

**MIDWEST
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TECHNICAL NOTE

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Reference: Basic Design Criteria for Feedlot and
Livestock Windbreaks

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**SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE**

NOTE:

Technical Note MNTC Ecological Sciences 190-LI-1, "Benefits Associated With Feedlot and Livestock Windbreaks" should be reviewed after reading this technical note. Technical Note MNTC Ecological Sciences 190-LI-6, "Basic Windbreak Design Criteria For Farm And Ranch Headquarters Areas And Large Residential Lots" should also be reviewed. The basic principles associated with the design of multirow plantings are covered in more detail in 190-LI-6.

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**BASIC DESIGN CRITERIA FOR FEEDLOT
AND LIVESTOCK WINDBREAKS**

Feedlot windbreaks are designed primarily to provide protection from wind and blowing snow. The protected areas leeward from such plantings are used extensively by livestock during the cool or colder portions of the year. Experience has shown that properly designed feedlot and livestock windbreaks will function properly and maximize benefits. Conversely, improperly designed windbreaks will not function properly and may have few, if any, major benefits. The following are the major considerations which should be taken into account in the design of any feedlot or livestock windbreak.

1. The direction of troublesome prevailing winds.

2. In areas where snowdrifts accumulate within the windbreak, the windbreak must be located a sufficient distance away from the feedlots and livestock concentration areas to keep all drifted snow from getting into the feedlot or interfering with feeding operations.

3. All water stored in snowdrifts within windbreaks must be diverted away from feedlot.

4. Plant only tree and shrub species which are well adapted to the soils at the planting site.

5. All windbreaks must be fenced to prevent damage from livestock.

6. All runoff from feedlots and areas where livestock concentrate

must be diverted away from windbreaks.

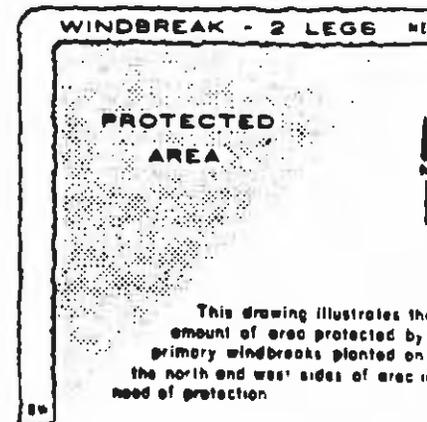
7. In areas subject to winter storms, consideration should be given to making plantings of sufficient width to provide good cover for wildlife during severe storms.

Figures 1 and 2 illustrate the area protected by a windbreak of one or more legs. In the examples the problem winds are from the north (figure 1) and north and west (figure 2).



This drawing illustrates the amount of area protected by a primary windbreak planted on the north side of an area in need of protection. The area to be protected would be vulnerable to winds from all directions except from the north.

Figure 1. Area protected by one primary windbreak.



This drawing illustrates the amount of area protected by primary windbreaks planted on the north and west sides of area in need of protection.

Figure 2. Area protected by two primary windbreaks.

Figures 3, 4 and 5 illustrate the major design criteria for such plantings. When livestock feeding operations are located at the farm or ranch headquarters, it is important to incorporate these design criteria into the windbreak design for protecting the entire area (feeding areas and headquarters

areas). For more specific information on numbers of rows, species, soils, etc., contact the Soil Conservation Service, the Extension Service, or the State Division of Forestry. Additional plantings to provide protection from sun and to enhance wildlife values can be added to the basic

plantings. Table A gives the minimum amount of space needed per animal within the feeding and holding area. To determine the size of feedlot (excluding windbreak), multiply the figure in the table times the maximum number of head that will be placed in the feedlot at any one time.

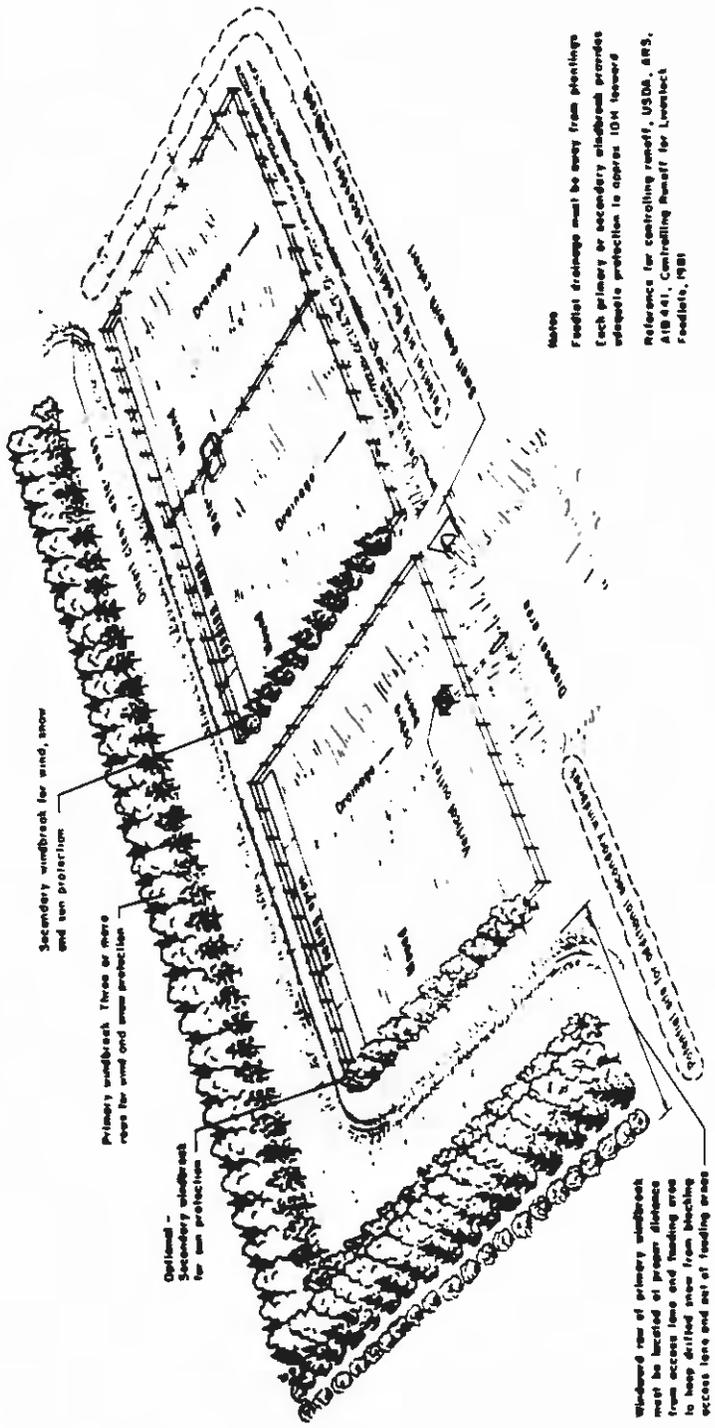


Figure 3. Basics of feedlot windbreak design.--Wind and snow protection.

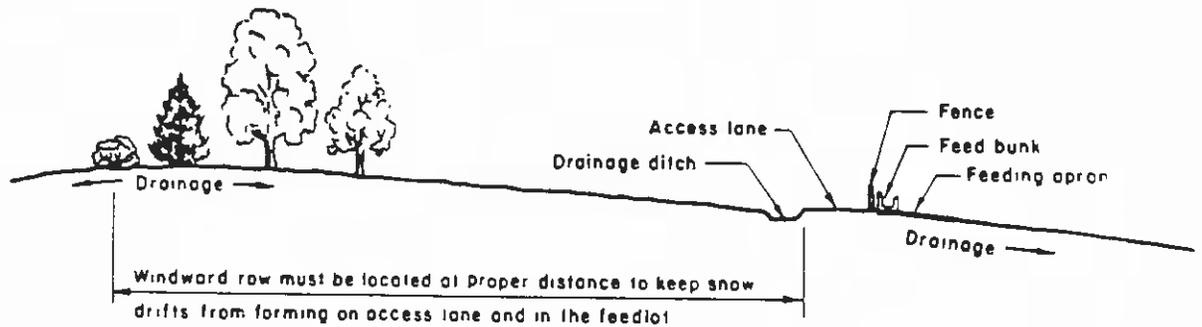


Figure 4. Basics of feedlot windbreak design.—Cross section for wind and snow protection.

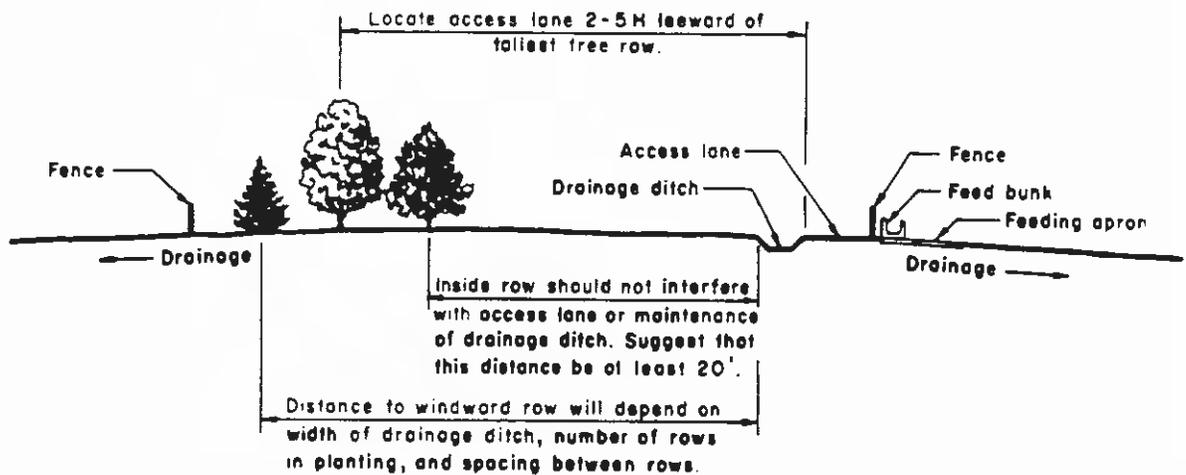


Figure 5. Basics of feedlot windbreak design.—Cross section for wind protection only.

Table A. Amount of Space Needed Per Animal^{1/} Within Feedlot
(Excludes Windbreaks)

<u>Type of Animal</u>	<u>Minimum Square Feet per Head^{2/}</u>
Beef - Feeders	250
Cows	300
Calves	200
Dairy - Cows	400
Calves	200

There is some leeway in design of windbreaks that will be used for: feeding livestock on an infrequent or intermittent basis during severe storms, escaping the elements associated with severe storms, and calving or lambing. Where windbreaks are used only for shelter, significantly less protected space is needed per animal. In all cases, runoff from the areas where the livestock concentrate should be away from the windbreaks and the clean water from the snowdrifts within the windbreaks should be diverted away from the protected zone. Where space permits, place the windbreaks where natural features provide for all or most of the necessary drainage. Depending on state and other regulations, there may or may not be a need for a waste disposal area. An access lane for the feeding operations is also

optional. All other criteria in regard to the distance to outside rows of windbreaks from areas in need of protection should be followed.

Figure 6 presents some ideas for the shape of livestock windbreaks located away from the farm or ranch headquarters and where the protected area will not be used on a continuous basis. All of these designs will provide protection from winds and/or blowing snow from all directions. The size of livestock windbreak plantings can be adjusted to fit the size of the herd or flock involved. Where sufficient land is available, it is suggested that plantings be made somewhat larger than current needs.

^{1/} For feeding, shelter, etc.

^{2/} Estimated.

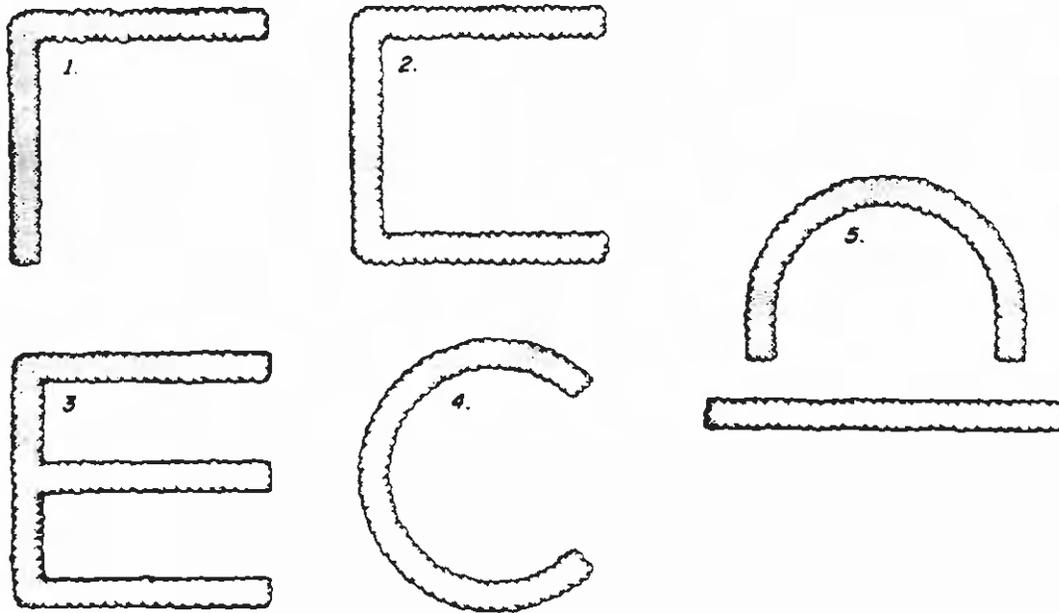


Figure 6. Ideas for the shape of livestock windbreaks.

TWIN ROW HIGH DENSITY WINDBREAKS

To overcome some of the problems associated with renovating the thousands of acres of existing plantings, at least one new design concept has come into being to allow for the ease of renovation. It is called Twin Row High Density Windbreaks. Essentially, it is a combination of narrow and wide between-the-row spacings. Figure 7 illustrates the basic concept.

Each twin row contains two rows of the same species which are planted approximately 4 to 6 ft apart. The wide between-the-row spacing of the twin rows provides for ease of renovation in the future. For instance, if the rows happened to be planted to a combination of fast growing short-lived species (15 to 25 years) for quick protection and long-lived species (25+ years) for long-term protection, renovation problems in the future would be minor and the costs would be inexpensive.

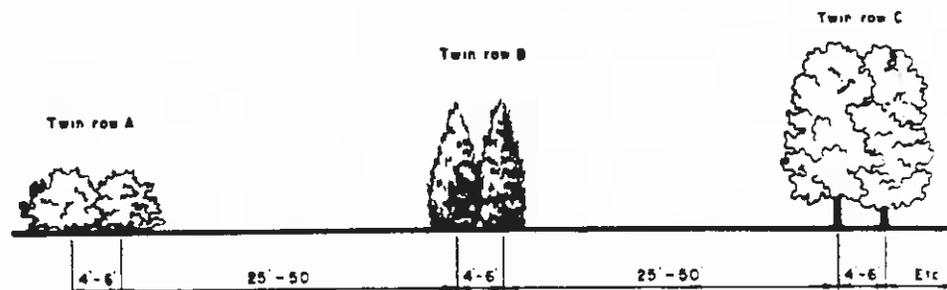


Figure 7. Basic Twin Row High Density Windbreak Design

Figures 8 and 9 illustrate two different methods of renovating the planting if something happens to Twin Row B.

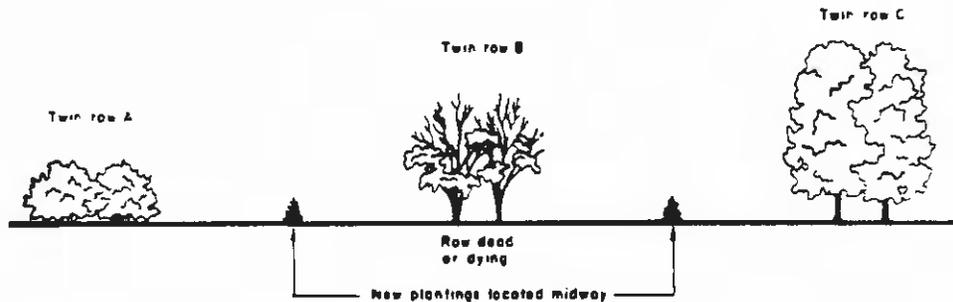


Figure 8. Renovation Without Removing Dead or Dying Rows

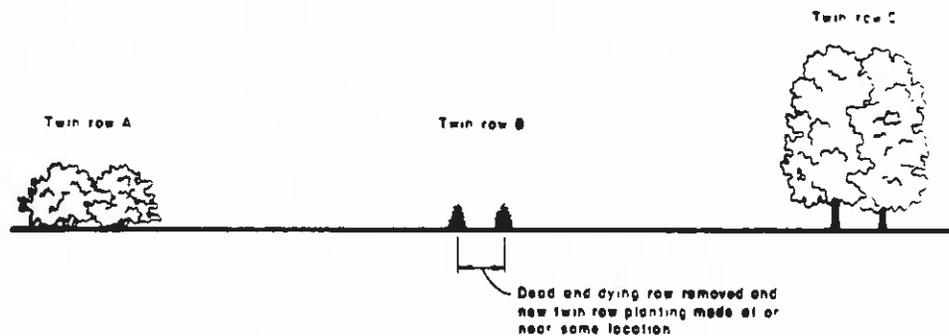


Figure 9. Renovation by Removing Dead or Dying Rows and Replanting

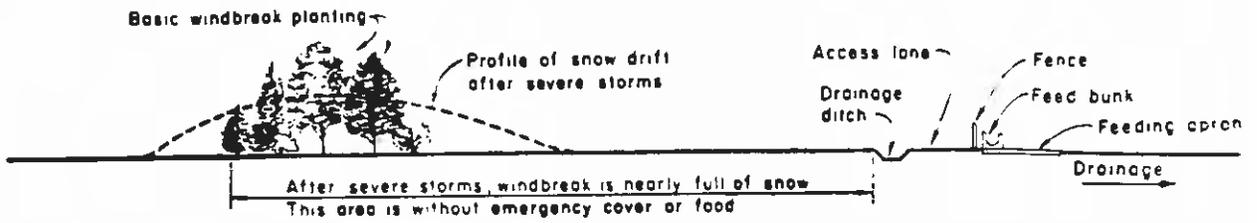
It is important to note these forms of renovation can be applied without damaging the remaining rows. This design concept does not generally take any additional space over the older designs. However, the space is utilized differently.

ENHANCING WILDLIFE VALUES

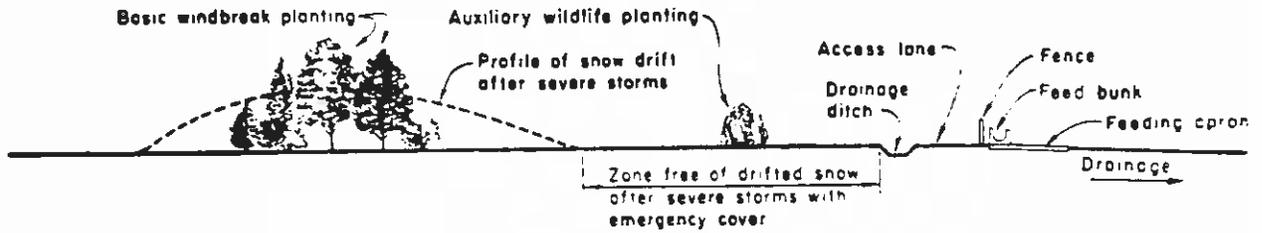
Feedlot and livestock windbreaks offer extensive opportunities for providing cover and feed for a wide variety of wildlife. Often by making minor adjustments in basic design significant increases can be made in wildlife values.

Although wildlife values can be enhanced during all seasons, feedlot and livestock windbreaks can provide extensive wildlife benefits during critical times of the year, generally the winter or early spring months. In many intensively farmed areas, windbreaks provide the only meaningful emergency cover and in the case of feedlots emergency feed during critical climatic events (storms), Figures 10, 11, and 12 present some options to enhance wildlife values in areas subject to severe winter and early spring storms.

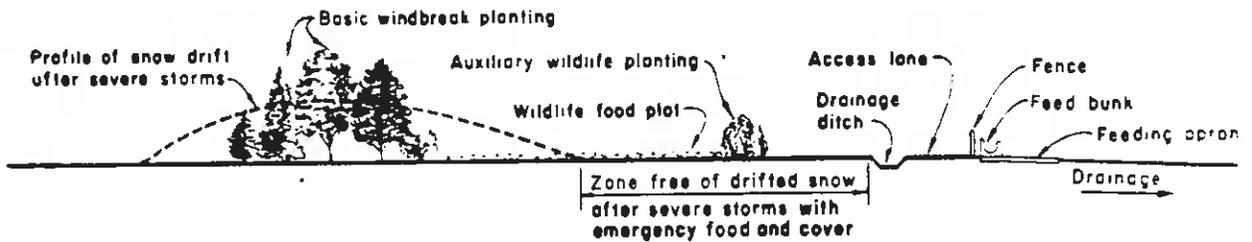
Consult Technical Note MNTC Ecological Sciences 190-LI-4, "Enhancing the Wildlife Values Associated With Windbreaks" for additional guidance in improving wildlife values.



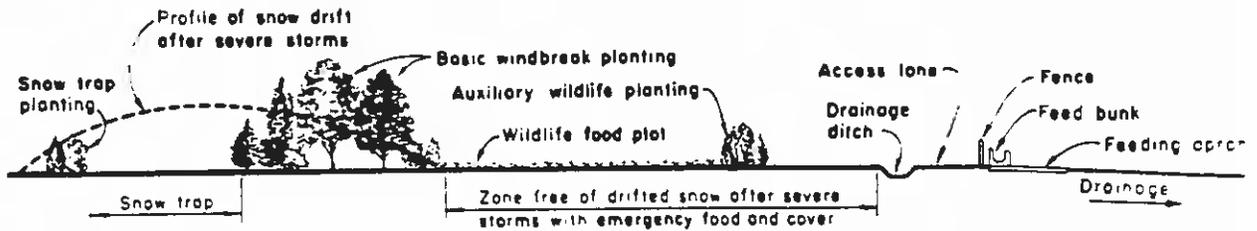
CROSS SECTION OF CONVENTIONAL WINDBREAK PLANTINGS
Areas subject to severe snow storms



CROSS SECTION OF CONVENTIONAL WINDBREAK PLANTINGS WITH EMERGENCY COVER
Areas subject to severe snow storms

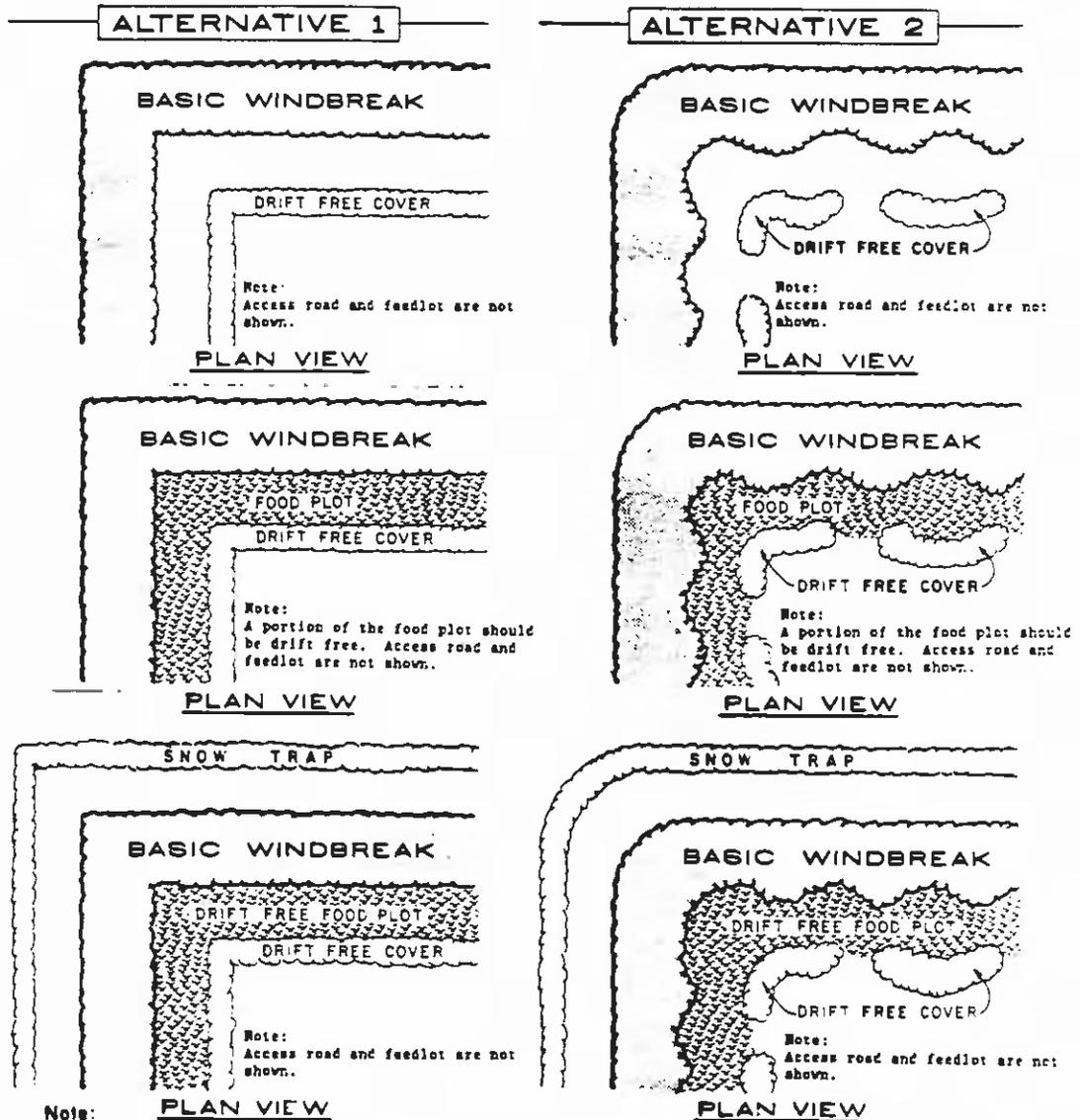


CROSS SECTION OF CONVENTIONAL WINDBREAK PLANTINGS WITH EMERGENCY FOOD AND COVER
Areas subject to severe snow storms



CROSS SECTION OF CONVENTIONAL WINDBREAK PLANTINGS WITH SNOW TRAP TO PROVIDE ADDITIONAL EMERGENCY FOOD AND COVER
Areas subject to severe snow storms

Figure 10. Enhancing the winter wildlife values of feedlot windbreaks.-- Conventional plantings.



Note: Both alternatives are approximately equal for enhancing wildlife values. Alternative 1 is the least expensive and the easiest to establish and maintain. Alternative 2 offers more opportunities to incorporate Landscaping principles into the design of plantings to improve appearance. It also provides greater opportunities to use a wider variety of trees and shrubs.

Figure 11. Two alternatives for accomplishing the principles illustrated in figure 10.

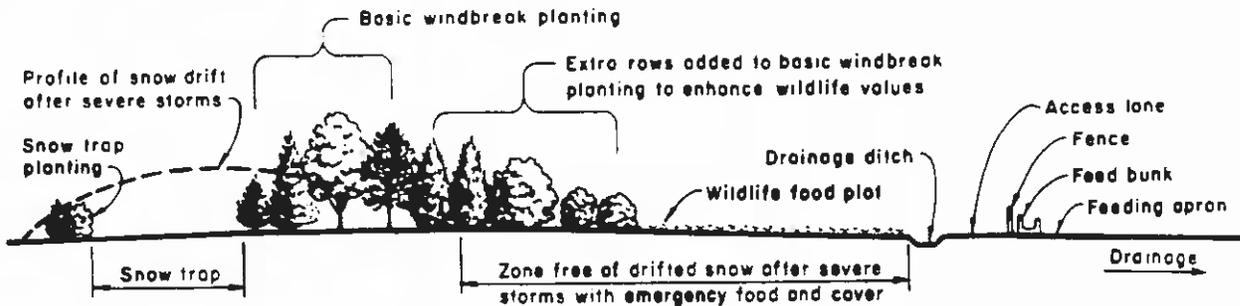


Figure 12. Enhancing the winter wildlife values of feedlot windbreaks.--
Adding extra rows to conventional plantings.

Summary

Properly designed feedlot and livestock windbreaks can have a significant impact on the performance of domestic livestock and the survival of domestic livestock and wildlife. They can also be a valuable aid in the performance of duties associated with raising livestock. Care must be taken to design them correctly to avoid the problems that can result from poor designs.

David L. Hintz
DAVID L. HINTZ
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Directors Staff



Windbreaks benefit wildlife in many ways.

(Adapted from Ohio Dept. of Natural Resources)