Poultry litter
What is *in* it for row crops?

Robert Florence

Soil, Plant & Pest Center
SoilLab.Tennessee.edu

County Agent In-service
Jackson, TN
December 12th, 2019

Great resources

Dr. Shawn Hawkins
Department of Biosystems Engineering and Soil Science.

W 796

Litter Land Application Management

https://extension.tennessee.edu/publications/Documents/W796.pdf

DEPARTMENT OF AGRICULTURE

2019 Certified Manure Testing Laboratories

https://www2.mda.state.mn.us/webapp/lis/manurelabs.jsp

Producer

Q) I am going to apply poultry litter, how much should I put down?

Extension agent

Q) What did its analysis come back as? *and*

What is the soil result? *and*

What crop are you going to?

Q) What did its analysis come back as?

University of Arkansas example report

% H20	52.4				
% Solids	47.6				
			-on dry basis-	Water	
Total %N	4.16		Total %Mg	Extractable P mg/kg	
			Total %S		
Total %P	1.20		Na,mg/kg		
			Fe,mg/kg		
Total %K	3.28		Mn,mg/kg		
Total %Ca	1.63		Zn,mg/kg		
Total %C			Cu, mg/kg		
NO3-N, mg/kg			B, mg/kg		
NH4-N, mg/kg			Al, mg/kg		

Available nitrogen = Total N x 0.45

Almost ½ of the total N is available at spreading

Incorporation may give you a slightly higher available amount

University of Arkansas example report
https://cpb-us-e1.wpmucdn.com/wordpressua.uark.edu/dist/3/599/files/2019/05/Manure-Dry-Example-report.pdf

Q) What did its analysis come back as?

University of Arkansas example report

		-lbs/ton on as-is basis-		
N	39.6	Mg		Water Extractable P
P2O5	26.2	S		
K2O	37.8	Na		
Ca	15.5	Fe		
Carbon		Mn		
NO3-N		Zn		
NH4-N		Cu		
		B		

Sulfur can be 15 lbs. / ton in litter.

J. Gaskin and G. Harris. 2017

Manganese, Copper, and Zinc can be about 0.5 lbs. / ton in litter.

J. Gaskin and G. Harris. 2017

University of Arkansas example report
https://cpb-us-e1.wpmucdn.com/wordpressua.uark.edu/dist/3/599/files/2019/05/Manure-Dry-Example-report.pdf

J. Gaskin and G. Harris. 2017. Poultry litter applications on pastures and hayfields. UGA Extension. Bulletin 1330.
https://extension.uga.edu/publications/detail.html?number=B1330&title=Poultry%20Litter%20Application%20on%20Pastures%20and%20Hayfields#:~:targetText=Poultry%20litter%20is%20also%20a%20source%20of%20secondary%20nutrients%20such,for%20four%20to%20five%20years.

Sidebar *Variability*

	Lbs./ ton as-is basis			
N	58	74	58	62
P_2O_5	64	62	30	38
K_2O	40	44	60	66
	Malone, 1992	Patterson *et al.*, 1998	Chamblee and Todd, 2002	Bowers *et al.*, 2002

Summary of literature review by:
Coufal *et al.* 2006. Measurement of broiler litter production rates and nutrient content using recycled litter. Poultry Science. Vol 85. Issue 3. pg. 398 to 403. https://academic.oup.com/ps/article/85/3/398/1573033

Solid

Sample while loading

Take at least 5 sub-samples from multiple loads, mix well, combine to make a 1 lb sample
sampling directly from a stacked or bedded pack is not recommended.

During Spreading

Spread tarps in a field (6.7 ft^2 = $1/1000^{th}$ acre).

Combine samples from multiple locations and mix well to create one composite sample

Pictures from John Peters

Liquids

Pit

Agitate the pit well (2 to 4 hours) before sampling
Place several sub samples in a large bucket

Loading

Pictures from John Peters

Solids

A gallon heavy duty plastic bag filled half way, with air squeezed out.

Liquids

A 1 quart plastic bottle (not glass)

Freeze if not taken to lab immediately

Sidebar *Value*

There is money in that litter….

63 pounds N / ton (assume 45% available)
then 28 pounds of N / ton is available

$17 of N per ton

55 pounds P_2O_5 / ton

$24 of P_2O_5 per ton

47 pounds K_2O / ton

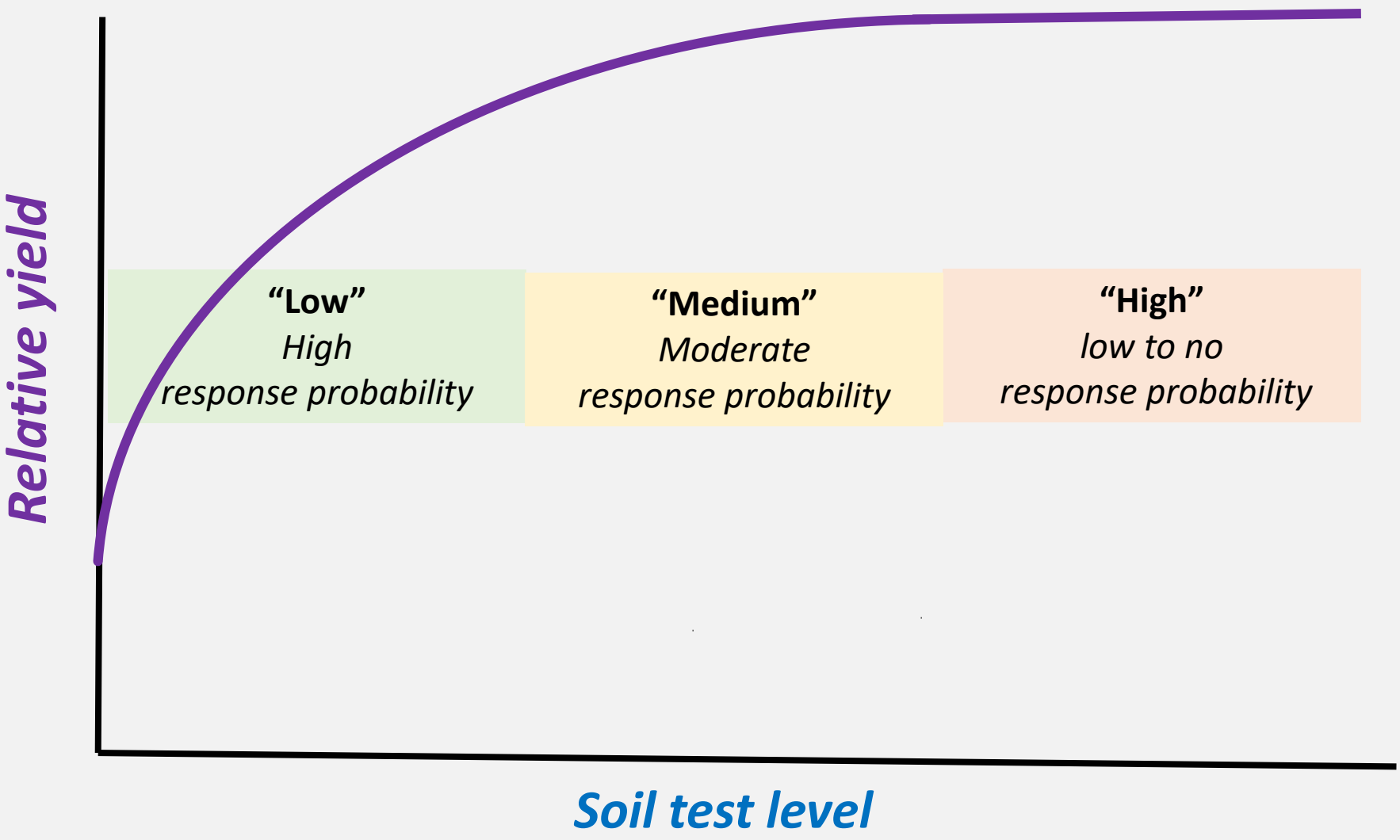
$15 of K_2O per ton

$56 of nutrient per ton

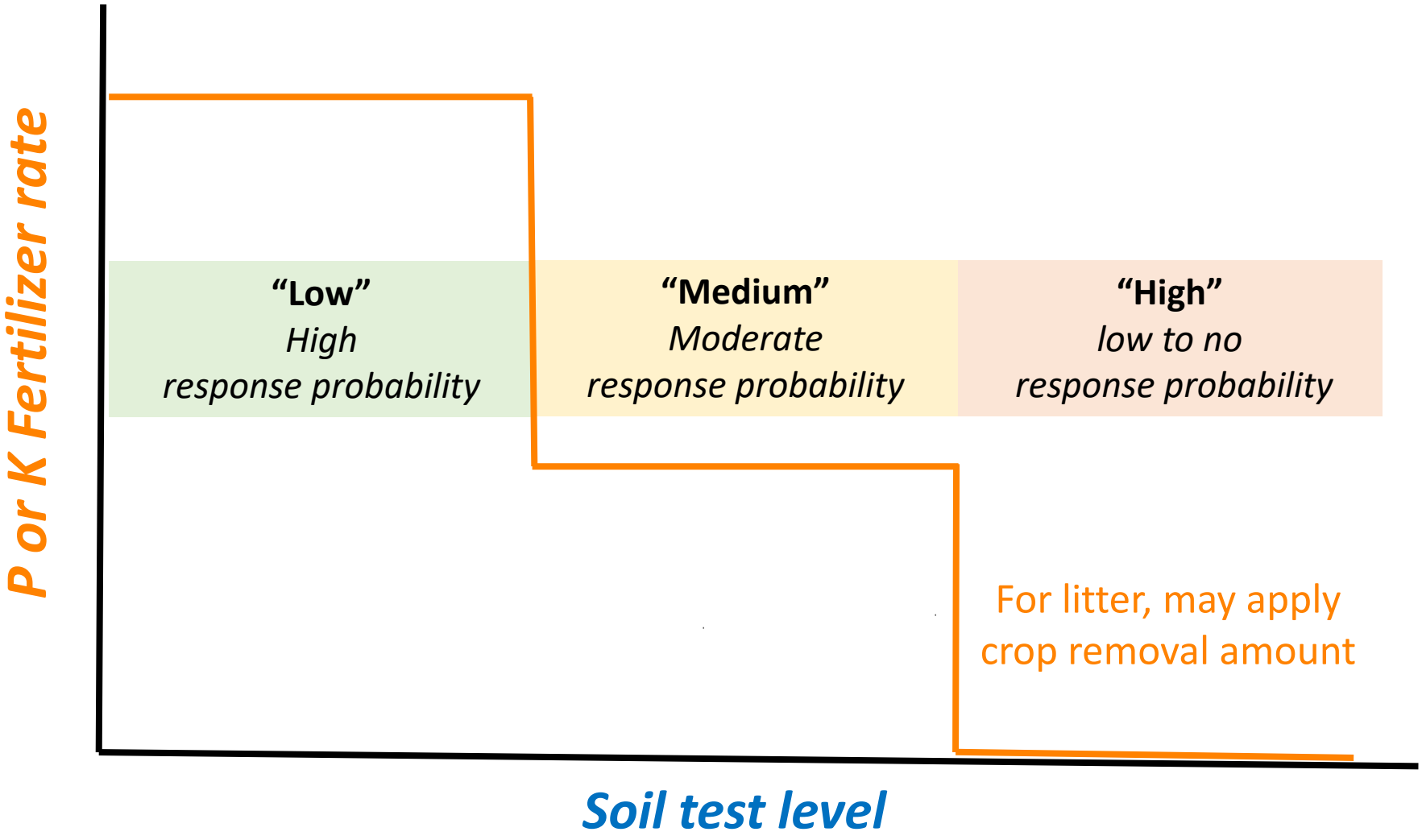
Assuming

Fertilizer	Cost per ton
40 - 0 - 0	$ 485
18 - 46 -0	$ 520
0 - 0 - 60	$ 385

What are the soil results?



What are the soil results?



What are the soil results? Balancing act

Poultry litter has N , P, and K…

If apply to P rate

One may need supplemental N or K, depends

If soils are very high in phosphorus,

Try applying to other lower P field first.

Amount of litter to meet N need or crop removal may be considered.

May need to apply supplemental nutrients.

If litter application did not meet the N, P, or K needs.

What crop are you going to?

This drives your nitrogen rate…

Crop Description			Nitrogen (lb/ac) (N)	
			Establish	TopDress / Maintain
AGRONOMIC CROPS				
Corn Grain[1] (grain yield @ 15% moisture)	Maintain=Split Applied @V6 (≈ 16" tall)	100-125 bu/ac	120	0
		126-150 bu/ac	50	100
		151-175 bu/ac	60	120
		176-200 bu/ac	70	140
		201-225 bu/ac	80	160
Canola[2]			30	110
Cotton			60-80	0
Sorghum[3]	Grain		60-90	0
Small Grain[4]			15-30	60-90
Soybeans[5]			0	0
Sunflower	Seed	1st Crop	90-120	0
		2nd Crop	45-60	0
Switchgrass[6]	Biofuel		0	0
Tobacco			150-200	0

From S. Hawkins. 2018. Litter Land Application Management. UT Extension publication W796.
https://extension.tennessee.edu/publications/Documents/W796.pdf

What crop are you going to?

This drives your crop removal

(which also has variability)

Corn		Soybeans	
P_2O_5	K_2O	P_2O_5	K_2O
Removal range *(pounds per acre)*			
27	21	21	45
66	47	53	85
Assuming 150 bu/acre		*Assuming 50 bu/acre*	

Information extrapolated from:

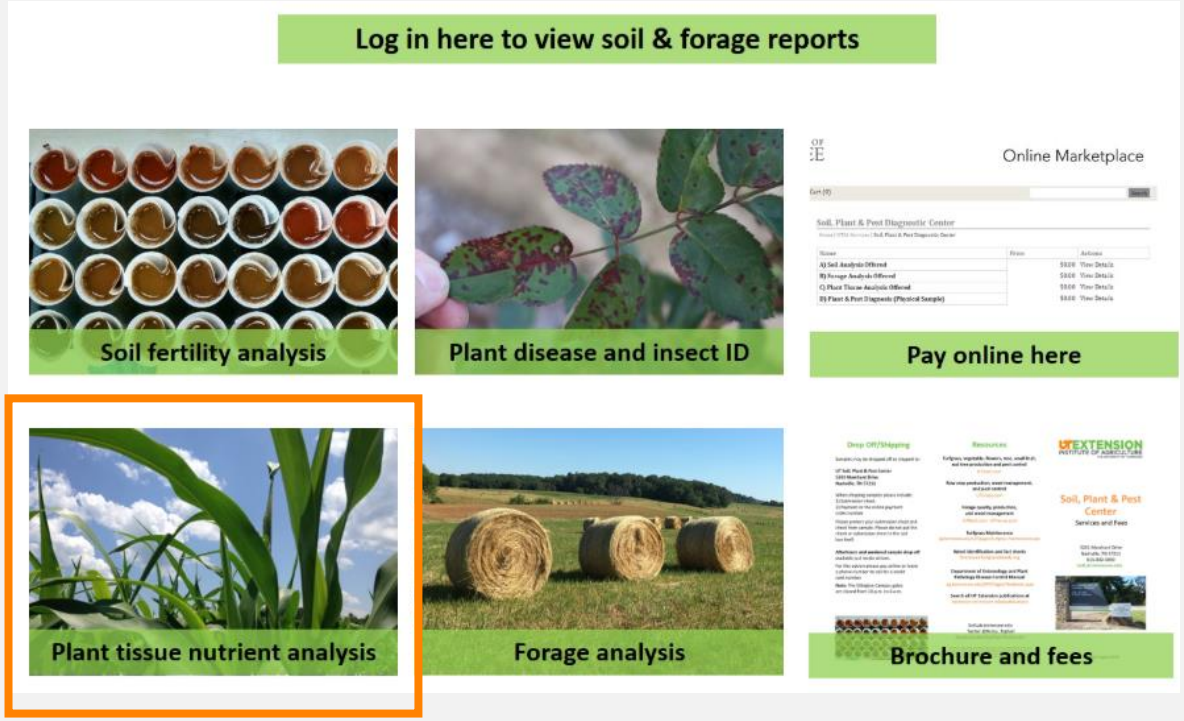
A P Mallarino *et al*. 2011. Nutrient uptake by corn and soybean, removal, and recycling with crop residue. Integrated Crop Management Conference. Iowa State University. Des Moines, Iowa.

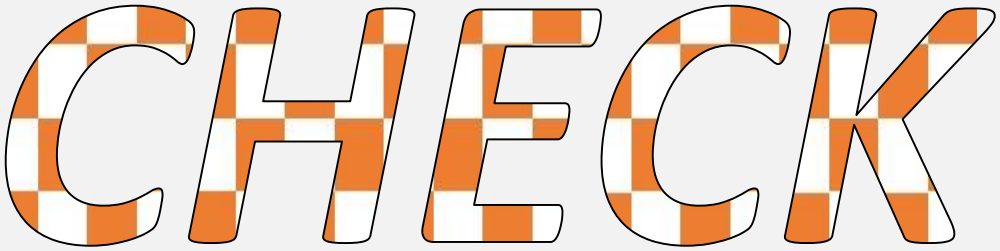
What crop are you going to?

We can test your grain for removal rates…

Mineral test is $20 and Includes:
Phosphorus, Potassium, Calcium, Magnesium, Sulfur, Zinc, Manganese, Iron, Boron, and Copper

SoilLab.Tennesse.edu





Your soil, litter, and grain/silage

Questions?

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