

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

This practice may be applied as part of a resource management system to provide shade areas for livestock, thereby protecting 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

Laws and regulations. Planned work shall 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.

Orientation. If it is desirable for the area to be kept dry, the longest axis should be oriented 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, then an east to west orientation of the long axis is desirable.

Protection. The top of the structure should 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. Tie-down of the structure at the four corners is recommended.

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

Table 1 – Recommended Shade Requirements

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

Maximum size of individual units shall be limited to 25 feet by 50 feet.

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

Location. The structure shall be a minimum of 50 feet from any type structure that could be an obstruction to the circulation of air and shall be

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located to create desired livestock travel patterns. The structure shall be moved as needed to prevent destruction of vegetation in the immediate area.

The livestock shade structure shall be 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. Planning, design, and construction shall ensure the structure is sound and of durable materials that commensurate with an anticipated life of 10 years.

Structural Members. The main structural members shall be constructed 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). Longitudinal members of the top frame shall be constructed 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). All structural members shall be galvanized or otherwise protected with suitable protective paint coatings including a primer coat and two or more final coatings. Galvanized coatings damaged or destroyed by welding shall be thoroughly wire brushed and painted with at least two coats of zinc dust-zinc oxide primer conforming to Federal Specification TT-P-641, Type III.

An exception to the use of the above protective coating would be to 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.

Vertical member spacing shall not exceed 19 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.

Bracing shall be provided at the junction of all structural members. The corners of the roof frame shall be braced 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, bracing shall be provided by knee braces of equivalent section to the main members, 1/4 inch gusset plates or other methods providing equivalent rigidity. Steel structural shapes, plates, and bars shall meet the requirements of ASTM A-36. All welding shall be continuous and shall conform to the code for welding in Building Construction, American Welding Society, AWS D1.0-63 for the type of weld used. The weld shall be suitable for the steel and the intended service.

Fabric. Mesh shade fabric shall be suitably constructed of high quality materials and shall be recommended by the manufacturer to be suitable for this use. The mesh fabric shall provide 70 to 80 percent shade.

Polypropylene fabric or similar materials that are highly resistant to outdoor exposure are acceptable cover material and shall meet or exceed the requirements in Table 2.

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

CONSIDERATIONS

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

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.

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 ²	4.2	ASTM D-1910

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

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

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

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

It is necessary to maintain the tension on the shade fabric to realize its life expectancy.

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

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

NRCS Conservation Practice Standard, Heavy Use Area Protection, Code 561