TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE BOISE, IDAHO SOIL CONSERVATION SERVICE

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TN - RANGE 15

Taken from a presentation made by Jerry Lumm, Area Range Conservationist, Area II, Boise, at the State Range Workshop held at Twin Falls, Idaho, September 11 - 13, 1979. This material will be especially useful as a training aid for new and inexperienced conservationists.

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CONSERVATION PLANNING ON RANGE LAND

In order to get good visual conservation on the ground on land used for livestock grazing, SCS personnel must be able to explain to the cooperator the needs of his grass resources.

The following information is extracted from a publication by the Arizona Inter-Agency Committee published in 1972:

> The part about how plants grow and proper use covers all of the points that need to be discussed with the rancher. All new employees and others who might work on rangeland during the course of his or her career must be able to cover this material with the rancher in a smooth professional manner.
>
> Each individual will have to develop his or her own personal approach, but all of the important points covered in this material must be covered. For best results, it is advised that you do not use any set forms. The information will have a greater impact on the rancher if you use a tablet and get the information from your head.

HOW PLANTS GROW

All green plants live and grow on food manufactured primarily in their own green leaves. Ranges can flourish and soil is conserved only if the individual plants have an opportunity to make food for their own growth.

Plant food is manufactured in the green leaves, and not, as many people suppose, drawn from the soil. Because the plant's "food factory" is above ground, grazing, mowing, or clipping promptly stops production to the extent that green foliage is removed.

Carbon, hydrogen, and oxygen from the air and water make up about 95% of the plant material. Minerals from the soil make up only about 5% of plant roots, stems, seeds and leaves. The leaves take in carbon dioxide from the air through tiny openings. Energy from the sun is trapped by green pigments in the leaves. This energy makes possible the formation of sugars from oxygen and hydrogen. Plants change the sugars in the presence of mineral elements from the soil into proteins, pigments, fibers, oils and waxes.

A plant uses sugar, pigments, starch, proteins and oils to grow and reproduce itself. Animals obtain these foods when they eat the foliage and seeds.

Reserves are utilized to initiate herbage and root growth after winter dormancy and again in July after a dry May and June. When enough green leaves are available to produce more sugar than is being utilized for growth, carbohydrate reserves accumulate.

There are many studies which show the influence of different heights of herbage removal and frequency of removal. Herbage removal is usually least detrimental after the growing season when carbohydrate reserves have accumulated and root and herbage growth has ceased. This illustrates that one method of obtaining proper grazing use is not to graze too closely and to allow rest between grazing periods. The amount of rest necessary will depend on species and growing conditions.

Research shows that close grazing will cause significant reduction in yield of grasses after two years of grazing during the late spring or throughout the growing period. Vigor of a grass may be maintained when grazed early in the growing season (on firm soils) if the plants are not grazed too closely and then not grazed during the latter part of the growing season. They are then able to make herbage and root growth and recover carbohydrate reserves prior to dormancy.

Adjusting grazing so that growth requirements of range plants are met helps to insure soil conservation and productive ranges.

That happens when plants repeatedly lose their green leaves during the growing season? Since no leaves are left to carry on photosynthesis to produce new sugar supplies, the plants use foods stored in the roots and stem bases to grow more green leaves. If this process is repeated often enough, the supply of plant food becomes exhausted and the plant dies. Excessive removal of herbage also stops root growth, removes seed producing stems, and removes top growth which protects the tender basal buds from temperature extremes.

Most range plants can tolerate some degree of use and still maintain themselves as a part of the range plant community. The degree of safe use depends on such factors as kind of soil, condition of range, season of use, degree of slope, etc. Safe use of plants in good condition grazed during the growing season is about 50%. However, if ranges are not in good condition, safe use is much lower and periodic rest is required.

Close grazing year after year during the period when the plants are actively growing reduces plant vigor. Top growth that is kept small cannot feed a large root system, neither can a stunted root system supply enough minerals and water to support a large growth of stems and leaves.

The efficiency in the use of moisture (pounds of grass per inch of water) by the properly-grazed species is significantly increased as these plants are maintained in a good, vigorous condition. A healthy plant is an efficient plant. Weak plants are less productive, damaged more by drought conditions, unable to withstand extremes in temperature, and more susceptible to disease and insects.

Properly grazed species use of moisture (pounds of grass per inch of rainfall) is more efficient than overgrazed plants.

Studies show that herbage removal usually affects root growth. One such study showed that by reducing above ground growth in 10% increments, root growth was likewise reduced. These studies indicate that no level of harvesting, not even the lightest, encourages root production. For example, root growth was stopped completely for 17 days after removal of 90% of the top and for 12 days after removal of 80% of the top.

The only food available to a range plant is that which is synthesized in the photosynthetic processes. Much of this food is used by the plant in processes of assimilation and respiration. The plant can grow and store food only if there is a surplys accumulated in the tissues or organs of the plant for use at such times as total energy used exceeds

that which is produced. In order for a range forage plant to remain productive and maintain essential food reserves (vogor) and compete successfully with other plants in the community, the average demand for energy must not exceed the average rate of production or that which is in reserve. A basic understanding of this process is essential to the establishment of grazing practices which will maintain or improve the productivity of desirable species. Plants grazed closely during periods of critical growth (periods when the energy demands are high) weakens the plant, causing a loss of production, and if continued over a period of years, the plant invariably dies.

When a plant dies, that space may be quickly occupied by another plant or the soil may remain bare. Usually the replacement plant has one of the following characteristics:

> Is less palatable (at least during the period the former plant was grazed), escapes close grazing by growing near the ground, is protected by spines, etc., coarse or woody, and thus resisting grazing, or, an annual which can perpetuate itself by producing an abundant seed crop.

See Exhibit #1 for How to Grow Plants

Steps in Developing the Advanced Conservation Ranch Plan

Planning

The probability of securing effective conservation of range resources depends entirely upon how well operators understand the fundamental principles and benefits of conservation. It is necessary, therefore, that conservation plans for range land be prepared by technician and operator, and that essential features be given joint consideration while they are going over the operating unit together.

A. Once an operator has requested assistance, the ranch planner should do the following:

   1. Find out what is known about the prospective cooperator and his operations.

      a. Farming or ranching experience on present holdings.
      b. Owner, operator, lessee, or manager.
      c. Kind of operating unit.

         (1) Straight ranching.
         (2) Farming and ranching.
         (3) Kind and class of livestock run.

   2. Rancher objectives and personal interest.

   3. Rancher's knowledge of soil conservation program.

      a. Soil conservation district operations.
      b. Soil.
      c. Vegetation.
      d. Livestock and range management.
      e. Soil and water conservation practices.

B. Select planning materials needed.

   1. Aerial photograph of ranch holdings.

   2. Technical Guide - range site descriptions, soil information, etc.

C. Make definite date with operator to go over the ranch; also determine time required.

D. Ask operator to review past and future plan of management.

1. Kind and size of unit.

2. Acres under different kinds of land use.

3. Crop acreage and crop yields.

4. Kind and class of livestock.

5. Systems of grazing.

6. Number and size of pastures.

7. Physical developments; fences, stock water, etc.

8. Future plan of operation.

Consideration of Farm or Ranch Resources in the Field with Operator (Planner should be accompanied by the person responsible for putting the plan into effect. This person may be the owner, operator, manager, or foreman).

A. Forage resources.

1. Check key range vegetation (only most important plants).

   a. Climax plants, decreasers, and increasers.
   b. Invading plants.

2. Show him how to distinguish important range plants at different seasons of the year.

   a. Seed stalks and heads.
   b. Leaves.
   c. Roots.

3. Discuss with him economic value of key range plants.

   a. General forage value and productivity.
   b. Feeding value to different kinds and classes of livestock.
   c. Seasonal grazing values.
   d. Poisonous and mechanically injurious plants.
   e. Invading plants.

4. Show him how to segregate significant range sites as distinguished by:

a. Soil and slope.
b. Kind of vegetation.
c. Productivity of sites.

5. Help him to choose alternatives to use in adjusting livestock to forage supply by:

   a. Protecting breeding herd by keeping stocker yearlings, steers, or lambs that can be marketed readily during periods of feed shortages (70% breeding herd, 30% stockers).
   b. Culling old and other inferior animals.
   c. Maintaining adequate feed reserves.

6. Assist him in determining his range condition and productivity.

   a. Excellent - 76% to 100% of plants are climax.
   b. Good - 51% to 75% of plants are climax.
   c. Fair - 26% to 50% of plants are climax.
   d. Poor - 0 to 25% of plants are climax.
   (Correlate productivity with range condition as determined from grazing capacity determinations or other satisfactory measurements of safe use).

7. Discuss his additional forage needs.

   a. Irrigated pastures for seasonable green forage.
   b. Supplementary feeds.
   c. Reserve feeds.

8. Help him determine range developments needed.

   a. Livestock water.

      (1) Kinds and location.

   b. Water conservation practices.

      (1) Flood control dams and diversions.
      (2) Water spreading.
      (3) Gully and stream bank control.
      (4) Contour furrows or renovation.
      (5) Rest to build up litter on ranges in extremely poor condition.

   c. Fencing.
   d. Seeding.
   e. Eradication and control of invading and poisonous plants.
   f. Livestock management facilities.

(1) Corrals.
(2) Shelter.
(3) Location of feed supplies.
(4) Road or trail developments.

g. Firebreaks.

9. Consider other methods of facilitating sound grazing management.

a. Grazing systems.

(1) Rests to let better plants increase.
(2) Timely and seasonal grazing.

b. Salting.

(1) Salt distribution.
(2) Amounts needed.

c. Mineral supplements.

(1) Distribution.
(2) Kind and amounts needed.

10. Consider with him the problem of keeping livestock numbers and forage supply in balance yearlong.

a. Help him determine when a given pasture or range has been properly used by considering:

(1) Trends in range condition.
(2) Degree to which the best forage plants have been taken at different seasons of the year.
(3) Degree to which animals are taking invading plants at different seasons of the year.
(4) Adequacy of plant litter and stubble to prevent runoff and erosion.
(5) Degree to which runoff and soil erosion is taking place.
(6) Degree to which patchy or uneven grazing is taking place.
(7) Degree to which soil crusting, baking, or packing is taking place.
(8) Condition of livestock.
(Carrying out of sound soil and water conservation program depends on how much the rancher knows about his grazing resources and how much he has become interested in putting his knowledge into action. Keeping livestock and forage resources in balance requires continuous close observance of both on the part of the rancher yearlong.

Sound conservation only comes about when he makes adjustments in line with wise and timely observations. It has been said that "the eye of the master fattens the steer" in the feedlot. Likewise, the well-trained eye of the rancher fattens his livestock on the range and keeps his grasslands in maximum production. Forage productivity fluctuates with rainfall. Therefore, grazing plans must be flexible so that plants can thrive continually).

11. Plan implementation:

    a. Review plan for needed changes.
    b. Give guidance and encouragement on scheduled practice installations.
    c. Schedule future dates for follow-up.

See Exhibit #2 for Levels of Management

EXHIBIT # 1

HOW PLANTS GROW

DISCUSS AND SKETCH FOOD STORAGE CYCLE
GROWTH STAGES OF LEAVES STEMS AND ROOTS

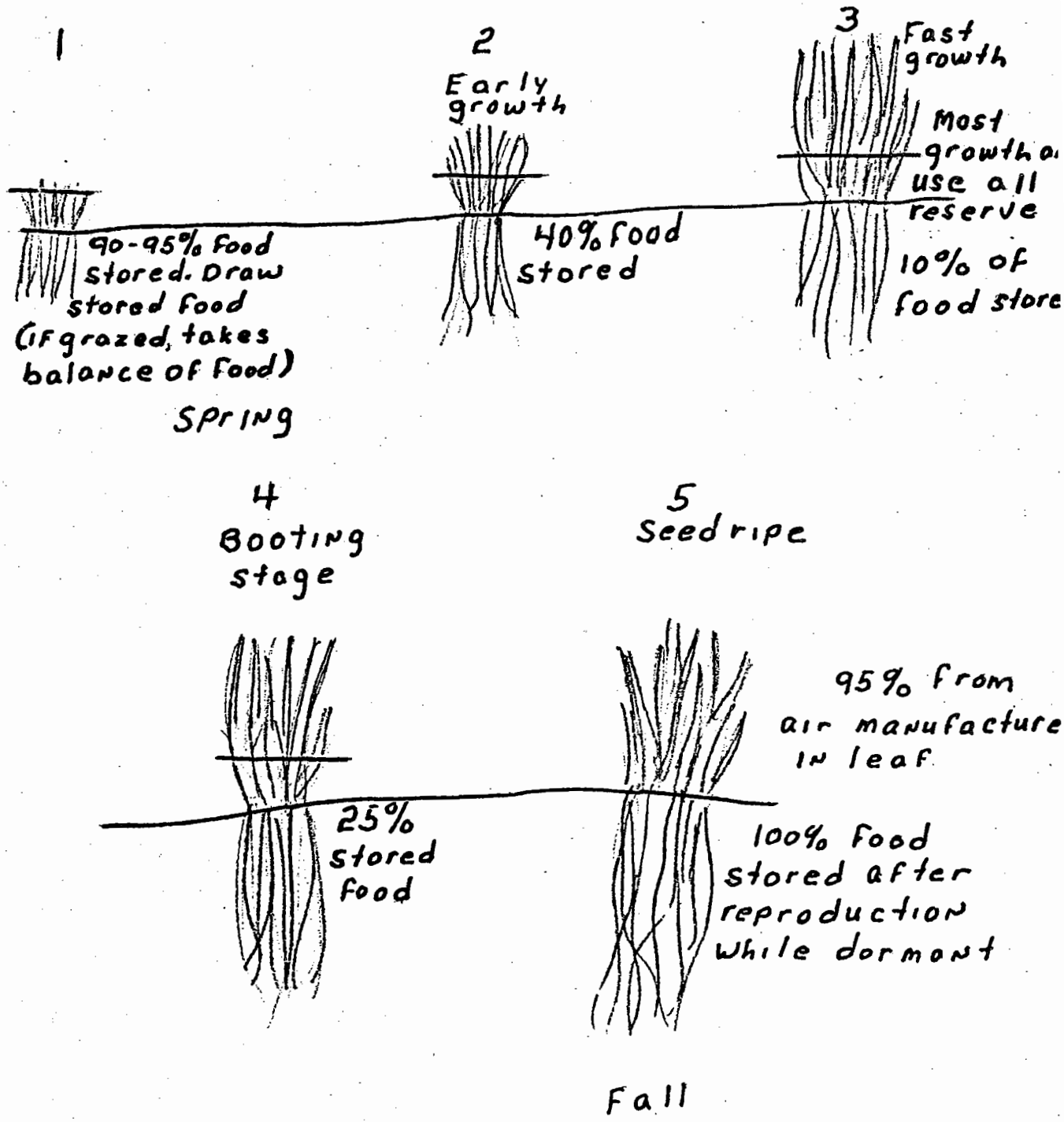
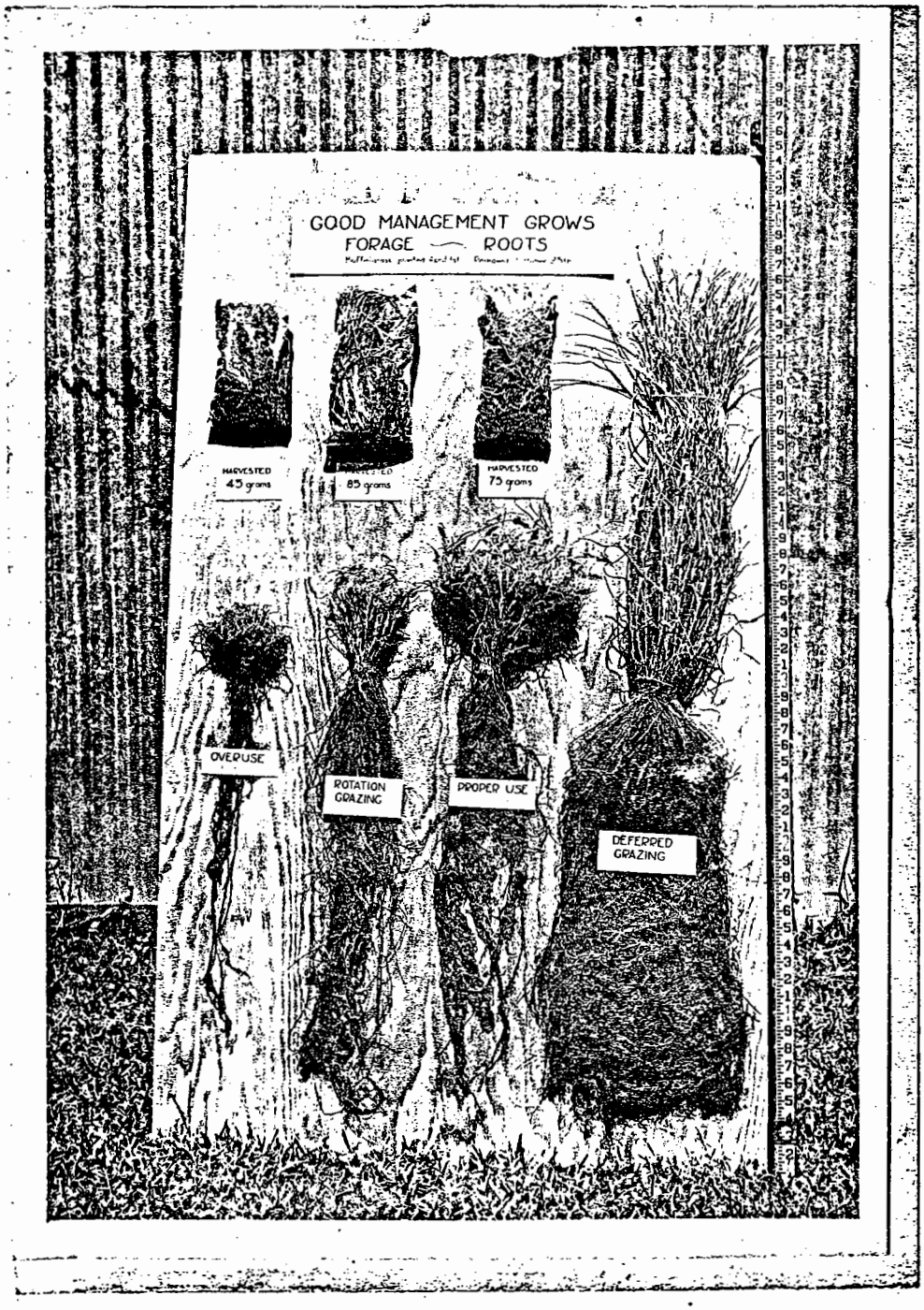


EXHIBIT # 2



4 Levels of Management

Note root development and foragement