NATURAL RESOURCES CONSERVATION SERVICE
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

This practice applies to areas:

- Where animal productivity and well being is adversely affected by heat generated from sunshine; or
- Where livestock are excluded from natural shade along stream banks or other water courses.

CRITERIA

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

General. Portable livestock shade structures are preferred and are made to be moveable with farm equipment. As an alternative, the structures can be made permanent if a proper location is available. The structure(s) shall be sized to meet the needs of the livestock operation but shall not be less than 80 percent 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 feet from any surface water, at least 150 feet from an up-gradient well, and at least 300 feet 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 feet 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.

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

Steel Structural Members. The main structural members shall be constructed of 2-inch minimum, nominal diameter steel pipe meeting or exceeding the requirements of ASTM A-53 for Schedule 40 pipe (wall thickness of 0.154 inch). Longitudinal members of the top frame shall be constructed of 1 ¼ inch minimum nominal diameter steel pipe meeting or exceeding the requirements of ASTM A-53 for Schedule 40 pipe (wall thickness of 0.140 inch). 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 feet in the longitudinal direction and 15 feet in the traverse direction. The length of vertical members shall not exceed 12 feet except that length may be increased to 13 feet to provide slope (pitch) to the top of structure. A minimum height of 7 feet shall be provided for a swine shade structure. A minimum height of 8 feet 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 ¾ inch diameter steel bar, 1 ¼ inch 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, ¼-inch 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 Arkansas 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 percent 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, elastic straps, or other equivalent methods so as to provide adequate and even tension on the fabric in accordance with the manufacturer's

recommendations. Structural support under the fabric is necessary to prevent oscillating damage from wind.

CONSIDERATIONS

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

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
Small ruminant	8

- The manufacturer typically warrants the cloth for at least five 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 Arkansas 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.
- Shade cloth should be at a height to prevent animals from reaching it.

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 against structural supports 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 placed on the structural steel components.
- Portable structures should be moved periodically to prevent destruction of vegetation in the immediate area.

REFERENCES

Arkansas NRCS Conservation Practice Standards

Heavy Use Area Protection - Code 561
Waste Storage Facility - Code 313