

CONSTRUCTION SPECIFICATION

LIVESTOCK SHADE STRUCTURE

1. Scope

This specification covers the planning, materials, and installation of livestock shade structures.

2. General

Livestock shade structures shall 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. To the maximum extent practicable, structures should be planned to be shared among paddocks with varying locations to better spread nutrients and prevent destruction of vegetation in immediate area.

3. 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. Tie-down four corners of structure(s) using cables and anchors. Anchors shall be screw-type or stakes. Stakes should be no less than 18 inches in ground.

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

4. Location

The structure shall be located on a well-drained site, and as far as practicable but no less than 200 ft. from any surface water, at least 150 ft. from an uphill well, and at least 300 ft. from a downhill well. The structure shall be located a minimum of 50 ft. from any type structure that could be an obstruction to the circulation of air. Shade 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.

5. Structural materials

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

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- ¼ 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.

Bracing shall be provided at the junction of all structural members. The corners of the roof frame shall be braced with a ¾ -in. diameter steel bar, 1-¼ 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, ¼ -in. gusset plates or other methods providing equivalent rigidity. All welding shall be continuous, professionally completed, and suitable for the material used.

6. 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

7. Shop Fabrication

Shop fabrication of structural elements may be performed for easy field assembly in lieu of welding. All such fabrication shall permit assembly of the structure to have strength equal to that of a continuously welded structure. All such fabricated-members shall be joined by no less than two ½ -inch machine bolts with connecting members being no less than double pipe thickness or 3/8 - inch steel plate. The designer shall approve plans for such fabrication.

8. Construction Tolerance

Structural dimensions and materials used shall be documented in writing. Minor construction tolerances may be accepted by the person responsible approving the construction.

9. Recommended Shade Requirement

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

10. Other Recommendations

- The shade structure should have an overall positive impact on water quality by reducing the cattle loafing times in riparian areas.
- Shade fabric should be kept tight to prevent wind damage. Heavy “bungee cords” work well, but may require more frequent maintenance/replacement.
- Consider the use of fabric designed to allow wind to easily pass through the fabric while still providing shade.
- Removal and storage during the winter months can extend the life of the shade cloth.
- 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.

11. Documentation

Plans and specifications shall be in keeping with this specification and include plan map, standard 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.