

Guidelines for Nitrogen Management of 4-5 Cut Intensively Managed Grasses

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With Input From

The NMSP Internal and External Advisory Committees

Dairy producers are increasingly able to harvest 4-5 cuttings of grass hay per year (versus 3-4 cuttings) and managers have asked for updated nitrogen (N) and manure application guidelines that reflect this reality. Generally, when a field is 50% or more grass, it should be managed as a grass. Fields with 50% or more legume should be managed with a focus on legume requirements. In most conditions and given adequate rainfall, supplemental N to grass stands will increase yield and protein content. In addition, the dense sod formed by grass root systems substantially limits N losses below the root zone.

At first green-up in early spring, while manure can be the N source, fields are often too wet to handle traffic from heavy manure tankers and grass may be more responsive to the readily available N in urea or UAN fertilizer. As with the 3-4 cut system, N allocation for a 4-5 cut system can be 75-100 pounds of fertilizer N per acre at green-up, followed by 50-75 pounds of N per acre after first cutting, and 50 pounds N per acre after subsequent cuttings for a total of 275 pounds of N per acre. Research suggests that the N allocation after each cutting is less important than the total N applied at green up and after first cutting, so producers can choose to shift the N allocation per cutting, using 275 pounds of N per acre from manure and/or fertilizer as an annual upper limit. For example, an application of 125, 100 and 50 pounds of N per acre could be made at green-up, after first, and after second cutting, respectively.

If manure is used, the standard manure N credit charts should be employed. The example below shows 50 pounds of N credit per acre with a surface application of 9,500 gallons per acre based on a liquid manure sample with 15 pounds of organic N and 10 pounds of inorganic N per ton of manure. This example does not include organic N credits from past manure applications. In this example, the 9,500 gallons also contain 38 pounds of P_2O_5 and 95 pounds of K_2O . The latter could cause elevated potassium levels in the crop and may not be suitable for dry cow rations. Injection of manure, instead of surface application, reduces the rate needed to meet 50 pounds of N per acre to 5,500 gallons per acre in this example. This reduction in rate also lowers the P application to 20 pounds of P_2O_5 per acre and the K application to 55 pounds of K_2O per acre.

Three items of caution: (1) odors resulting from surface application of stored manure can impact neighbors and may limit application opportunities; manure injection equipment can greatly reduce odor issues without harming the stand; (2) some farmers have reported crop damage after use of high rates of manure; farmers accept full responsibility for crop injury or other issues that may arise when electing to use high rates of manure; (3) over time, multiple applications of manure in the same crop year will cause soil P accumulation and may eventually restrict future manure spreading because of P index guidelines.

Example:

Crop available nutrients from manure - current year						v1.2 October 2005		GL Albrecht, QM Ketterings, and KJ Czymmek			
Manure Analysis						Fertilizer Value of Manure					
Animal Species	Cows					Cost per pound of nutrient					
Units	lbs/1000 gallons					N	\$	0.38	/lb		
Total N	25	lbs/1000 gallons				P ₂ O ₅	\$	0.27	/lb		
Ammonium-N	10	lbs/1000 gallons				K ₂ O	\$	0.19	/lb		
Organic-N	15	lbs/1000 gallons				<i>Note: the actual value of manure nutrients, calculated below, depends on the cost of application and the need for N, P₂O₅ and K₂O by the crop.</i>					
P ₂ O ₅	4	lbs/1000 gallons									
K ₂ O	10	lbs/1000 gallons									
Total Solids	8	%									
Density	8.34	lbs/gallon									
Past Manure Applications						Past Applications					
Units	gallons					N Credit					
Applied last year	0	gallons/acre	0	lbs/acre	0	lbs/acre	\$	-	/acre		
Applied 2 years ago	0	gallons/acre	0	lbs/acre	0	lbs/acre	\$	-	/acre		
Total N available from past applications					0	lbs/acre	\$	-	/acre		
Current Manure Application						Current Applications					
Units	gallons					Nutrient Credit					
Application Rate	9500	gallons/acre				Ammonium-N credit	0	lbs/acre	\$	-	/acre
Application Method & Timing	Topdressed or incorporated after 5 days					Organic-N credit	50	lbs/acre	\$	18.95	/acre
<div style="border: 1px solid black; padding: 2px; display: inline-block;">Manure Organic-N Availability Chart</div>						Total N available from current application	50	lbs/acre	\$	18.95	/acre
<div style="border: 1px solid black; padding: 2px; display: inline-block;">Manure Ammonium-N Availability Chart</div>						Total P₂O₅ from current application	38	lbs/acre	\$	10.26	/acre
						Total K₂O from current application	95	lbs/acre	\$	18.05	/acre