



# Boosting Pasture Production

Feed costs represent half of the production costs of a cow herd, but increased grazing days significantly reduce feed costs. Beef cow producers should always look for ways to increase the productivity of their pasture acres. Some of the most practical ways to boost pasture production are fertilization, overseeding, and improved grazing management.

## Pasture fertilization

Fertilization is just as important for pasture production as it is for crop production. Pasture fertilization may be one of the easiest and most economical solutions to increasing pasture productivity.

Pastures respond well to fertilizer and lime nutrients, particularly nitrogen (N). Nitrogen application can either be a one-time, annual application or can be split applied. Grass-based pastures generally respond very efficiently to the first 40-50 lb. per acre of N. Kentucky bluegrass will continue to respond to N applications up to 150-180 lb. per acre annually, but at a decreasing rate of response. Kentucky bluegrass, bromegrass, and orchardgrass are cool-season grasses, and their greatest growth rates are in April, May, and June. Growth slows during hot weather and dry conditions, which typically occur July through August.

As the weather cools in late summer and the moisture supply improves, cool-season grasses again increase their growth, which continues into October. For best growth and grass yields, adequate N must be available during

spring to early summer and again late summer to fall. Consequently, splitting these applications throughout the year will likely give the best results and optimize forage growth with rainfall and nutrient demand. If splitting N applications, apply some N early in the spring and some again in August. Spring N applications could be made all at once in early spring (March and April) or some applied in early spring and the rest in last spring (May or early June). If planning a late spring/early summer or late summer N application, its success will depend on having adequate moisture and not excessive heat. Tall fescue is also a cool-season grass that responds well to additional N fertilizer; however, high rates of fertilization increase the risk of fescue toxicosis.

High or frequent applications of N (particularly spring N application) to legume-grass mixed pastures will make the grass component of pastures more competitive and limit the amount of legumes in the mixture. To encourage a greater legume presence, use modest N rates and limit application to summer or fall; maintain optimum soil pH, phosphorus (P), and potassium (K) levels; improve grazing management; and consider overseeding legumes (interseeding or frostseeding).

Yield responses to P and K are not dramatic or consistent. However, grass responds to N more efficiently when P and K levels are adequate. P fertilization also increases the P concentration in the plant, which, in turn, increases the nutritional value of the grazed forage to livestock. The P and K rates in recommendations for grass pastures are based on soil tests and expected removal from the field.

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**Table 1. Suggested single application.**

|                          |                                               |
|--------------------------|-----------------------------------------------|
| Kentucky bluegrass       | April: 60-100 pounds N/acre                   |
| Tall cool-season grasses | April: 80-120 pounds N/acre                   |
| Warm-season grasses      | Late April to early May: 80-150 pounds N/acre |

**Table 2. Suggested multiple applications.**

|                             |                                                                                                                                                                                                                                                                                  |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kentucky bluegrass          | <ul style="list-style-type: none"> <li>• Early spring (March and April) 60-80 pounds N/acre</li> <li>• Late spring (May to early June) additional 30-40 pounds N/acre</li> <li>• And/or late summer (August to September) (optional) additional 30-40 pounds N/acre</li> </ul>   |
| Tall cool-season grasses    | <ul style="list-style-type: none"> <li>• Early spring (March and April) 80-120 pounds N/acre</li> <li>• Late spring (May to early June) (optional) extra 40-60 pounds N/acre</li> <li>• And/or late summer (August to September) (optional) extra 40-60 pounds N/acre</li> </ul> |
| Legume-grass mixed pastures | <ul style="list-style-type: none"> <li>• If less than 1/3 legume, treat as a grass pasture</li> <li>• If more than 1/3 legume, no nitrogen is recommended</li> </ul>                                                                                                             |

Forage plants will respond to added P and K when applied to soils with low or very low soil P and K test levels. Some yield response can be achieved by fertilizing to raise the soil P and K test index from low or very low, to at least the optimum index. Additional P and K likely will be needed for pastures that also have a hay crop removed.

For example, one ton of bromegrass hay removes 7.9 pounds  $P_2O_5$  and 41 pounds  $K_2O$ . More information on nutrient removal by forages can be found in Iowa State University Extension and Outreach publication [A General Guide for Crop Nutrient and Limestone Recommendations in Iowa](https://store.extension.iastate.edu/Product/5232) (PM 1688) (https://store.extension.iastate.edu/Product/5232). Timing of P and K applications can be flexible when soil test values are in the optimum category. If soil test values are very low or low, fertilizing with P and K in the fall or early spring is recommended to help enhance early growth during favorable environmental conditions.

Legumes are more responsive than grasses to moderate to high levels of pH. For grass-based pastures, try to maintain a pH level of 6.0-6.5. To encourage and maintain legumes, try to maintain a pH of 6.5 for clovers,

grass, and birdsfoot trefoil; for alfalfa a soil pH of 6.9 is recommended. Test pasture soils every 3-5 years to determine lime, P and K needs.

**Table 3. Annual phosphorus and potassium application rates for grass pastures.**

| Soil Test Category | Bluegrass   |        | Tall grass* |        |
|--------------------|-------------|--------|-------------|--------|
|                    | $P_2O_5$    | $K_2O$ | $P_2O_5$    | $K_2O$ |
|                    | pounds/acre |        |             |        |
| <b>Very Low</b>    | 40          | 50     | 60          | 85     |
| <b>Low</b>         | 30          | 35     | 40          | 65     |
| <b>Optimum</b>     | 0           | 0      | 25          | 50     |
| <b>High</b>        | 0           | 0      | 0           | 0      |
| <b>Very High</b>   | 0           | 0      | 0           | 0      |

\* Smooth bromegrass, orchardgrass, tall fescue, reed canarygrass, switchgrass, big bluestem, Indiangrass, Eastern gamagrass, Sudangrass, and sorghum x Sudangrass hybrids.

\* Source: ISU Extension and Outreach publication [Fertilizing Pasture](https://store.extension.iastate.edu/Product/0869) (PM 0869).

See more information on soil testing and pasture fertilization in ISU Extension and Outreach publications [Fertilizing Pasture](https://store.extension.iastate.edu/Product/4175) (PM 0869) (https://store.extension.iastate.edu/Product/4175), [A General Guide for Crop Nutrient and Limestone Recommendations in Iowa](https://store.extension.iastate.edu/Product/5232) (PM 1688) (https://store.extension.iastate.edu/Product/5232), and [Take a Good Soil Sample to Help Make Good Fertilizer Decisions](https://store.extension.iastate.edu/Product/3915) (CROP 3108) (https://store.extension.iastate.edu/Product/3915).

## Overseeding

Frostseeding and interseeding, sometimes called oversowing, are seeding methods used to add more productive or higher quality forages into an existing sod. Their contribution to stand productivity is much slower than that achieved from N fertilizer, so expect a gradual production increase. Both grasses and legumes may be added to existing pasture sods. However, the success of this is generally better when done on a thin or less-competitive sod, and when follow-up clipping and grazing management are directed at reducing competition from weeds and existing pasture species.

One important step in both frostseeding and interseeding is to control broadleaf weeds before introducing legumes into the pasture. When done successfully, added legumes can contribute to the N needs of the site and lead to similar yield increases seen from moderate N fertilizer rates. When interseeding forages, be sure to allow adequate time for the new seeding to become established prior to grazing. A word of caution: the benefits of

frostseeding or interseeding may be short-lived, unless grazing management is used to allow for “rest” and expression of the yield potential of the new pasture components. Continuous stocking at high stocking rates will erase any seeding gains within a few years. More information on overseeding is available through ISU Extension and Outreach publications [Improving Pasture by Frost Seeding](https://store.extension.iastate.edu/Product/4158) (PM 0856) (<https://store.extension.iastate.edu/Product/4158>) and [Interseeding and No-Till Pasture Renovation](https://store.extension.iastate.edu/Product/4420) (PM 1097) (<https://store.extension.iastate.edu/Product/4420>).

## Improved grazing management

Improved grazing management can lead to some very practical gains in forage and livestock productivity on the same site. For forage plants to express their yield potential, some level of rotational grazing should be practiced that will allow rest and recovery of the plants following grazing. By dividing an existing pasture into 3-5 smaller paddocks and using thoughtful rotation and rest, one can increase productivity by 10%-15%. Dividing and managing 6-10 paddocks often can lead to an additional 5%-10% in productivity. Some of this increase will be evident within a few months, but realistically, it will take 2-3 years to reach its full benefit.

## Summary

There are several practical strategies for beef cow producers looking for ways to increase the productivity of pasture acres. Nitrogen fertilizer will give the most immediate increase, but it requires some common sense about rates and timing. Productivity and quality gains can be attained by introducing some new forage species into the existing sod; however, the benefits will occur more slowly and can easily be erased by improper or abusive follow-up grazing management. Longer-term benefits often occur with improved grazing management. Changing grazing management may require some added cost and learning some new skills. The other two strategies, fertilization and oversowing, can be done in conjunction with improved grazing management for an even faster and more sustained pasture production improvement.



**No-till drill pasture renovation. Photo by Matt Sanderson.**

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Cover photo by Denise Schwab.

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