Using Management to Reduce Fertilizer Costs
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When growing crops, close attention to nutrient, water, labor, and energy use efficiency is critical. With energy costs at an all time high, it is critical to maximize productivity in relation to every input. Corn is very responsive to fertilizer and exhibits deficiency symptoms to a greater degree than most crops commonly grown in the Deep South. Likewise, fertilizer has always been one of the main expenditures in growing corn for grain or silage. Relatively cheap fertilizer prices over the past several decades changed management of fertilizer from row applied to broadcast applications. Higher analysis fertilizers allowed many acres to be spread in a day with little or no handling by hand. With recent spikes in fertilizer prices and no relief in sight, growers are looking for ways to reduce cost. Research with banded applications of P and K fertilizer and in row anhydrous ammonia has been shown to significantly reduce costs and yields are often increased when fertilizer is applied near the row at planting. Micronutrients may also be used with other dry materials at planting and sulfate forms of Mn or Zn can be used that are normally cheaper per pound of nutrient than chelates. Therefore, higher rates of material may be applied near the plant that is available in higher concentrations throughout the growing season than when these materials are broadcast over the field. Specific equipment is available through many of the fertilizer dealers that allow moving fertilizer material from gravity flow wagons into banding equipment. There is more labor involved but the result is less fertilizer needed and higher yields are produced. An example of the differences is shown below.

Current cost of fertilizer:		price/lb
DAP	$1000/ton	$1.09
Muriate of potash	$600/ton	$0.50
28-0-0-5	$360/ton	$0.64
Amm. Nitrate	$425/ton	$0.62
Urea	$650/ton	$0.71
Anh. Ammonia	$730/ton	$0.44

Our research has shown that fertilizer (P and K) can be reduced by at least a third when banded vs. broadcast applications with as much as a 7-10% yield increase. Nitrogen applications are not reduced but anhydrous ammonia may be used to reduce the cost by about 1/3 as compared to solid or liquid sources.
An example of savings is shown below and these levels are demonstrated in the field. Soil test call for 60 lbs/A of P_2O_5 and 180 lbs/A of K_2O and 200 lbs/A of N as 28-0-0-5 will be compared to anhydrous in both systems.
The following has 1/3 less nutrients of P and K used in the band:

	Broadcast	(cost/A)	Band
60 lbs P2O5	$65	1/3rd less	$44
180 lbs K2O	$90	1/3rd less	$60
200 Lbs N	$128 as 28-0-0-5		$88 as anhydrous
Minors	$10		$10
Total cost	$293		$202
Cost/ton silage	$12.73		$8.08

From our research, we would expect corn silage yields to be increased from 23-about 25 tons/A if we banded fertilizer vs. a broadcast application. Growers should try a portion of their farm with this

management to make sure that this management works on their farm. It is critical that anhydrous ammonia gets a good seal if put out at the same time as planting. Otherwise, seedling damage can occur.

Table 1. Total Nutrient Uptake of Corn Plants at Several Stages of Growth and age (Quincy)

Stage of Growth	Days after planting	N	P	K
		Lbs uptake/A		
20 inches	41	14	2	27
48 inches	60	72	8	116
Tassel	82	122	18	191
Maturity	132	280	45	296

The crop removed almost 300 lbs/A each of both nitrogen and potassium, and about 50 lbs/A of phosphorus. These nutrients must be available from the soil or applied to the crop during growth, along with about 30 lbs/A of sulfur in the sulfate form, and 2 lbs/A of boron. Nitrogen, sulfur and boron should be applied in at least three split applications if grown under irrigation because of their mobility in the soil, with a third or less at planting and two sidedress applications. Since starter fertilizer is important for early growth of corn, the initial application of nutrients should be applied as starter. Micronutrient applications of zinc and manganese at 2 to 3 lbs/A often result in dramatic responses in grain yield. Soil-test levels of phosphorus and potassium should be determined and the rate of application adjusted accordingly. A silage crop that takes up 300 lbs. of N has about one ton of protein produced from that acre.