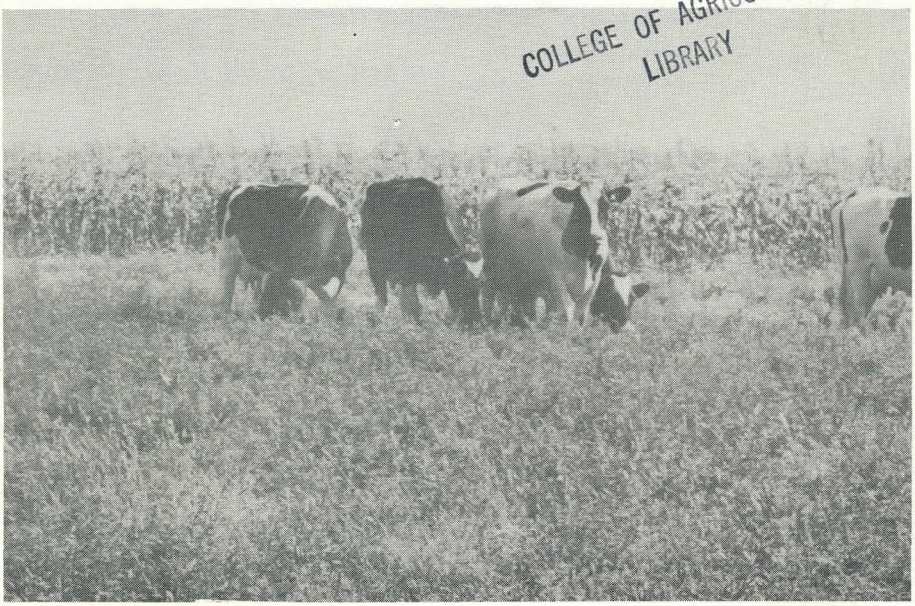
March 1955 EC 55-108

S
85
E7
#55108
c. 1

Irrigated Pastures

for Nebraska

RECEIVED
DEC 2 1970
COLLEGE OF AGRICULTURE
LIBRARY



EXTENSION SERVICE
UNIVERSITY OF NEBRASKA COLLEGE OF AGRICULTURE
AND U.S. DEPARTMENT OF AGRICULTURE
COOPERATING
W. V. LAMBERT, DIRECTOR

CONTENTS

Irrigated Farms Grow More Forage Crops 2

Plan Your Pasture Program 2

A Good Seedbed is Vital to Top Production 5

What is a Good Pasture Mixture? 6

How to Seed Forage Plants 8

Manage Your Pasture Well 10
- Controlled grazing is very important 10
- Let's pamper the legumes 11
- It pays to fertilize 13
- How to irrigate the pasture 14

What Can We do About Livestock Bloat? 16

IRRIGATED PASTURES FOR NEBRASKA

Donald F. Burzlaff 1/

Irrigated Farms Grow More Forage Crops

Irrigation on Nebraska farms is rapidly gaining in importance. In the last 12 years the irrigated acreage increased by half a million acres; from 685,890 in 1941 to 1,218,385 acres in 1953.

With irrigation, greater diversification is introduced on many farms. More high-quality forage can be grown at lower cost and can be included in a good rotation with corn, small grains and other cash crops. An increase in forage production demands a shift to livestock enterprises (beef or dairy) on many Nebraska farms, in order that the feed produced can be marketed to best advantage.

A diversified farm program demands a great deal of long-range planning. This is particularly true for the farmer who plans to shift to livestock in addition to changing from non-irrigated to irrigated farming. He will need to plan rotations. Livestock numbers for the unit will have to be determined on a basis of feed requirements and the amount of feed that can be produced in the crop rotation. When calculating the feed requirements the need for summer forage will have to be determined. A suitable pasture program for an irrigated farm enterprise requires as much planning as any other part of the farm program.

Plan Your Pasture Program

For a successful pasture program, consider the following suggestions:

1. Include the pasture in the crop rotation.

Move the pasture from field to field in a good rotation system. Three or four years is ample time for a pasture in the rotation. In this way more of the land

---

1/ Donald F. Burzlaff is Assistant Extension Agronomist, University of Nebraska, College of Agriculture.

receives the benefit of soil structure improvement and increased fertility due to the pasture. And the pastures themselves have a higher yield potential when they are not left on the same area year after year.

2. Provide adequate acreage for the number of animal units 2/ in your livestock program.

Stocking rates are affected as much by pasture management practices as by the species of grass and legumes that compose the vegetative cover. If continuous grazing is practiced, stocking rates will be lower than if a properly managed rotation grazing system is used. Likewise a pasture that is adequately fertilized will support more animal units per acre than one which does not have a good soil fertility program.

Pastures composed of grasses and legumes adapted to high production under irrigation will support more livestock than pastures seeded to grasses and legumes that are not suited to cultivation under irrigation.

Class of livestock and length of the grazing season must also be considered in determining how many acres should be devoted to irrigated pasture.

One acre of a well-managed, properly fertilized irrigated pasture made up of a mixture of desirable grasses and legumes should support two to three animal units for a 150-day grazing season.

3. Plan for season-long grazing.

Extend the grazing season over as long a period as possible through the use of temporary pastures.

Late summer seeding of rye and vetch will furnish pasture for livestock early in the spring before the perennial grasses and legumes have made sufficient growth to permit their use as pasture. Second year sweet clover may also be used for this purpose. These same temporary pasture crops may be used to provide pasture in the fall when grazing on permanent pastures

---

2/ One animal unit is equivalent to a mature cow with a nursing calf.

should be terminated to permit the build-up of the necessary food reserves of the forage crops.

Sweet clover, fall-seeded rye, or rye and Madison vetch will lengthen the grazing season by 30 days. Some farmers seed hairy vetch between the corn rows at the time of the last cultivation, to assure supplementary high quality green roughage at the time the cornstalks are being grazed. The vetch can be seeded with an inexpensive broadcasting device which can be attached on the front of the tractor. The broadcaster has a small motor which is powered by the battery of the tractor. The vetch seed should be inoculated. Rye makes a satisfactory pasture during the early spring when many of the perennial grasses and legumes are still dormant.

4. Select adapted varieties of recommended pasture grasses and legumes.

Satisfactory production will result when high-yielding strains of pasture plants are seeded. Select strains and varieties recommended for your particular locality. Certified seed will assure the quality and kind of seed desired. The proper ratio of grasses to legumes in the pasture mixture is also important to obtain highest production.

Thin stands due to low germination, poor establishment or winter killing commonly occur when price alone is the motive for selecting a pasture mixture.

5. Provide supplemental feed for livestock at certain times of the year.

Supplemental feed in the form of temporary pastures as discussed on page 3 should be planned to extend the grazing season. This is most vital in early spring and late fall. It may be necessary to provide forage during the hot, dry months of the year when many of the cool-season grasses are in a dormant state. Sudan is an excellent warm-season forage plant for pasturing during the hot summer months. At this season the permanent pastures often do not produce enough to adequately support the livestock. Silage of

all kinds or alfalfa hay may be satisfactorily used as a warm-season forage supplement.

Supplemental feed in the form of dry roughage should be made available to livestock grazing pastures containing legumes that cause bloat. The use of such roughages to reduce the bloat hazard will be discussed in a later section.

A Good Seedbed is Vital to Top Production

The success or failure of any grass and legume seeding is often directly related to the amount of preparation given the seedbed. The following suggestions may aid the farmer to secure better stands:

1. Soil tests should be made prior to seedbed preparation. Supply fertilizers necessary for production of grasses and legumes before seeding. Lime and phosphate may be applied before the field is plowed or disked. In the case of band application, a portion of the fertilizer may be added during the seeding process. It is usually best not to make a major application of nitrogen until after the seeding has become established. This will avoid stimulating the growth of the weedy grasses.

2. Shallow plowing or disking is usually more satisfactory than deep tillage since less packing will be required before seeding. Cover all trash or debris that may interfere with uniform seeding or distribution of irrigation water.

3. Weed-free seedbeds contribute to successful seedings. Weeds remove essential moisture and nutrients that germinating seedlings may need to become established.

4. When borders are used to facilitate irrigation they should be constructed prior to the final leveling and packing.

5. The seedbed should be packed as firmly as possible before seeding. Care should be exercised in the

packing process to assure a mellow soil. Rolling or packing while the soil is wet will result in crusted soils and poor seedbeds.

6. The surface of the field should be smooth and level to insure uniform depth of seeding and proper distribution of irrigation water.

What is a Good Pasture Mixture?

It is important to seed a mixture of adapted, high-yielding strains of grasses and legumes. The question is often asked, "Why seed grasses and legumes in mixture rather than in pure stand for pasture purposes?" This question is easiest answered by the following statements:

1. Seeding hazards do not affect all crops the same. More consistent results can be expected from seeding a mixture than from seeding an individual forage.

2. Because of varying soil conditions, a mixture of grasses and legumes that contains species adapted to several soil types assures a more uniform stand over the entire pasture.

3. Mixtures of grasses and legumes yield more than any of the components grown by themselves.

4. There is less trouble from weeds when grasses and legumes are grown in combination. The grasses tend to fill in the bare areas between legume plants. Soil erosion is also decreased.

5. The hazard of livestock bloat is reduced in pastures containing a proper ratio of grasses to legumes.

Pasture mixtures should contain only a few species of pasture plants. Each constituent of the mixture should fulfill a definite purpose. A large number of species in a mixture doesn't necessarily assure success. Select species that are adapted to the growing season of the area and to irrigation. Select high-

yielding species, since water is not a limiting factor. Avoid many of the pasture plants used for non-irrigated pastures, as they do not produce as well as many of the grasses and legumes that are suited to irrigated conditions.

Listed below are satisfactory mixtures for irrigated pastures derived from successful plantings made by Nebraska farmers.

I.	Smooth bromegrass	12#
	Ranger alfalfa	3#
		15#/acre
II.	Intermediate wheatgrass	12#
	Ranger alfalfa	3#
		15#/acre
III.	Smooth bromegrass	6#
	Intermediate wheatgrass	6#
	Ranger alfalfa	3#
		15#/acre
IV.	Smooth bromegrass	3#
	Tall fescue	3#
	Intermediate wheatgrass	3#
	Orchard grass	3#
	Ranger alfalfa	3#
		15#/acre

In regions where the soil is highly alkaline, tall wheatgrass should be substituted for the other grasses in the mixture since it is the only one which exhibits satisfactory tolerance of such a condition. Strawberry clover is a legume that will produce well on wet, alkali soils.

Ladino clover may be substituted for a portion of the alfalfa in the mixture if adequate irrigation water is available at all seasons of the year. To be able to overwinter without serious winter killing, ladino clover requires irrigation late into the fall.

If the operator hesitates to use alfalfa because of the bloat hazard, broadleaf birdsfoot trefoil may be substituted in the mixture. The Empire strain of broadleaf birdsfoot trefoil is recommended for Nebraska. Four to six pounds per acre is an adequate amount of seed to include in a pasture mixture. In case the European varieties are used the seeding rate should be doubled. Another factor to be considered when trefoil is used in the mixture is that inoculation with the proper strain of nitrogen fixing bacteria is essential to produce satisfactory stands. Double or triple the amount of inoculum recommended by the manufacturer to get the best stands.

Under conditions of sub-irrigation, high water tables or occasional flooding and silting, reed canarygrass may be used in the mixture. There is some question concerning the palatability of this grass, but under the above conditions its use can be justified since no other grass will produce as much forage in these situations. Ioreed is recommended as it performs best under Nebraska conditions.

Smooth bromegrass is a long-lived perennial that yields well on fertile irrigated land. The strains Lincoln, Lyon and Lancaster are recommended as being most productive.

How to Seed Forage Plants

The following points will have to be carefully considered before the seeding is made:

1. Method of Seeding.

Probably the most effective method of seeding irrigated pastures is broadcasting the seed between corrugated rollers. Band seeding is a new and quite satisfactory method of seeding grasses and legumes. With this method a band of fertilizer is placed approximately 1 inch below the seeds at the time of planting. Special drills are now available to perform this operation. Conversion kits for standard drills are also being manufactured.

2. Depth of Seeding.

Do not place grass and legume seed too deep in the soil. The maximum depth for most grasses is 3/4 to

1 inch below the surface of the ground. Legumes should be placed at a 1/4 to 1/2 inch depth. Here again, the corrugated roller type seeder will give the most uniform placement of seed in the ground.

3. Date of Seeding.

Under irrigated conditions late summer seeding will generally give the best stands of grasses and legumes. This is due primarily to the reduced competition from weeds in the fall. Successful stands can be expected from seedings made the last two weeks in August or the first week of September.

If spring seedings are necessary, cool-season grasses should be planted as early in the spring as the ground can be worked. Early planting is required for the seedlings to become established before the summer heat and drought occur. When mixtures containing legumes are seeded this early hazard of frost injury to the legumes exists. But it is better to risk frost injury than to lose stands as a result of hot dry weather. Another alternative in this case might be to make a split seeding. Plant the grass as early as possible and then make a second seeding to plant the legumes after the frost danger has passed.

4. Companion Crop.

If wind erosion is a hazard during the winter months, it is often wise to seed a companion or nurse crop. Oats make a satisfactory companion crop for fall seedings since they are killed by frost and do not compete with the new seedlings the following year as would a winter-annual companion.

5. Inoculation of Legumes.

All legumes included in the pasture mixtures should be inoculated with the proper strain of nitrogen-fixing bacteria. These are available from commercial seed distributors. The instructions accompanying the package will state the type of legume for which each inoculant is to be used.

Skim milk is often substituted for water in the inoculation of legume seeds. It will cause the inoculum

to adhere to the seed coat in a more satisfactory manner than will water. Inoculate only enough seed for one day's use. If there is seed left over from the previous day's seeding, it should be reinoculated.

The most essential things to keep in mind in making the seeding are shallow planting and pressing the soil firmly about the seed. In the case of severe blowing or other erosion hazards it may be necessary to mulch the seeding with a ton of straw per acre after seeding. Uniform distribution of the mulch with a manure spreader is essential for uniform stands of grasses and legumes.

Manage Your Pasture Well

CONTROLLED GRAZING IS VERY IMPORTANT

Controlled grazing is an essential management practice since many legumes, alfalfa in particular, are easily damaged by continuous grazing.

Several grazing systems have been developed for the purpose of obtaining highest production and for maintaining legumes in the stand.

Rotation Grazing is neither difficult nor costly to carry out. Under this system of grazing the pasture is divided into three or more units. The livestock is permitted to graze on one unit of the pasture until the forage has been properly utilized. At the end of the use period, the livestock is moved to another unit of the pasture. This procedure is repeated until the whole pasture has been grazed.

With proper stocking rates, this system will permit sufficient rest for each unit so that the legumes will maintain themselves satisfactorily. The length of the rest interval depends upon the rate of stocking and the degree of use. Under proper utilization and stocking a three-to four-week interval is recommended.

The species in the mixture will also affect the length of the rest period. Research agronomists at the University of Nebraska College of Agriculture are investigating the recovery of various legumes after they have been grazed. This information, when available, should add much to our understanding of management practices necessary to maintain legumes in pasture.

Strip Grazing is a modification of rotation grazing that has been adopted by many dairymen. The size of the unit, in this case, is determined by the amount of forage the animals can consume in one day. This permits the animals to have fresh pasture each day and reduces the loss of forage by trampling that occurs in larger grazing units. The frequent rotation of this system of grazing contributes to maximum forage production.

Soiling. Under this system livestock does not graze the pasture at any time. Instead, the animals are confined to a dry lot and the green forage, harvested with a forage chopper, is hauled to them. The absence of trampling losses and the more uniform use of all plants in the mixture contributes to maximum forage production. In order to feed the livestock when adverse weather makes forage harvesting impossible supplies of supplemental feed must be maintained throughout the grazing season.

If it is not possible to establish a rotation grazing system, continuous grazing can be practiced without loss of legumes from the stand if:

1. The pasture is not overstocked.
2. High fertility of the pasture is maintained.
3. Grazing is deferred until May 10 in the spring and ended by September 10. (Grazing may be resumed after the first killing frost of the season.)

LET'S PAMPER THE LEGUMES

Many pastures in Nebraska have lost their productivity because management practices were not adequate to prevent death of the legume.

To assure the maintenance of proper proportions of legumes to grasses in a pasture:

1. Plant the proper mixture.

Seed legumes and grasses in a 1 to 4 ratio by weight for best results. Such a ratio will yield a forage consisting of approximately one half grass and one half legume.

2. Maintain an adequate fertility level.

If grasses tend to dominate a grass-legume mixture, applications of phosphorus and lime in acid soils or phosphorus alone in many cases will correct the situation. When legumes appear to dominate the stand, application of nitrogenous fertilizers in rather heavy amounts will favor the grasses. These different reactions to applications of fertilizers afford a method of controlling legumes in the pasture. Periodic soil tests and correction of deficiencies are an integral part of the pasture management program.

3. Practice rotation grazing.

Rotation grazing is an essential management practice for maintaining legumes in pasture mixtures. The resting period allows time for the necessary build-up of root reserves.

4. Mow the pasture after each use period.

It is not uncommon to find pastures with a patchy appearance which results from unequal utilization of the forage by the grazing animals. Clipping the pasture after the grazing period will eliminate ungrazed plants and promote uniform regrowth of the forage plants. Serious stand losses may result from failure to clip the unused portions, since livestock tends to concentrate on the new regrowth in the areas they had previously grazed. Mowing may also serve to control some of the weed problems that exist with irrigated pastures.

IT PAYS TO FERTILIZE

Grasses and legumes are as demanding upon soil nutrients as most crops that might be included in the crop rotation. Maximum production from pastures requires a well-planned soil fertility program.

Most cool-season grasses are high in their demands for nitrogen and phosphorus. These grasses produce most of the forage in the spring and early summer and in the fall when the soil temperatures are low. The microorganisms of the soil are relatively inactive and the process of natural nitrification is extremely slow.

Supplemental nitrogen should be applied to the irrigated pastures each year for top forage production. The amount of available nitrogen to apply will vary from 40 to 120 pounds or more, depending upon other management practices. This nitrogen is best applied in split application in order to balance the forage production throughout the grazing season. It is a common and recommended practice in Nebraska to make an early spring application and then a second application early in June of the same year.

Properly inoculated legumes have the capacity to convert atmospheric nitrogen into compounds directly available to themselves and later to the grasses growing with them. This phenomenon reduces the demand of the legume on the supply of nitrogen in the soil and consequently results in a stimulation of grasses in the mixture. Highest production still demands application of nitrogen to supplement the benefit of the legume.

Most soils in Nebraska are deficient in phosphorus, many in lime and a few in potash. Soil tests performed by the Soil Testing Service of the University of Nebraska Agricultural Extension Service will determine these deficiencies for the farmer. Recommendations on how to correct these deficiencies accompany the soil test report.

It is a common and acceptable practice to apply sufficient quantities of lime, phosphorus and potassium at the time of seedbed preparation to carry the pasture through the rotation.

Barnyard manure is a valuable source of essential plant nutrients. Annual applications of barnyard manure at a rate of 6 to 10 tons per acre will substantially reduce the quantity of commercial fertilizer required to keep the pasture in production.

In line with this, it is in order to mention that harrowing to break up droppings in the pasture is a desirable practice. Not only is the manure more easily decomposed when broken into small pieces, but livestock will make more uniform use of the forage. It's a good idea to harrow the droppings prior to irrigation of the pasture.

HOW TO IRRIGATE THE PASTURE

Slope of the land, soil texture, and the source and amount of irrigation water will influence the selection of the irrigation system. The four types of irrigation commonly practiced in Nebraska are discussed in the following paragraphs.

Flooding from Field Laterals. Under this system laterals are placed at various intervals throughout the field. The placement of the laterals is determined by the contour of the land, soil texture and amount of available water. Irrigation is accomplished by raising the water level in the lateral with a check dam of some kind. The overflow of water floods the area between the laterals.

A minimum of land preparation is required in readying a field for irrigation when this system is employed. Care must be exercised to avoid excessive water losses due to over irrigation or runoff.

Border Irrigation. Border irrigation is characterized by the construction of small dikes or levees parallel to the direction of flow of water. These dikes or borders, as they are commonly called, are placed at regular intervals across the pasture prior to time of seeding. The distance between borders is determined by the amount of slope, the texture of the soil and the amount of irrigation water that is available. The borders confine the water to a pre-determined area.

Irrigation is accomplished by diverting water from a supply lateral into the upper end of the bordered strip. It flows by gravity to the end of the strip. The irrigator must be careful to avoid waste of water from over irrigation when this system is used.

When this system has been properly designed and installed it requires a minimum of labor. The county agent and the irrigation engineers from the University of Nebraska College of Agriculture can supply information concerning use of this method of irrigation.

Corrugation System. This type of irrigation is used to irrigate pastures on slopes too steep for border irrigation. Irrigation is accomplished by diverting water from laterals into small furrows or corrugations. The furrows are placed at intervals that permit complete soaking of the area between them. If the intervals between the corrugations are too wide or the length of run is too great inefficient use of water will result.

The corrugations can be constructed with equipment used to make ditches for irrigation of row crops. It is important that they be constructed after the seeding operation. If the corrugations lose their effectiveness it may be necessary to reopen them in subsequent years.

Sprinkler Irrigation. Many farms in Nebraska are irrigated by sprinkler systems. These are most common on light soils or in areas too steep for gravity irrigation. The infiltration rate of water on light or sandy soils is usually too high to make flood irrigation

a sound practice. Efficient sprinkler irrigation requires carefully planned installation of equipment. Farmers who want to install sprinkler irrigation on their farms can receive technical assistance in design and installation from the University of Nebraska College of Agriculture.

Rotation grazing adapts itself well to irrigated pastures because livestock has to be removed from the pastures during the time of irrigation. It is convenient to plan the grazing rotation in such a manner that resting pastures may be irrigated while the livestock is in another unit. Never irrigate a pasture while it is being grazed. The trampling will destroy much of the forage as well as pack the soil unnecessarily; and will cause difficulties for future irrigation.

The amount of water and the frequency of application will vary from one farm to another.

Light or sandy soils require frequent light irrigations. The heavier soils with high water holding capacity may require heavier applications of water at less frequent intervals. Since the grasses and many of the legumes included in pasture mixtures are relatively shallow rooted, it is generally considered wasteful to wet the soil to a depth greater than 4 feet.

In areas where natural fall moisture is limited, late fall irrigations will be necessary to maintain Ladino clover in a pasture mixture.

What Can We do About Livestock Bloat?

Livestock bloat is one of the major reasons why many farmers object to legumes in the pasture mixture. However, the improvement in quality and quantity of forage produced by a mixture over the straight grass pasture makes it highly desirable to plant the legume.

The bloat hazard cannot be completely controlled, it can only be reduced. Bloating may occur with livestock that have eaten any green succulent feed, grass

or legume but is most common in the case of legumes The greatest hazard seems to occur when the plant is making rapid succulent growth, either after favorable moisture and temperature in the spring or after irrigations during the dry months of the summer.

In general, the hazard of livestock bloat can be minimized by observing the following precautions:

1. Maintain a favorable ratio of grasses to legumes in the pasture mixture. At least one half of the forage should be grass.

2. Make dry roughage available to the livestock in the pasture. Portable feedracks filled with good quality hay and moved from one pasture unit to another in the rotation system have proved effective in minimizing the bloat hazard. Many farmers find that clipping swaths through the pasture and allowing the cured forage to be consumed from the windrow is equally effective.

In some instances, bales of hay scattered throughout the pasture is substituted for mowing or the use of feedracks. In any case, where dry roughage is used to reduce bloat it must be remembered that the hay should be of good quality, otherwise it will not be eaten by the livestock. On the other hand, the farmer should avoid the use of extra-leafy, green alfalfa hay for this purpose. It is too "soft" and will not help to reduce the bloat hazard.

3. Allow at least a 10- to 15-day interval between time of irrigation and grazing. This will permit the rapid early growth of legumes to mature somewhat before grazing takes place.

4. Take extra precaution when the forage is wet. Bloating hazard is greater following heavy dews, light frost or on misty damp days. It may be necessary to remove the animals until the foliage has completely dried.

5. Dispose of "easy bloaters." Cattle vary in susceptibility to bloat.