NATURAL RESOURCES CONSERVATION SERVICE
MONTANA CONSERVATION PRACTICE SPECIFICATION

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 chiseling, ripping or subsoiling.

PURPOSE:

- Fracture compacted soil layers and improve soil permeability.
- Reduction in water runoff and increased infiltration.
- Break up root-bound conditions and thatch to increase plant vigor.
- Renovation and stimulation of the plant community for greater productivity and yield.

CONDITIONS WHERE PRACTICE APPLIES: This standard may be applied on pastureland, rangeland, grazed forest and native pastures **where the slopes are no greater than 15 percent.**

SPECIFICATIONS APPLICABLE TO ALL TREATMENTS: A Grazing Land Mechanical Treatment plan shall include the following information:

1. Location–Field numbers and map or sketch of areas treated and areas excluded.
2. Acres and how determined.
3. Site condition including soils, ecological sites, slope, species composition, similarity index, canopy cover, and production of existing vegetation.
4. Desired and expected vegetation composition and production after treatment.
5. Method of treatment and type of equipment.
6. Date(s) of practice application.
7. Spacing, width, and depth of treatment.
8. Planned percent control of undesirable target vegetation.
9. Soil protection provided during establishment period.
10. Special considerations.
11. Date and signature of planner and producer.

Refer to **TABLE 1. Guide to Mechanical Treatment Selection by Dominant Ecological Site** to determine the most appropriate treatment for site conditions and resource concerns.

SPECIAL CONSIDERATIONS:

- NRCS Area or State Biologist should be consulted before implementation of this practice to determine the effects of this practice on key wildlife habitat (e.g., sage grouse nesting sites). Consultation with the local Montana Fish, Wildlife and Parks biologist is encouraged.

- Keep in mind that making positive changes in grazing management on some sites to improve forage production – for example changing season of use and longer recovery periods for individual pastures in the short term (over a 3-5 year period) – may prevent the immediate need for grazing land mechanical treatment.

- Pre-treatment plant communities may show no annual bromes in the stand or low percentages of annual bromes, however, when the soil is mechanically disturbed, annual brome seed that is present in the seed bank may germinate at much higher densities than pre-treatment levels.

- Drought following treatment, low vigor plants or other conditions may require extended recovery periods for the desirable forage species. The producer will be encouraged to extend the grazing deferment period whenever the situation is warranted.

- If the treated area is used for dormant season grazing, or as a feeding area, care must be taken not to compact the soil or damage plant crowns of desirable grasses, especially during the first two years following treatment.

- Optimum treatment dates are during late fall or early spring when moisture conditions are adequate.

- For best results inspect the site for desired grasses – this would include at least one key rhizomatous forage plant per square yard over the majority of the area to be treated. This practice will stimulate more rhizomatous tillering of western wheatgrass and other rhizomatous species.

- Mechanical treatments shall not interfere with trafficability, such as emergency fire lanes.

- Use of harrows such as spring-tooth, spike-tooth or large tires may be used to minimize soil roughness across the treated acres.

- The value of the expected improvement in forage production must be sufficient to justify the costs of mechanical treatment and grazing deferment.

- In some areas mechanical treatments may not be desirable in areas where runoff is captured to store water in a reservoir.

- Clip weeds or apply herbicides, if necessary, to control undesirable vegetation following treatment. Refer to Field Office Technical Guide (FOTG), Section IV, Practice Standard and Specification, Herbaceous Weed Control (Code 797).

- Compliance with all applicable federal, state, tribal, and local laws and regulations, including permits, permissions, or notifications is required.

ADDITIONAL SPECIFICATIONS APPLICABLE TO RENOVATION OF SEEDED PASTURE OR TAME HAYLAND:

- Disking or other types of prior approved renovation.

- Suitable equipment includes offset disk or other equipment approved on a case-by-case basis.

- Operations will be on the approximate contour.

- Two operations may be required for adequate results. If two operations are used, the last operation will be done on the contour.

- Depth of treatment will be from 1-3 inches.

ADDITIONAL SPECIFICATIONS APPLICABLE TO CONTOUR FURROWING AND CONTOUR SCALPING:

- Equipment to be used is a modified lister plow, with or without seeder.

- Furrows will be constructed on the approximate contour. Natural dams to control erosion will be left within each furrow by lifting the machine out of the ground for a short distance at random intervals, not to exceed 300 feet.

- Contour furrows will be at a depth of 4 to 10 inches.

- Contour scalping will be at a depth of 2 to 4 inches. Scalping width will be 18 to 28 inches.

- Furrows must be at least 6 inches and not more than 30 inches wide.

- Spacing between contour furrows should be based on the size of the furrow cross section (furrow depth x width):

  - 12–16 inch cross section: ≤ 2 feet

  - 17–25 inch cross section: ≤ 3.5 feet

  - 26–48 inch cross section: ≤ 5 feet.

- Spacing is correct if the sod removed from the furrows covers the majority of the area between them.

- On exceptionally low condition rangelands, seeding into the furrows may be desired. Refer to the Field Office Technical Guide (FOTG), Section IV, Practice Specification, Range Planting (Code 550) for details on seeding.

ADDITIONAL SPECIFICATIONS APPLICABLE TO PITTING:

- Suitable equipment includes a modified disk plow with pitter, rotary drum pitter, or rotary subsoiler.

- Pits will be approximately 16 inches apart and not less than 3 inches deep.

ADDITIONAL SPECIFICATIONS APPLICABLE TO CHISELING:

- Equipment will be standard chisel plow having straight chisel shanks, twisted shanks, or 6-inch shovels (sweeps). (Refer to **TABLE 1.**)

- Depth of treatment will be from 4 to 6 inches deep.

- Distance between chisels shall not exceed 18-inch centers. (Centers from 12 to 14 inches are preferred.)

- Optimum treatment dates are during late fall or early spring when soil moisture conditions are adequate.

- No seeding is recommended with this treatment.

ADDITIONAL SPECIFICATIONS APPLICABLE TO DISKING OR OTHER RENOVATION:

- Suitable equipment includes offset disk, chisel plow with twisted shanks, or similar equipment.

- Operations will be on the approximate contour.

- Two operations may be required for adequate results - second pass at a steep angle to the first pass.

- Depth of treatment will be from 4 to 6 inches.

- At least 50 percent of the existing undesirable vegetation should be destroyed.

- Re-seeding would be optional with this treatment, but is not recommended.

ADDITIONAL SPECIFICATIONS APPLICABLE TO DEEP RIPPING:

- Suitable equipment includes a construction ripper or agricultural type subsoiler capable of penetrating the soil to a depth of at least 16 to 20 inches.
- Operations will be on the approximate contour.
- Spacing between the ripping will not exceed 4 feet.

TREATMENT MANAGEMENT:

- The treated area will have complete protection from grazing by domestic livestock from the date of treatment until October 1 during the first year and from green-up (~April 15) to October 1 the following year. Additional deferment or rest may be needed depending on results.
- Field Office Technical Guide (FOTG), Section IV, Practice Specification , Prescribed Grazing (Code 528) will address a short-term prescribed grazing strategy and a long-term prescribed grazing strategy:
  - A short-term prescribed grazing strategy will address how the loss of acres (for grazing) due to deferment or rest of treated pastures will alleviate any harmful effects from livestock grazing which may potentially occur to untreated pastures.
  - A long-term prescribed grazing strategy will be developed to include pastures where the treatment occurred as well as for other untreated pastures that would be part of a grazing management unit (e.g. where one herd would typically graze through multiple pastures during the growing season or for a significant portion of a growing season).

TABLE 1. Guide To Mechanical Treatment Selection by Dominant Ecological Site [1/]

	Rangeland Ecological Site						
Vegetation or Soil Problem	**Claypan**	**Clayey**	**Dense Clay [2/]**	**Loamy**	**Shallow [3/]**	**Sandy**	**Overflow**
Blue grama and/or clubmoss sod	A4, A2, A1, A3, C1, C2, D1, D2	A3, A2, A1, B1, B2, D1, D2	N/A	A3, A2, A1, B1, B2, D1, D2	A3, A2, A1, B1, B2, D1	A3, A2, A1, D1, D2	A1, A2, A3, D1, D2
Claypan present	A4, A2, A1, A3, C1, C2, D1, D2	N/A	N/A	N/A	N/A	N/A	N/A
Surface layer compaction less than 8 inches deep	A3, A2, A1, B1, B2, D1,	A3, A2, A1, B1, B2, D1, D2	A2, A1, C1, C2	A3, A2, A1, B1, B2, D1, D2	A3, A2, A1, B1, B2, D1	A3, A2, A1, D1, D2	A2, A1, A3, D1
Subsoil compaction greater than 8 inches deep	A4, C1, C2, E	A4, C1, C2, D1, D2	N/A	A4	N/A	N/A	A4, D1
Weedy or barren areas	C1, D2, D1	D1, D2, B1, C1, A2, A3, A1	A2, A1, C1	D1, D2, B1, C1	B1, C1, D1, D2	D1, D2	A2, A3, D1, D2

[1/] Treatments should be selected based on ecological site and condition, planned grazing system, available equipment, and benefit/cost ratio. The order of listed options may be changed based on local conditions.

[2/] Dense Clay ecological sites are not highly productive, so improved grazing management may be the best economical option for site improvement.

[3/] Shallow ecological sites are those with soil depth of ≤ 10 inches, and the design for this practice must be developed cautiously.

Treatment A: Chiseling at 4 to 6 inch or 6 to 10 inch depth.

No.	Equipment	No. of Operations
A1	Straight shanks	1 or 2
A2	Twisted shanks	1 or 2
A3	6-inch shovels (sweeps)	1
A4	Deep chiseling 6-10 inches	2

Treatment B: Contour scalping at 2 to 4 inch depth.

No.	Treatment
B1	Interseeded
B2	Not interseeded

Treatment C: Contour furrowing at 4 to 10 inches.

No.	Treatment
C1	Interseeded
C2	Not interseeded

Treatment D: Renovation and seeding.

No.	Treatment
D1	Two operations with chisel, then third with drill attached
D2	Disk plow and seed

REFERENCES

Clubmoss on Montana Rangelands, Montana State University, Bulletin 645, 1970.

Range Developments and Improvements, John Vallentine, Brigham Young University, 1977.

Management Plan and Conservation Strategies for Sage Grouse in Montana, Final. 2005, Montana Sage Grouse Work Group.

USDA, Natural Resources Conservation Service, Field Office Technical Guide (FOTG), Section IV, Practice Standards and Specifications:

Herbaceous Weed Control (797)

Prescribed Grazing (Code 528)

Pest Management (Code 595)

Wetland Wildlife Habitat Management (Code 644)

Upland Wildlife Habitat Management (Code 645).