

The Agronomic “F” words: Fertilizer, Feed, and Fuel  
*Ideas for resiliency for the season ahead, and planning for the future*

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The Long Range Weather Forecast for Atlantic Corridor predicts a warm spring and a hot, slightly drier than average summer for 2022. The forecast is encouraging for timely spring plantings, and the slightly dry summer is likely to be a welcome change for those who contended with slow growth last year due to the overcast and soggy season. While the weather forecast for this year is sunny, the fertilizer, feed, and fuel forecast is a stormy one. Ongoing supply chain struggles are expected to affect agriculture in many parts of the world. Many have already noted the increased fertilizer prices and are bracing for high grain costs. Of course, no one has missed the rising prices of fuel. This leaves many asking, what can we do to weather the storm?

First and foremost, farms should have contingency plans. Just as farms (hopefully) have plans for wet years or dry years, livestock farmers should have plans for feed shortages and high costs, and all farms should have a fuel and fertility plan. In most cases, we are all already trying to move to operations that reduce fuel and fertility inputs to enhance economic and environmental sustainability, even in the absence of high input costs. Below are some ideas about how to adapt this year, and how to start building in risk mitigation for the future. These suggestions also carry the benefit of contributing to on-farm sustainability.

Before reading on, note that not all ideas work for all farms. Start by determining what you are willing to try. If some ideas seem too much of a stretch for you to commit to, but you find yourself curious, consider trialing new approaches on just one field – or even half a field – to make your assessment. Or, if the tenants of soil health seem too demanding to meet, try just one improvement. It all adds up.

### Feed

At the time of this publication, your overwintered cover crop might still be standing and might even be in the boot stage. If so, do not let this forage pass you by. Years of research at our farm facility and on-farm with local dairies have found that rye, wheat, and triticale cover crops are excellent forage and regularly generate 1.5-2 tons of dry matter per acre in Massachusetts – that is when crops are harvested to leave 3 inches of residue behind so you can avoid soil contamination in your feed and leave residue to contribute to soil organic matter. When harvested at the right time, these crops also offer relative feed values around 115, and crude protein values from 9-12%. Of course, you do not have to harvest all of your cover crop fields in the spring rush. On a dry matter basis, one small, 5-acre field could add as much as 10 tons to your forage inventory.

If you are concerned about returning the residue to build soil health, there is no need to fret. The remaining 3 inches of cover crop residue after harvest can return as much as a whopping 1.6 tons of dry matter. You could terminate the cover crop after harvest or try planting green and then use a labeled herbicide to terminate the living cover crop residue. If you do plant green, do not make

the mistake of banding or broadcasting fertilizer at planting. We have made that mistake for you at the research farm and can assure you that if your cover crop is alive, it will beat your corn to capturing that fertility. Also, note that cover crop regrowth – especially rye – is often rapid after harvest.

If your operation has a not yet planted field come late June/early July when the soils are warm, consider planting summer annuals. Our co-researcher Dr. Heather Darby and her technician Sarah Ziegler and the University of Vermont have conducted extensive trials of summer annuals. Their work with millets, vetch, chicory, sudangrass, clovers, and ryegrass – among others – has shown that summer annuals can produce an extra 1.5 – 2.75 tons of dry matter per acre. We recommend checking their work for seeding rates, planting combinations, and expected yields. Some mixtures are suitable for silage, while others are more conducive to grazing. The summer annuals can be great remedies for overgrazed and trampled fields near the barn, and their close proximity makes grazing more feasible for those without a current grazing program.

Last but not least, consider your grazing program. If you do not have one, you may wish to start one. While the logistics can be daunting at first, a grazing program can supplement or reduce the need for corn, hay, and grain. Moreover, grazing can drastically reduce fuel inputs due to far less tractor work, and pastures with 30% or more legumes present require no additional nitrogen fertility. If you are already grazing, consider shortening your rotation period. If animals are stocked for 5-7 days, try a 3-day or shorter rotation. More frequent moves and smaller paddocks result in increased utilization efficiency, reduce the land required to support a herd, and can increase animal productivity.

### Fertility

There is no reason to guess when it comes to fertility. A soil test is your ally when deciding what amendments your land needs. You may find you do not need to apply some nutrients at all, and you may find the lack of other nutrients are limiting your yield production. Soil tests should be conducted at least every three years. However, a soil test is only as good as the quality of the sample. The investment of time to get a good sample across a field provides immediate payoff via the accuracy of the recommendations that are generated. For phosphorus and potassium, if your soil is in the optimum or above optimum range, you could skip adding these fertilities this year. For those who still wish to follow the principles of “build and maintain”, emphasis on “maintain”, if your soils are in the optimum range you can apply nitrogen and phosphorus at only crop removal rates.

When submitting your soil samples, we recommend that you spend the few extra dollars to have soil organic matter analyzed. For every percentage of soil organic matter, 20-40 lbs. of nitrogen are released per acre during the growing season. An additional 1-2 lbs. of phosphorus are also released. If you have 4% soil organic matter, that is 80-160 lbs. of nitrogen and 4-8 pounds of phosphorus stored in your field.

What to do based on your soil organic matter levels? You can use your soil organic matter as a credit in your nitrogen and phosphorus fertility planning. However, soil organic matter is not a significant source of potassium. Note that, again, the analysis is only as good as your sample

collection and preparation. Samples submitted with high organic matter residues, like roots or leaves will return artificially high results. If your field has a history of tillage on sandy or loamy soils, high soil organic matter levels are unlikely at a sufficient level, but even 2% or 3% soil organic matter helps.

If applying manure, either have your manure analyzed if you can prepare a well-mixed samples or use book values to estimate the nutrient content. The nitrogen, phosphorus, and potassium in your manure supply a further fertility credit in your fertility program.

For those willing to try something new, consider intercropping corn and soybean for silage. The soybean provides a crude protein boost to the silage, can fix its own nitrogen if you inoculate the seeds, and will also help to provide nitrogen fertility to the corn silage. The harvest time is the same for these crops when making silage and the required equipment is the same. Plant the crops in alternating strips comprised of multiple rows. The number of rows is up to your equipment, time, and patience. Fewer rows in each strip increases the nitrogen benefit from soybean to corn but increases the precision required at planting.

As already noted, summer annuals can provide high-value feed. They can also cut down on your nitrogen inputs. Planting legumes such as vetch, clover, or sunn hemp will fix their own nitrogen and provide plants that fix their own nitrogen and subsequently contribute nitrogen to the companion crops. while sharing their nitrogen with their neighbors. When planting legumes, be aware that all inoculants do not work with all legumes. The inoculant used for sunn hemp is not the same inoculant used for clover. Make sure you request an inoculant compatible with your plants when ordering seeds and be weary of inoculant stored and room temperature before it is sold to you. Inoculant is living bacteria that should be kept cool and is best refrigerated.

If you do not want to wait for summer annuals, a “pop up pasture” mix that we recommend to meet spring feed and fertility needs is as follows: 8-10 lbs./A mammoth red clover, 35 lbs./A spring oat and 6-8 lbs./A pearl millet. Plant this mix now through the first week of June.

Finally, if you are growing corn, band nitrogen instead of broadcasting, and make pre-sidedress nitrate tests (PSNT) a priority. Banding fertilizer delivers it nitrogen close to plant roots and increases fertilizer use efficiency while making the fertility less available to weeds between the rows. PSNT tests are taken when corn is about 10-12 inches high and to a depth of one foot. However, if you have broadcast nitrogen at planting, PSNT samples will not be accurate and should be skipped. If you banded fertility at start-up, PSNT samples are also unlikely to provide accurate guidance. Be sure to dry soils before submitting them. Warm, moist soils in plastic bags will encourage mineralization to occur and will artificially inflate your nitrate levels. For further information about PSNT please use the following link:

[https://ag.umass.edu/sites/ag.umass.edu/files/fact-sheets/pdf/pre\\_sidedress\\_nitrate\\_n\\_test\\_psnt\\_21-2019\\_0.pdf](https://ag.umass.edu/sites/ag.umass.edu/files/fact-sheets/pdf/pre_sidedress_nitrate_n_test_psnt_21-2019_0.pdf)

## Fuel

Anything that reduces distance and duration in the field will help reduce fuel requirements. If you have been thinking about transitioning to a no-till system, the time is ripe to make the move.

Reduced tillage or outright no-till systems can save substantial time in the tractor and therefore, fuel, too. No-till systems are also a sure-fire way to help build your soil health.

For those thinking about trying out more pasture, it is one of the best ways to reduce fuel costs. Well-managed perennial pastures require only fertility inputs. No tilling, spraying, annual planting, or mechanical harvesting is needed.

Our feed, fertilizer, and fuel problems are not going away this summer, if ever. To avoid saying the “f words” contingency planning and shifts to long-term sustainability are critical for both economic and environmental resiliency. For a long-term, across the board recommendation, focus on your soil health. Reduced tillage, dutiful cover cropping, and good grazing management all contribute to soil health. The soil will pay you back in enhanced fertility, microbial activity that supports your plants, water holding capacity, and increased ease of rooting so plants can go deep to seek nutrients and moisture in lean years.

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