NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

GRAZING LAND MECHANICAL TREATMENT

(Acre)

CODE 548

DEFINITION

Modifying physical soil and/or plant conditions with mechanical tools by treatments such as pitting, contour furrowing, and ripping or subsoiling.

PURPOSE

- Fracture compacted soil layers and improve soil permeability
- Reduce water runoff and increase infiltration
- Break up sod bound conditions and thatch to increase plant vigor
- Renovate and stimulate plant community for greater productivity and yield

CONDITIONS WHERE THIS PRACTICE APPLIES

This standard may be applied on pastureland, rangeland, grazed forest, and native pastures where the slopes are less than 30 percent with accelerated runoff and limited moisture penetration and/or on areas where the vegetative health or vigor due to soil condition is undesirable.

CRITERIA

General Criteria Applicable To All Purposes

Mechanical treatments such as contour furrowing, pitting, ripping or subsoiling shall be designed and applied in a manner to accomplish the desired objectives and address the natural resource concerns. These treatments shall be limited to soils and slopes where surface disturbances will not result in unacceptable levels of soil erosion, sedimentation, or bring large rocks to the soil surface.

Areas to be treated will be relatively free of undesirable or noxious plants that are likely to increase because of surface disturbance. Should undesirable or noxious plants increase following treatment, pest management by timely application of herbicides, mowing, or flash grazing may be required. Refer to the Oklahoma NRCS Practice Standard and Specification for Pest Management (595) for information and guidelines on the control of competing or undesirable vegetation.

Sufficient desirable species should be present that have a potential for increasing in the plant community as a result of the mechanical treatment and subsequent management. Desirable forage species will be of sufficient quantity and have a distribution pattern that allows the plants to take advantage of the improved moisture and spread into disturbed areas. Where the density of desired grasses is such that seeding or replanting is required, refer to the Oklahoma NRCS Practice Standards and Specifications for Range Planting (550) or Pasture and Hayland Planting (512).

Adequate rest from grazing will be applied to ensure desired plant responses from this treatment for all grasses except introduced sod pastures (See Aeration and Plugging for grazing management on sod pastures). Generally, the treated area will be deferred from grazing from the date of application until frost in the application year, and from March 15 to November 1 the following year if needed for vegetative recovery. If treated areas are included within a prescribed grazing system which ensures adequate periods of rest and light to moderate utilization to improve plant vigor, then no season-long deferment is required.

This practice will not alleviate the negative effects of poor grazing management. Implementation of

a prescribed grazing plan is essential in achieving the desired effects of this practice. A prescribed grazing plan must be initiated at the time of practice installation. Refer to the Oklahoma NRCS Practice Standard and Specification for Prescribed Grazing (528) for further information on grazing management.

All treatments should be planned on the contour when conditions warrant.

The application of this practice has the potential to impact buried underground utilities. Follow national policy and state operating procedures in checking for underground utilities prior to treatment.

If the selected mechanical treatment will exceed the depth of prior ground disturbance, this activity could affect buried cultural resources. If application of this practice will impact cultural resources, follow NRCS national policy and state operating procedures for identifying cultural resources.

Mechanical treatments will not impede trafficability and should not cross roads, trails, natural drainage ways, emergency fire lanes, or stock loafing areas. However, this practice can be used to control unwanted vehicular traffic. Desirable vehicle travel lanes destroyed during practice installation can be re-established by disking.

Soil mineralogy and soil conditions will be evaluated to ensure that the desired effects will result from the application of this practice. This practice will generally be applied in the spring. Mechanical treatments will be done when soil moisture is adequate to allow opening of the sod, but limited enough to prevent compaction (less than 30% of field capacity). This is when the soil is slightly moist and forms a weak ball with defined finger marks.

Treatments will not be applied when the soils are excessively wet, frozen or snow covered. This practice applies to fine, medium, or moderately coarse textured soils having few or no stones in the upper profile, or on soils with a claypan present. Fine textured soils will clod excessively if conditions are too dry and compact if conditions are too wet. Stony soils will damage equipment and leave very rough surface conditions.

All work performed under this standard shall comply with state, federal, and local laws and regulations.

Aeration and Plugging

Aeration or plugging may be used only on sod forming grasses and should be planned to coincide with fertilizer and/or irrigation applications.

Aeration and plugging is most applicable on sites where soil surface compaction resulting from livestock or equipment traffic is creating accelerated runoff and retarded water infiltration.

Aeration with spike or blade type aerators may be applied to pastureland as needed, but not more than two times a year. On implements that allow pitch on the knife gangs, care will be taken to limit disturbance to less than 50 percent of the existing cover.

Timing of treatments will vary depending on soil type, soil moisture, and vegetation conditions. Treatments will be done when damage to plants will be minimal and plant response will be quickest.

Due to the large variety of equipment available to perform this treatment, depth of treatment will vary depending on the specific piece of equipment used. Depths will range from 4 - 22 inches, but will average around 8 inches for most equipment.

Grazing deferment requirements will follow the minimum guidance listed as "Plant height to start grazing" contained in the Oklahoma NRCS Practice Standard and Specification for Prescribed Grazing (528).

Aeration and plugging is limited to areas of not more than 20 percent slopes.

The following methods; Contour Furrowing, Pitting, Disking, Chiseling, and Deep Ripping, are not commonly used in Oklahoma. There is little or no research in Oklahoma to support these methods. It is recognized that certain methods may have merit in the far western part of the state or in the panhandle, based on research from other parts of the country. The following is provided and described for guidance only.

Contour Furrowing

Contour furrowing is most applicable on moderately fine, medium and moderately coarse textured soils with less than 20 percent slopes.

Furrows shall be constructed on the contour. The horizontal interval will be spaced to no more than 1.0 foot of vertical interval, not to exceed 10 feet. The horizontal interval should be decreased as average rainfall increases. Dams to control erosion will be created within each furrow by lifting the equipment out of the ground for a short distance at random intervals. Dam spacing will be from 10 - 15 foot random intervals. Depth of furrows will be from 3 - 6 inches with a width of 6 – 12 inches.

Do not perform this practice when the ground is frozen.

Pitting

Pitting, a series of small basins can be considered as an alternative to contour furrowing. It is most applicable on sites where the soil surface characteristics exhibit a condition that allows accelerated runoff and prevents or retards water infiltration.

Pitting is limited to fine and medium textured soils with few stones in the upper part of the profile and where slopes do not exceed 20 percent.

Implements used in pitting are of two general types, the eccentric disk, and the spike tooth or rotary pitter.

Pits made with the eccentric disk are usually 2 - 6 feet long, 6 - 12 inches wide, 3 - 6 inches deep, and spaced 16 - 42 inches apart.

Pits made with the spike tooth or rotary pitter is usually 10 - 18 inches deep, spaced 3 - 6 feet apart.

Disking

Disking is most applicable on sites where vegetation composition is the concern due to soil compaction. Disking only applies to plants that will make a quick recovery following treatment such as bermudagrass, weeping lovegrass, or old world bluestems.

Suitable equipment includes offset disk, one-way plow, or similar equipment.

Depth of disking will be 4 - 6 inches and is limited to areas of not more than 10 percent slopes.

Provide sufficient plant nutrients, grazing management, and pest management for recovery. Refer to the Oklahoma NRCS Practice Standards and Specifications for Nutrient Management (590), Pest Management (595), and Prescribed Grazing (528) for more information.

Chiseling

Chiseling may be used on sites where vegetation composition is the concern because of soil conditions, and improvement of the desired plant community can be accomplished by chiseling. Chiseling for this concern is limited to areas of not more than 20 percent slopes.

Suitable equipment for chiseling is a chisel plow, preferably with twisted shanks.

Chiseling operations should be done in a manner that will shatter restrictive layers with a minimum of surface disturbance. To minimize disturbance in sod pasture, it may be desirable to run a coulter ahead of each chisel. Application of this practice should not destroy the turf nor disturb more than 50 percent of the existing plants. Sod-forming grasses can generally be chiseled on a closer spacing than bunch grasses.

Depth of the chiseling treatment should be determined by finding the depth of the most restrictive soil layer but will generally be from 6 - 10 inches. On shallower soils the majority of the A and B horizons should be fractured. Extremely rocky soils shall not be treated.

Spacing between chisels will be 2 - 3 feet apart. This practice is not applicable where excessive density of trees and shrubs exist and where the roots would impede the proper use and safety of the equipment.

Deep Ripping

Deep ripping is most applicable on sites where soil compaction and/or restrictive layers are too deep to be mediated with chiseling.

Suitable equipment for deep ripping includes a construction ripper or agricultural type subsoiler.

Depth of treatment will be from 10 - 30 inches.

Spacing between the rippings will be 3 - 4 feet apart.

This practice is not applicable where excessive density of trees and shrubs exist and the roots would impede the proper use and safety of the equipment.

Deep ripping is limited to areas of not more than 20 percent slopes that are not rocky.

CONSIDERATIONS

At least 50 percent of the existing undesirable vegetation may be destroyed with this practice. If the combination of other practices such as fertility, pest management and grazing management is not
sufficient to restore the desired plant community, then replanting practices should be utilized. Oklahoma NRCS Practice Standards and Specifications for Range Planting (550) and Pasture and Hayland Planting (512) may be used in conjunction with Grazing Land Mechanical Treatment.

Resident wildlife needs and requirements should be considered when planning this treatment. Small birds often use treated areas for nesting sites and other birds such as prairie chickens or pheasants will use contour furrows as travel lanes.

Drought following treatment, low vigor of desirable grasses, or other abnormal conditions may require extension of the grazing deferment beyond the minimum stated above. The protection period should be extended beyond the original dates whenever the situation warrants.

Time of year, depth, and spacing of treatment will be considered when planning this practice on wet surface soils with traffic pans.

Addition of commercial fertilizer, animal waste, and other soil amendments may be done in conjunction with this practice. Refer to the Oklahoma NRCS Practice Standard and Specification for Nutrient Management (590) for further information and guidelines.

Mechanical treatments should not be considered within watersheds where soil-laden runoff water is captured in a reservoir.

Increased surface roughness may make the treated area undesirable for some uses. Mechanical treatment may not be desirable on areas to be used for recreation, for example, due to surface roughness.

Investigate for compacted layers with a probe or other appropriate tool prior to treatment.

Investigate for tile drainage systems, pipelines and other buried structures prior to work.

To help ensure uniform utilization by livestock, apply this practice to as many acres as possible within a given grazing unit (pasture, paddock).

Consideration should be given to the client's economic resources and natural resource objectives when applying this practice. Generally, the value of the expected improvement in forage production should be adequate to justify the cost of mechanical treatment and deferment.

PLANS AND SPECIFICATIONS

When planning this practice, the specifications for installation will be customized for each site or planning unit according to the criteria and operation and maintenance of this standard. Specifications shall be recorded in/on a treatment plan, specification sheets, job sheets, narrative statements in conservation plans, or other acceptable forms or documents needed to communicate with the client.

The following list of items will be considered and recorded as minimum documentation when planning this practice:

Location - Field numbers, and map or sketch of areas planned for treatment or excluded from treatment

1. Soils / Ecological Site
2. Similarity Index (Native)
3. Pasture Condition (Introduced)
4. Slope
5. Extent in acres and how determined
6. Objectives of the practice
7. Density of desirable plants (# of plants per square foot)
8. Planned installation date
9. Planned treatment type or method
10. Planned equipment
11. Dam spacing and depth, width, and horizontal interval of furrows if contour furrowing
12. Depth, width, length and spacing of pits if pitting
13. Number of operations, depth of tillage and percent of vegetation destroyed if disking
14. Depth and spacing if chiseling
15. Depth and spacing if deep ripping
16. Average depth of treatment and estimated percent disturbance if aerating or plugging
17. Prescribed grazing plan / livestock deferment

18. Other useful information
19. Date and signature of conservationist

OPERATION AND MAINTENANCE

Implementation of an effective prescribed grazing plan will assist in the long term operation and maintenance of this practice. If the desired effects of this practice are lost over time, the practice may need to be repeated.

REFERENCES AND OTHER READING MATERIAL

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