



Manure Application to Perennial Grasses

Grasses have advantages when it comes to efficiency of manure nutrient use. Compared to alfalfa, grasses have a greater response to manure and greater resistance to traffic damage. Manure can be applied multiple times during the season versus in spring or fall only for row crops like corn. Grasses use large quantities of nutrients, minimizing the risk of nutrient leaching or runoff. Grass can remove over twice the nitrogen (N) per acre compared to corn.

Nutrients in dairy manure vary with the animal's ration, the form of the manure, and the method of storage and application. Significant variability in composition means that book values for nutrients in manure are not reliable for nutrient management planning. Each farmer should have manure samples analyzed, to build up their own nutrient analysis database.

Proper manure storage allows farms to conserve ammonia-N and potentially double the amount of useable N applied, if the manure can be incorporated into a growing crop. Total N applied minus estimated N volatilization equals available N. Most manure is surface applied to grass fields, although equipment is becoming available for incorporation into sods.

Amount to Apply vs. the Form

For established stands of pure grass there is essentially no concern of smothering or salt injury to the stand. If topdressing with liquid manure, the amount used in a single application will depend on the N, P, and/or K status of the field. Up to 100 lbs of available N/acre can be applied per cutting. If the field needs to be maintained at the current soil P levels for farm nutrient management purposes, then only the estimated amount of crop P removal should be added as manure.

If solid or semi-solid manure is applied there are potential contamination issues to consider. No more than 20 tons/acre of semi-solid

manure should be applied at one time, unless harvesting for the season is completed. Higher rates greatly increase the chances of manure contamination of harvested grass forage. Manure particles picked up at harvest can infect the forage with detrimental organisms, resulting in poor fermentation of silage. There is also the possibility of transferring pathogens such as Johne's disease this way.



Figure 1. 20 tons/acre of semi-solid dairy manure on orchardgrass stubble.

Timing of Manure Applications

Timing of manure applications on farms, especially in the spring, must be coordinated with other farm activities, making it desirable to have alternate application times during the season. Spring application of manure should maximize efficiency of manure nutrients, but the impact of manure applications at other times of the year is not clear.

We studied the effect of semi-solid manure timing on orchardgrass under a 3-cut system. The first two cuts are lactating dairy quality forage, while the fall harvest is more suitable for heifers or dry cows. Between 40 and 80 tons/acre of manure were applied in split applications, compared to a check and to 225 lbs actual N/acre. The study was conducted at the Cornell Willsboro Research farm.

Table 1. Manure application rates on orchardgrass from 2003 to 2007. Manure or N was applied in various combinations at spring greenup and after 1st 2nd or 3rd cutting. E.g. 0-0-0-40 is 40 tons/acre applied after 3rd cut.

Treatment	2006 Yield
10-10-10-10	4.0
20-20-0-0	4.0
0-0-20-20	3.9
0-0-0-40	3.9
20-20-20-0	4.0
0-0-20-40	4.4
20-20-20-20	4.4
N 100/75/50/0	3.5
0-0-0-0	2.6

Treatments (Table 1) were first applied in 2003, but some did not take effect until 2004 (e.g. 0-0-0-40 treatment). By the second year of the study (2004) the highest rate of manure application yielded at least as much dry matter as commercial N (Fig. 2). Several other studies in NY with manure applied to perennial grasses also resulted in yields equivalent to that from fertilizer N after two years.

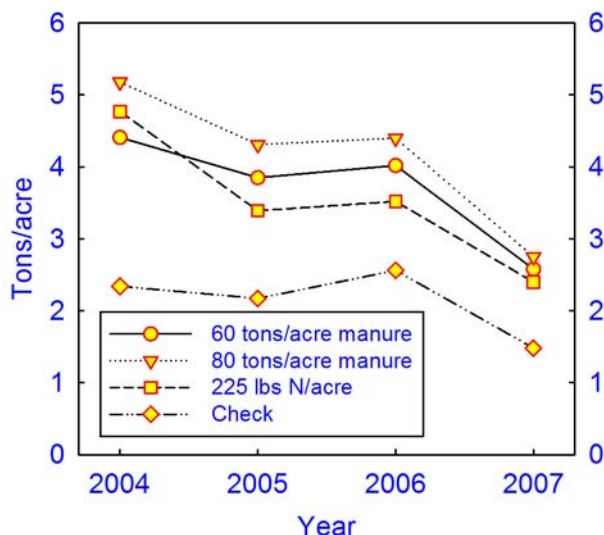


Figure 2. Annual yield of orchardgrass as influenced by commercial N fertilizer vs. manure applications.

Yield increased somewhat as the rate of manure application increased, but manure rate did not affect forage CP. Application rate and

timing of application of manure had very little effect on forage nutritive value. Fertilizer N application did result in higher forage CP than manure treatments.

Summary

In general, regular application of manure to perennial grass stands will produce yields as high as those with recommended fertilizer N rates after two years of applications. Timing of surface manure applications does not affect yield or quality, but timing needs to be evaluated for overall environmental impact.


Additional Resources

- 2011 Cornell Guide for Integrated Field Crops Management. Electronically accessible at: <http://ipmguidelines.org/Fieldcrops/>.
- Cherney, J.H., Q.M. Ketterings, M.H. Davis, and D.J.R. Cherney. 2010. Split Application of Nitrogen vs. Dairy Manure on Temperate Perennial Grasses. Forage and Grazinglands doi:10.1094/FG-2010-0215-01-RS.
- Cherney, J.H., Q.M. Ketterings, M.H. Davis, and D.J.R. Cherney. 2010. Timing of semi-solid dairy manure applications does not affect yield and quality of orchardgrass. Agron. J. 102:537-543.
- Ketterings, Q.K., J.H. Cherney, K.J. Czymmek, E. Frenay, S.D. Klausner, L.E. Chase, and Y.H. Schukken. 2008. Manure use for alfalfa-grass establishment. Agronomy Fact Sheet No. 42. Dept. of Animal Science.

Disclaimer

This information sheet reflects the current (and past) authors' best effort to interpret a complex body of scientific research, and to translate this into practical management options. Following the guidance provided in this information sheet does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of particular discharge levels from agricultural land.

For more information



Cornell University
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Grass Management Manual
<http://forages.org>

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