



Precision Flock Management Managed Grazing

Forage Growth and Intensive Grazing Basics

The Challenge for Experienced Graziers

Forage is a key resource for sheep production. As ruminants, sheep are ideally suited for utilizing it. *Managed Grazing* is an economically efficient and biologically sustainable way of producing lamb and wool from forage however it requires specialized knowledge and skills to use that forage effectively. This fact-sheet addresses the principles and specific techniques needed to manage paddocks in a sustainable and profitable way.

Traditional Forage Management Recommendations

- Agronomic grazing recommendations are usually based on *forage height*
 - For example: put sheep into a paddock when the grass is 8 inches high; remove them when the grass is grazed to 2 inches.
- Sheep feeding recommendations are based on *amount of feed consumed*.
 - For example: we develop a ration for a ewe in early lactation by first knowing the weight of the ewe and estimating her dry matter intake. Then we try to include all the required nutrients in that amount of feed.

Here is a practical issue: how many inches of grass are required to meet the nutritional needs of a ewe in early lactation rearing twin lambs? By following the agronomic grazing recommendations that focus on forage height, we cannot answer that question. Also, forage height tells nothing about the *density* of that forage (number of plants per square foot).

Goals for this Fact Sheet:

- To provide information on managing forages in a practical, efficient manner that maintains the health and sustainability of the forage and provides good feed for the animals.
- To describe forage growth in a way so we can manage forages better.
- To develop skills for *Managed Grazing* to improve pasture productivity.

Therefore, forage height does not provide an accurate estimate of the *amount* of feed in a paddock nor is it a guide to how long sheep can remain in a paddock. The art and the science of grazing is the convergence, or blending, of the disciplines of forage management and animal nutrition.

For *Managed Grazing* and good forage management, we need to answer the following questions:

- How much forage is in a paddock?
- How many sheep can a paddock support?
- How long should sheep remain in a paddock?

A Better Way of Managing Paddocks

We should manage forage by the *amount of forage in the paddock*. By convention, the amount of forage is also called the “mass” of forage. This technique will give us the information we need to answer those critical grazing management questions.

Amount = mass, expressed in pounds (lb) forage dry matter (DM) per acre

Managed Grazing is a method for allocating feed to sheep by controlling the amount of forage sheep graze.

The amount grazed is called the Available Mass of forage. This amount is not the same as the total amount of forage in a paddock because we should always leave some residual forage at the end of the grazing period.

The basic principle of forage amount is expressed in the formula (all units in lb. DM/acre):

Available Mass = Total Mass minus Residual Mass

Where *Total Mass* = total amount forage above ground.

Residual Mass = forage amount remaining after harvest, either by grazing or cutting.

Available Mass = actual amount animals consume or is harvested as hay or silage.

For example:

Total Mass = 1,800 lb. DM/acre

Residual Mass = 1,000 lb. DM/acre

Available Mass = 800 lb. DM/acre

Using the amounts in this example, one acre of this forage contains 800 lb. available DM. Therefore, a 10-acre paddock of this forage will contain 8,000 lb. available DM (= 18,000 lb. Total Mass – 10,000 lb. Residual Mass.). This means that with *Managed Grazing*, this paddock can support 200 ewes of 160-lb for a total of 5 days and still leave a residual forage mass of 10,000 lb. (= 1,000 lb./acre). This calculation assumes that the sheep will consume forage at 5% of their bodyweight.

How Can We Measure Paddock Mass?

One simple method is described in detail in the Alberta Sheep & Goat Manual, section 2.4. This method uses a 42-inch circle,

a grass shears or garden shears, a postal scale that weighs to the nearest 1 gram, and a microwave oven. The results of this method are expressed as lb. forage DM/acre.

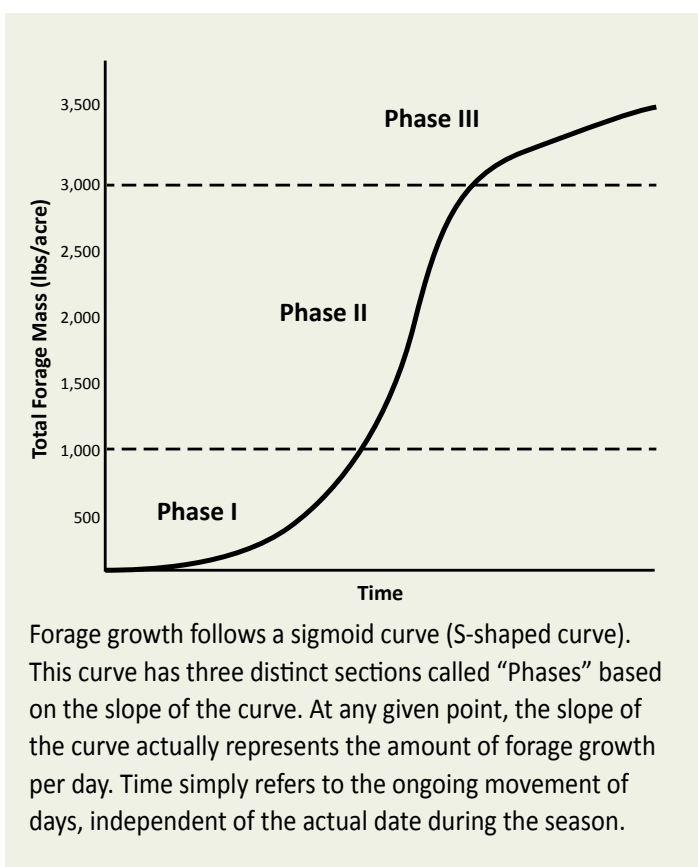
The Alberta Sheep & Goat Grazing Manual is available at:

www.ablamb.ca/producer_mgmt/sheep_mgmt.html

www.agriculture.alberta.ca/livestock/sheep&goats

Forage Growth Curve

The forage growth curve is the basis of *Managed Grazing*. This curve describes how forages grow over time. It provides a framework for making informed decisions about when to introduce and when to remove sheep in a paddock.



Phase I = Lowest section of the curve

This phase describes early growth forages or forages recently grazed or cut to low level. These plants have only a small amount of leaf area. Therefore they can only support a relatively low level of photosynthesis and leaf production per day. This situation occurs when forages are just beginning to grow from seed or runners, or if the plants were cut or grazed to this low level. This section of the curve is a building, or a rebuilding, period. The amount of forage that grows and accumulates

per day is very low. Phase I consists entirely of young, leafy growth. The nutritional value of these young plants is very high. However, Phase I is an inefficient growth period; with only relatively small amounts of new forage per day.

Key Message: Phase I growth occurs when total mass is <800–1,000 lb. DM/acre.

Phase II = Middle section of the curve

This is the vegetative period when leaves and tillers are growing and extending rapidly. The canopy is filling in quickly. This is the most efficient period of the forage growth curve. For improved forages with good soil fertility, this is the period of rapid leaf growth and tissue growth. Nutritional value is still very high. Forage contains relatively low levels of fibre, typically with a crude protein level of at least 14%, and often much higher.

Key Message: Phase II growth occurs between 1,000–3,000 lb. DM/acre.

Phase III = Upper section of the curve

The line is still rising, but at a slower pace. The canopy has filled in and closed over and forage growth is slowing. Fibre levels are increasing so fibre digestibility is decreasing as the plants mature. Growth is less efficient than during Phase II. This is a period of distinctly diminishing returns with a steadily diminishing net accumulation of forage per day. Although total yields are increasing, the additional growth is at a slower rate per day than in Phase II. Top leaves are still growing, but lower leaves are shaded and may be dying off. The nutritional value declines as plants enter their reproductive phases.

Key Message: Phase III growth occurs when total mass is > 2,800–3,000 lb. DM/acre.

Please note:

- ‘Key Messages’ are important generalizations. Each growth phase may have considerable variability, depending on forage species, soil characteristics (moisture, temperature, fertility), and production circumstances.
- Once you have one or more years of grazing records you can calculate a balance of total forage production (carrying capacity) for the grazing season and sheep forage needs (stocking rate x days grazing desired) to make grazing plans that are sound.

Day-to-Day Movement of Animals in *Managed Grazing*

- Introduce sheep into a paddock at the top of Phase II.
- Remove sheep from a paddock at the bottom of Phase II.
- Leave enough residual so that the forage is never grazed down into Phase I.
- Paddocks grazed into Phase I may take an extra 7–14 days to reach the bottom of Phase II, which adds a considerable lag time to rotations. This is a very inefficient use of the paddock.
- Never allow paddocks to grow and mature into Phase III.
- Monitor paddocks weekly, and move sheep from paddock to paddock as each paddock reaches the top of Phase II.

This movement strategy takes advantage of the most efficient portion of the growth curve, provides a high level of nutrition to the animals, and maintains the forage in a healthy, growing, and sustainable state.

However, to balance growing season forage yield with full season sheep forage requirements you will need to add to your plan the option of starting grazing earlier than is ideal. If you start your first rotation by grazing in the latter part of Phase I growth by the end of this rotation with rapid spring growth some paddocks will be in early Phase III growth, later than is ideal. On average you aim to have most pastures in Phase II; some of the paddocks will be in Phase 1 and some will be in Phase 3. On average - perfect!

Critical Principles for Good *Managed Grazing*

1. Stay in Phase II growth.
2. Leave enough Residual, usually at least 800–1,000 lb. DM/acre.
3. Protect re-growth: never allow sheep to remain in a paddock long enough so they can graze the re-growth. Usually the maximum is 5 consecutive days for high-quality forages with sufficient water and nutrients.
4. Move minerals and water with the animals. Supply minerals and water in every paddock; do not require sheep to walk back to the barn or creek for water.



What Happens. . .

- If forages are grazed into Phase I?
 - o Longer period of re-growth before forages enter Phase II. This adds time to the rotation period.
 - o Open ground is an opportunity for growth of weeds or unwanted forages.
 - o Open areas can be susceptible to erosion.
 - o Possible weakening and loss of some of the plants in the forage stand.
- If forages are allowed to grow into Phase III?
 - o Overly mature for grazing. Nutritional value too low for high-producing animals.
 - o If stocking density is low, sheep will exhibit excessive selection and uneven grazing.
 - o Taller grasses shade out shorter plants such as clovers and other legumes.
 - o Slow rotation. Time is money.
- If forages are allowed to grow into Phase II
 - o Spring growth is so rapid in a healthy forage stand you will find it difficult to finish the first grazing rotation without running into too many paddocks in Phase III stage of growth.

Now for the second rotation, do not just start again on your first paddock where you started rotation 1. Remember you started grazing this one too early, when it was in Phase 1. It will need a longer rest to recover from this setback. Pick the paddock you determine to be most advanced in Phase 2 and make it your first one for the start of the second rotation. Continue to pick the one most advanced in Phase 2 again and again, as you go through your second rotation.

Practical notes about units of measurement:

In this Internet age, it is quite easy to obtain information from around the world. International documents often describe forage amounts, seeding rates, and fertilizer application rates in terms of pounds or kilograms /acre or hectare (ha).

- o 1.0 kg = 2.20 lb.
- o 1.0 hectare = 2.47 acres
- o 1.0 kg/ha = 0.89 lb./acre — a difference of only 11%

Rule of Thumb: 1 kg/ha = 1 lb./acre is close enough for practical use.

By consistently using good *Managed Grazing* practices graziers can cut down on feed costs significantly. In addition, you will be managing your land for maximum efficiency and sustainability. For further information on *Managed Grazing* please refer to the next two factsheets in this series.

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For more information:
Alberta Sheep & Goat Grazing Manual
http://www.ablamb.ca/producer_mgmt/sheep_mgmt.html
<http://www.agriculture.alberta.ca/livestock/sheep&goats>

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