Utilization

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“Utilization” is a technical term referring to the intensity of grazing use. It can refer to individual plants, to a key forage species (one or more), or to the range as a whole. Utilization can be measured by several techniques, or it can just be described by adjectives such as “heavy”, “moderate”, “light”, “proper”, “safe”, “conservative”, etc. Utilization is a valuable tool used in grazing management and interpretation of data on rangeland condition and trend. But it can also be misused.

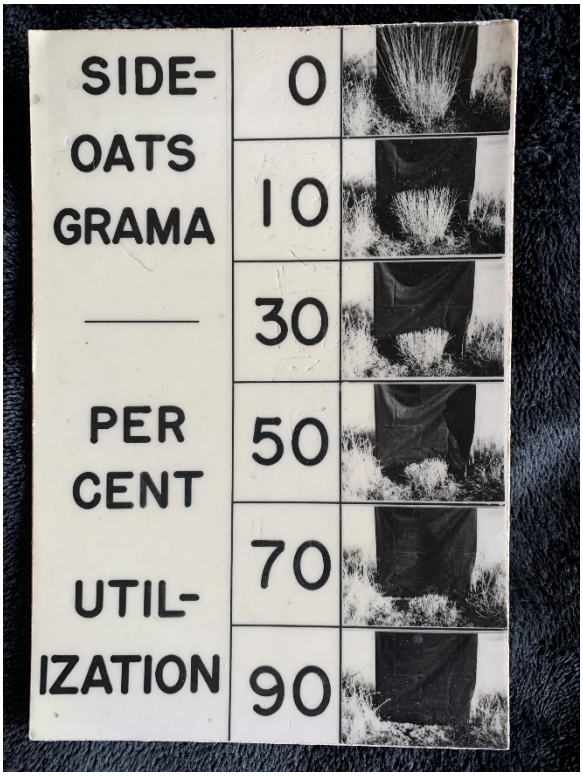
Utilization is defined as the percentage of the current year’s production removed by grazing. The grazing may be by livestock, wildlife, insects, or other causes – it is usually not possible to separate these causes. Current year’s growth is the amount of plant material on a dry weight basis produced in the current growing season. The growing season runs from spring into fall for most plants (some shrubs and some cool season annuals or grasses may be an exception). On herbaceous plants the aboveground portions of the plant die each year and regrow – so the current year’s production is all the aboveground portions excluding any old growth left over from the previous year. On shrubs aboveground, material accumulates from year to year in the form of trunks, stems, twigs, and older leaves (on evergreen shrubs). Utilization on shrubs is measured only as a percentage of the current twig and leaf growth.

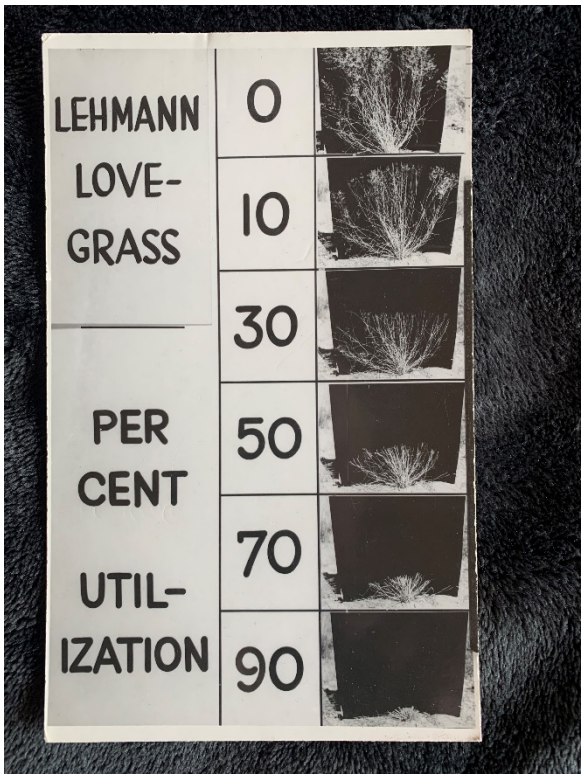
Utilization can only properly be measured after all of the current year’s growth is complete. This usually occurs in the late summer to fall, depending on the weather conditions. Utilization cannot be measured during the growing season since current year’s growth is not complete. If use is measured during the growing season, it should be called “seasonal use” not utilization. Seasonal use is a measure of the percentage of the current growth produced up to the time of measurement that is removed by grazing.

Use Mapping vs Key Species in Key Areas

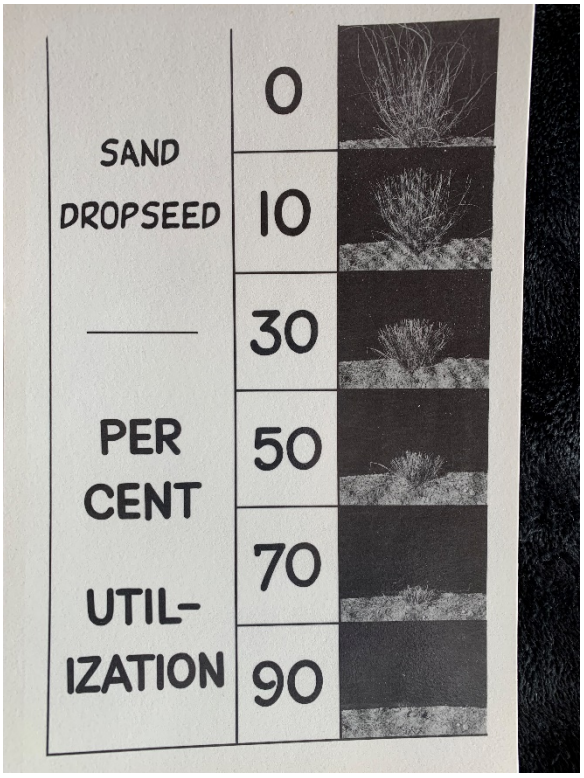
There can be several reasons to measure or estimate utilization or seasonal use. Use pattern mapping is one. Use pattern mapping involves observations of utilization over the entire pasture, allotment, or ranch. Based on these observations (usually made by driving, riding, or walking through the area) a map can be generated that shows areas of higher, lower, and no use. This information is very useful in planning where additional fencing or water developments are needed to reduce the size of underused and overused parts of the range – i.e., to improve livestock distribution. It may also provide information on areas that receive little or no use and thus where livestock grazing would have little or no impact on other uses such a wildlife. Use pattern mapping is usually based on visual estimates rather than quantitative measurements.

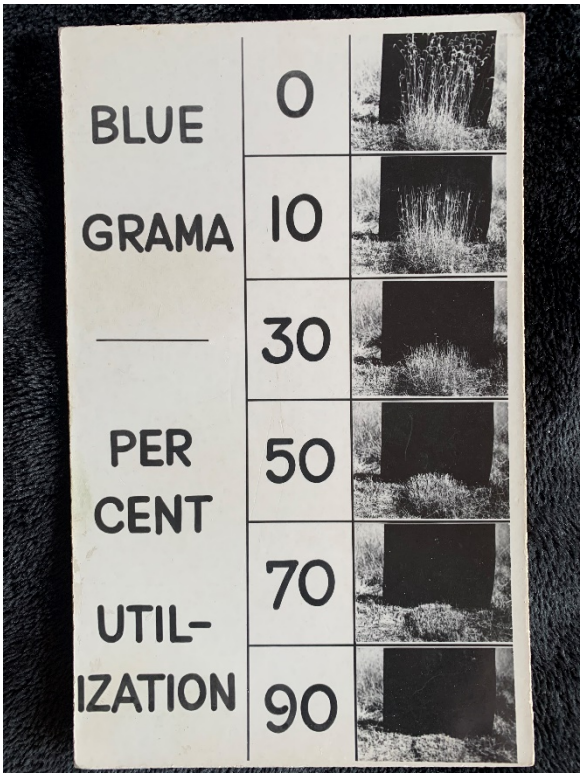
Another approach is to measure or estimate utilization on key forage plants in key areas of the pasture or allotment. Key forage plants are those which are palatable to livestock or wildlife and fairly abundant. If these plants are properly grazed, then it is assumed that other plants will not be adversely affected by grazing (and exception is so called “ice cream” plants which are very palatable but often not very abundant). Key areas are chosen to be representative of the pasture or allotment. It is assumed that when these areas are properly grazed the pasture as a whole will be properly grazed. Key areas should not be in an area where livestock concentrate, e.g., a short distance from a corral, water, or trail, and they should not be in areas which are not much used by livestock, e.g., too far from water, too steep, etc. Small riparian areas within a larger pasture are not key areas because they are not representative of the pasture as a whole and do not furnish much of the overall forage supply for livestock. However, because of their high resource value and the tendency for livestock to concentrate on these small areas, they may be used as “designated monitoring areas” or “critical areas” and utilization measured in them used to adjust grazing (timing, intensity) to achieve riparian objectives.





Photos: Examples of utilization measurement percentages for Sideoats Grama, Lehmann Lovegrass, Sand Dropseed, and Blue Grama





Proper Use

Utilization can be used to help decide whether livestock stocking rates are "proper" or whether they should be increased or decreased. "Proper" use is considered to be the amount of utilization a forage plant can receive and still maintain or improve its productive and reproductive ability. Excessive grazing can reduce productivity of plants by reducing both top and root growth. Plants that are repeatedly and frequently used excessively will produce less (due to lower leaf area and reduced root systems) and may be more susceptible to death due to drought or other factors. Most grasses are well adapted to grazing. Clipping studies have generally shown that grass growth is not much affected by utilization of about 40-50% of current growth when grazed during the growing season. They are less affected by dormant season use since the above ground portions of the plant are senescent at that time. Grasses in humid areas or under irrigation can withstand higher intensities of use than those growing in arid and semiarid environments. This is because conditions for regrowth are better. Thus, most of the scientific literature recommends more conservative use in harsh, arid environments (e.g., 30-35%). "Proper use" levels depend on the species of grass (short grasses are generally more tolerant of grazing than taller ones), the season of use (the "boot stage" of grasses, when they are starting to develop seedheads, is the most critical), and the time between defoliations (how much time the plant has to recover before being grazed again).

Grazing studies have also shown that "moderate use" is best for both the range and the ranch enterprise. Moderate use is usually defined as 40-60% on key species, although a more conservative level, e.g., 30-40%, is usually recommended for arid rangelands. Light to moderate utilization will ensure that range productivity is maintained, and this also usually provides the most profitable level for the livestock operation. Very light stocking is not profitable because total production is too low. Heavy stocking is less profitable because animal performance is usually reduced (e.g., calf crops, weaning weights), costs of operation are increased (e.g., feed, supplements, vet costs, death loss) and the rangeland may gradually lose productivity. On public lands, the desired utilization level may also be affected by other factors such as cover requirements for ground nesting birds, antelope fawns, or bank protection in riparian areas.

Utilization Methods

Utilization can be <u>estimated</u> or <u>measured</u>. General estimates can be made using descriptive terms such as: None (no sign of livestock use); Light (noticeable use on favored plants, but many ungrazed); Moderate (most key species used about 40-50%); Heavy (key species almost all grazed over 50%, substantial use of less preferred plants); and Severe (all forage plants heavily used, few if any seedheads remain, etc.). Use can also be estimated on a sample of individual plants, usually with photo guides or extensive training by clipping and weighing to train the observer.)

Utilization can be measured by several methods. One is to place cages over plots before grazing starts and then compared weight of forage in plots on grazed and ungrazed plots. This method is not very good for range work but is sometimes used. Another way is to develop a height to weight relationship for grasses so that the average percent of height removed can be measured and used to estimate the percent weight removed. Different grasses have different height-weight relationships. Still another way is to measure the "stubble height" remaining after grazing. A difficulty of measuring utilization is that one is trying to estimate what is gone, rather than what remains. Stubble height measurement concentrates on what is left and can be measured. This technique is often used in riparian areas.

Uses of Utilization Data

Utilization has several legitimate uses. Use pattern mapping (described above) can show where distribution of grazing needs to be improved. Utilization can be used to help interpret other monitoring data. For example, if trend monitoring shows a decrease in grass or an increase in bare ground the next step is to determine the reason for it so corrective action can be taken if possible. If utilization has been heavy in the vicinity of the trend plot, then reducing stocking or some other change in grazing management may be indicated. But if utilization has been none to slight, then some cause other than grazing must be sought. Finally, utilization, if done properly, should be related to intensity of grazing, i.e., stocking rates. So, if utilization guidelines are consistently exceeded over several years, then a reduction in stocking may be indicated. Conversely, consistent utilization at very light levels may indicate that stocking could be increased. Utilization may give some idea how much reduction or increase to consider. For example, if the utilization guideline is 50%, and measured utilization has only been 25%, this would indicate stocking could theoretically be doubled and still be within the guideline. Since there are other factors involved it usually is a good idea to phase in increases or decreases in stocking.

Misuse of Utilization

Utilization can be a useful tool in range management, but it has often been misused by government agencies and others. There are several ways this has been done:

Setting utilization "guidelines" as strict objectives. The guides to "proper use" mentioned above are not intended to be rigid objectives to be met in every pasture in every year. The grazing research from which they were derived concluded that *average* use of about 30-50% was best, but this could vary from only 20% in wet years when forage was abundant, to perhaps 60% in drier years. On average it was about right. Many times, agencies set objectives stating that utilization will not exceed 40% (or some other level) in any pasture in any year. This is not a valid use of utilization. Utilization is a tool, not a standard to be met. Setting a strict utilization limit is not compatible with the flexible, adaptive management the agencies often endorse.

Basing pasture moves on utilization. This problem is related to the one above. The agencies sometimes state in management plans that livestock will be moved when utilization reaches 40% (or some other level). But this does not recognize that utilization guidelines are only averages to guide management. There are other reasons why livestock should be moved sooner or later – e.g., Where did it rain? Is there adequate water in the next pasture? And so on. Also, if grazing is done during the growing season, then utilization cannot be measured (more on this below).

Confusing utilization with seasonal use. The utilization guidelines based on research mentioned above are based on the percent of current year's growth removed. They do not apply to seasonal use measured during the growing season. So, if the agency has set utilization guidelines, these are not appropriate to make decisions on pasture moves during the growing season. Seasonal use on July 1, will always be higher than utilization measured in the fall. When should utilization be measured? Utilization should be measured in the fall, after growth is complete, on pastures grazed during the growing season. If grazing occurs during the dormant season (fall, winter, early spring) then utilization should be measured at the conclusion of the grazing season before new growth starts. On year-round ranges, utilization is normally measured prior to the start of the growing season (spring).

Setting utilization standards that lack relevance or scientific basis. The guidelines for proper use discussed above are based on research involving both clipping and grazing studies. They are intended to maintain the "health" of the plants and the range, as well as provide economic returns to the livestock operation. As mentioned earlier, there may be cases where real or presumed impacts of grazing on other resource values may dictate different guidelines. However, when these guidelines are written into land use plans, they often lack any scientific basis or even logic. For example, if there is a need for plant cover for antelope fawning, then the measurement should be of cover for antelope fawns, not percent utilization on key forages species for cattle; this is for two reasons. First, "utilization" cannot be measured during the spring growing season when antelope fawns need the cover (as explained above). Therefore, some measure of average plant height or foliage density would be the appropriate guideline. Second, many plants other than key species for cattle can furnish cover for antelope fawns, e.g., other grasses, shrubs, etc. On a pure stand of crested wheatgrass, it might make sense to set a guideline based on seasonal use of crested wheatgrass or stubble height of crested wheatgrass. However, on most rangelands, there will be other plants that can furnish cover (sagebrush, rabbitbrush, etc.) so use or stubble height of crested wheatgrass is not necessarily relevant.