

NATURAL RESOURCES CONSERVATION SERVICE
INTERIM CONSERVATION PRACTICE STANDARD

INTERIM STANDARD
LIVESTOCK SHADE STRUCTURE

(No.)

CODE 717

DEFINITION

A permanent or portable, framed structure with a mesh fabric roof to provide shade for livestock.

PURPOSE

This practice may be applied as part of a resource management system to provide shade areas for livestock, helping protect surface waters from pollution and the livestock from excessive heat.

CONDITIONS WHERE PRACTICE APPLIES

Applicable where animal productivity and well being is adversely affected from heat generated by sunshine and the lack of shade. It is also used to provide shade areas so that livestock can be excluded from existing shade on streambanks or depressions thus reducing pollution of surface waters. It often is a component in an animal waste management system. It can provide shade in a pasture used for rotational grazing or in a holding area for dairy, beef, or swine operations.

CRITERIA

Federal, state, and local laws. All planned work shall comply with all Federal, state, and local laws and regulations.

General. Livestock shade structures can be permanent or be made to be moveable with farm equipment. The structure(s) shall be sized to meet the needs of the livestock operation but shall not be less than 80% of the recommended shade requirement (see Table 1). The maximum size of an individual portable unit (shade frame) shall be limited to 25 feet by 42 feet.

Orientation. If it is desirable for the area to be kept dry, the longest axis shall be oriented in a general north to south direction. This will permit a greater amount of sunshine to affect the total shaded area. If the animals are to be confined under the structure, then an east to west orientation of the long axis is more desirable.

Protection. The top of the structure shall be relatively flat so that strong winds will have minimum effect on the structure. A 1.0-foot pitch for the top of the structure is permissible to provide faster rain runoff from the roof.

Location. The structure shall be located on a well-drained site, if possible, and as far as practicable but no less than 200 ft. from any surface water, at least 150 ft. from an up gradient well, and at least 300 ft. from a down gradient well. If a well-drained site is not possible, a portable structure shall be used. The structure shall be located a minimum of 50 ft. from any type structure that could be an obstruction to the circulation of air. Portable structures shall be moved to new locations periodically to prevent destruction of vegetation in the immediate area. The structure shall not be located in the general vicinity of a water source or mineral block in order to create a desired livestock-grazing pattern.

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Table 1- Recommended Shade Requirement.	
Animal Type	Recommended Shade Requirement (ft² /hd)
400 pound calves	23
800 pound feeders	32
Beef cows	40
Dairy cows	50
Mature swine	20
Horses	60

Materials. Planning, design, and construction shall ensure the structure is sound and of durable materials commensurate with an anticipated life of 10 years.

Steel Structural Members. The main structural members shall be constructed of 2 in. minimum, nominal diameter steel pipe meeting or exceeding the requirements of ASTM A-53 for Schedule 40 pipe (wall thickness of 0.154 in.). Longitudinal members of the top frame shall be constructed of 1 $\frac{1}{4}$ in. minimum nominal diameter steel pipe meeting or exceeding the requirements of ASTM A-53 for Schedule 40 pipe (wall thickness of 0.140 in.). All structural members, welds and areas of damaged coatings shall be galvanized or otherwise protected with a zinc dust-oxide coating. The protective coating of the pipe is not required if the pipe wall thickness exceeds the minimum wall thickness by at least 20 percent.

Vertical member spacing shall not exceed 21 ft. in the longitudinal direction and 15 ft. in the traverse direction. The length of vertical members shall not exceed 12 ft. except that length may be increased to 13 ft. to provide slope (pitch) to the top of structure. A minimum height of 7 ft. shall be provided for a swine shade structure. A minimum height of 8 ft. shall be provided for a horse shade structure.

Bracing shall be provided at the junction of all structural members. The corners of the roof frame shall be braced with a $\frac{3}{4}$ -in. diameter steel bar, 1 $\frac{1}{4}$ in. minimum steel pipe or other methods providing equivalent rigidity. At junctions of vertical members with roof frame and ground frame, knee braces of equivalent section shall provide bracing to the main members, $\frac{1}{4}$ -in. gusset plates or other methods providing equivalent rigidity. All welding shall be continuous, professionally completed, and suitable for the material used.

Wooden Structural Members. Wood design for permanent or portable structures shall be in accordance with sound engineering principles. Pressure treatment requirements shall be accordance with criteria in NRCS conservation practice standard, Waste Storage Facility, Code 313.

Fabric. Mesh shade cloth shall be constructed of high-quality polypropylene fabric or similar materials and shall be recommended by the manufacturer to be suitable for this use. The cloth shall provide at least an 80% shade level and

be made with ultraviolet light (UV) protective materials. The edges of the fabric shall be taped and/or sewn to not unravel and grommets shall be installed on the edges of the cloth at maximum intervals of 2 feet.

The shade cloth shall be adequately secured to the shade cloth frame with UV protected polypropylene rope or other equivalent methods so as to provide adequate and even tension on the fabric in accordance with the manufacturer's recommendations.

CONSIDERATIONS

- The recommended shade area per head of livestock is shown in Table 1:

- The manufacturer typically warrants the cloth for at least 5 years. Replacement of the cloth may be necessary during the life of the structure.

- Tie-down of portable structures at the four corners is recommended for protection.

- Removal and storage during the winter months can extend the life of the shade cloth.

- Consider the use of fabric designed to allow wind to easily pass through the fabric while still providing shade.

- Construct the bottom of portable structures with skids to make relocation easier.

- Consider applying NRCS conservation practice standard, Heavy Use Area Protection, Code 561, where vegetation cannot be maintained underneath the shade structure.

- Shade structures will have a minimal or no affect on the water budget.

- The shade structure should have an overall positive impact on water quality by reducing the cattle loafing times in riparian areas.

- Due consideration should be given to economics, the overall waste management system plan, and safety and health factors.

PLANS AND SPECIFICATIONS

Plans and specifications for livestock shade structure shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purposes. Plans and specifications shall include construction plans, drawings, job sheets or other similar documents. These documents shall specify the requirements for installing the practice, including the kind, dimensions, amount, material coatings, and quality of materials to be used.

OPERATION AND MAINTENANCE

- Shade cloth should always be kept tight so that it will not be damaged by wind.
- Replace the cloth when it has deteriorated due to environmental conditions.
- Maintenance coatings may need to be replaced on the structural steel components.
- Portable structures should be moved periodically to prevent destruction of vegetation in the immediate area.

REFERENCES

NRCS Texas Conservation Practice Standards

[Heavy Use Area Protection - Code 561](#)

[Waste Storage Facility - Code 313](#)

