

NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD

LIVESTOCK SHADE STRUCTURE

(No.)  
Code 717



**DEFINITION**

A portable, metal frame structure with a mesh fabric roof to provide shade for livestock.

**PURPOSE**

To provide shade areas for livestock, thereby protecting surface waters from pollution and 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**

**Laws and regulations.** Plan and design the livestock shade structure to comply with all

Federal, state, and local laws and regulations. Waste management systems may need to be approved or permitted by the Florida Department of Environmental Protection.

Evaluate and avoid or minimize impact to cultural resources, wetlands and Federal and state protected species to the extent practicable during planning, design and implementation of this conservation practice in accordance with established National and Florida policy, General Manual (GM) Title 420-Part 401; Title 450-Part 401, Title 190-Parts 410.22 and 410.26, National Planning Procedures Handbook (NPPH) Florida Supplements to Parts 600.1 and 600.6, National Cultural Resources Procedures Handbook (NCRPH), National Food Security Act Manual (NFSAM), and the National Environmental Compliance Handbook (NECH).

**Orientation.** If it is desirable for the area to be kept dry, orient the longest axis in a 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, orient the shade structure long axis east to west.

**Protection.** Design the top of the structure 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. Tie-down of the structure at the four corners is recommended.

**Shade requirement.** The recommended shade requirement is shown in Table 1.

Limit maximum size of individual units to 25 feet by 50 feet.

For high-producing animals, provide shade for at least 75% of the herd in controlled grazing systems, particularly for dairy or beef cows.

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

Table 1 – Recommended Shade Requirements

Animal Type	Recommended Shade Requirement	
	Area (ft <sup>2</sup> /head)	Height (ft)
Dairy or beef	15	10 – 12
Swine	15 - 20	7

**Location.** Locate the structure to be a minimum of 50 feet from any type structure that could be an obstruction to the circulation of air and to create desired livestock travel patterns. Move the structure as needed to prevent destruction of vegetation in the immediate area.

Locate the livestock shade structure a minimum of 150 feet from any surface water bodies. If there is a good riparian zone established this distance may be reduced to 80 feet.

**Materials.** Plan, design, and construct the structure to be of durable materials that commensurate with an anticipated life of 10 years.

**Structural Members.** Construct the main structural members of 2 inches minimum, nominal diameter steel pipe meeting or exceeding the requirements of ASTM A-120 for Schedule 40 pipe (wall thickness of 0.15411 inch). Construct the longitudinal members of the top frame of 1-1/4 inches minimum nominal diameter steel pipe meeting or exceeding the requirements of ASTM A-120 for Schedule 40 pipe (wall thickness of 0.140 inch). For all structural members, use galvanized or otherwise protected with suitable protective paint coatings including a primer coat and two or more final coatings materials. Wire brushed and paint with at least two coats of zinc dust-zinc oxide primer conforming to Federal Specification TT-P-641, Type III on all galvanized coatings damaged or destroyed by welding.

Instead of using the above protective coating, use steel pipe exceeding the requirements of ASTM A-120, Schedule 40, for 2 inches nominal diameter steel pipe and having a minimum wall thickness of 0.187 inch.

Design vertical member spacing not to exceed 19 feet in the longitudinal direction and 15 feet in the traverse direction. Do not exceed 12 feet in length for the vertical members except to provide slope (pitch) to the top of structure which the length may be increased to 13 feet.

Provide bracing at the junction of all structural members. Brace the corners of the roof frame with a 3/4 inch diameter steel bar, 1 1/4 inches minimum steel pipe or other methods providing equivalent rigidity. At junctions of vertical members with roof frame and ground frame, provide bracing by knee braces of equivalent section to the main members, 1/4 inch gusset plates or other methods providing equivalent rigidity. Design the steel structural shapes, plates, and bars to meet the requirements of ASTM A-36. Design all welding to be continuous and conform to the code for welding in Building Construction, American Welding Society, AWS D1.0-63 for the type of weld used. Ensure the weld to be suitable for the steel and the intended service.

**Fabric.** Ensure mesh shade fabric to be suitably constructed of high quality materials and as recommended by the manufacturer to be suitable for this use. Specify the mesh fabric to provide a minimum of 70 to 80 percent shade.

Ensure polypropylene fabric or similar materials that are highly resistant to outdoor exposure to meet or exceed the requirements in Table 2.

Secure the shade fabric shall be to the structural steel members so as to provide adequate and even tension on the fabric in accordance with the manufacturer's recommendations.

Table 2 - Requirements for Shade Structure Fabric

Properties	Requirements	Test Method
Tensile Strength, lbs.	175 x 110	ASTM D-1682
Burst Strength, psi	300	ASTM D-751
UV Resistance Strength Retention, %	80 after 1200 hours of exposure	Federal Test Method Standard No. 191, Method 5804
Shade Level, %	73	ASTM D-1494
Weight, oz/yd <sup>2</sup>	4.2	ASTM D-1910

## CONSIDERATIONS

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

Consider that the shade structure should have an overall positive impact on water quality by keeping animals from open water bodies and using proper construction pollution prevention measures.

Consider the economics, the overall waste management system plan, and safety and health factors.

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

Consider removing and storing the shade structures during winter months to extend the life of the shade cloth.

Consider removing and storing the shade structures during hurricanes, if not tied down.

## PLANS AND SPECIFICATIONS

Prepare plans and specifications for livestock shade structure to be in keeping with this standard. Describe in the plans and specifications the requirements for applying the practice to achieve its intended purposes.

Include in the plans and specifications construction plans, drawings, job sheets or other similar documents. Specify in these documents the requirements for installing the practice, including the kind, dimensions, amount, material coatings, and quality of materials to be used.

As a minimum, include in the plans and specifications:

- The location of the shade structures.
- Typical detail showing the dimensions.
- Typical detail showing the material used, size, type of shade cloth.

- Location of utilities and notification requirements.

## OPERATION AND MAINTENANCE

Prepare an operation and maintenance (O&M) plan for the operator. The minimum requirements to be addressed in the O&M plan are:

- Maintain the tension on the shade fabric to realize its life expectancy.
- Replace maintenance coatings on the structural steel components.
- Turn down hooks attached to the narrow ends on each side of the structure when not being towed so not to damage the animals feet.
- Move portable structures periodically to prevent destruction of vegetation in the immediate area.

## REFERENCES

- ASTM A-36, A-120, D-751, D-1494, D-1682, D-1910
- Federal Specification TT-P-641
- Federal Test Method Standard No. 191, Method 5804
- Florida NRCS Conservation Practice Standard, Heavy Use Area Protection, Code 561
- General Manual (GM)
  - Title 420-Part 401
  - Title 450-Part 401
  - Title 190-Parts 410.22 and 410.26
- National Cultural Resources Procedures Handbook
- National Environmental Compliance Handbook
- National Food Security Act Manual
- National Planning Procedures Handbook
  - Florida Supplements to Parts 600.1 and 600.6