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WHEAT SEED QUALITY CONCERNS

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Significant Fusarium Head Blight (FHB) this past spring has resulted in seed quality concerns for wheat planting this fall. Recent records from the University of Kentucky Seed Testing Laboratory, indicate that almost 80% of the samples received by the laboratory since harvest had substandard germination (i. e., < 85% germination). The range of samples submitted is shown below:

% Standard Germination	% of Samples Received
>95	1.8
90-94	7.8
85-89	9.0
80-84	9.0
70-79	28.1
60-69	25.1
50-59	8.4
<50	9.0

As can be seen from the above table, the majority of the seed samples received have a standard germination of 79% or less. Almost 43% have a standard germination of 69% or less. Almost 20% had germination below 60%. One seed lot came in with a standard germination of only 29%! Interestingly enough, much of the low germination wheat seed is fairly good looking and has a high test weight. This happens when environmental conditions are not conducive for FHB symptom development, but late-season activity by the causal fungi results in high levels of seed infection and DON (i.e., vomitoxin) accumulation. Delayed harvest can result in the same situation. Of course, there were also plenty of fields that did have significant FHB symptom expression.

We are unaware of major concerns from commercial seed companies regarding availability of high germination seed for planting this fall. They, of course, have the option of using seed grown in areas not significantly impacted by FHB. However, many wheat producers, in an attempt to reduce production costs, plan on planting saved seed on their farms this fall.

For the record, we recommend planting certified seed when possible. Certified seed must meet minimum germination (85%) and purity standards, and this takes much of the guesswork out of the seed aspect of wheat production. Certified seed is also usually treated with a seed treatment fungicide. In some cases, economic conditions may force a producer to plant saved seed. In those instances, farmers can run into serious problems if they fail to consider the quality issue.

The good news in all of this is that most seed lots with substandard germination are responding well to seed treatment fungicides. For example, the UK Seed Testing Laboratory recently treated 50 low germination seed samples with a 50/50 mix of Raxil-Thiram. The result was an increase in germination to 85% or higher in 30 of the 50 samples. Percent germination following treatment was commonly increased 20-40%. The seed lot mentioned earlier in this article with a germination of 29% ended up with a germination of 85% following treatment. That is an increase of an amazing 56%! Keep in mind that while 30 of 50 samples were brought up to acceptable germination standards by treatment with Raxil-Thiram, there were 20 seed lots that could not be brought up to 85% germination. Most were close, but a few seed lots showed little response when treated. There are a couple possible reasons for this. One is that there was a lot of dead seed (or almost dead) seed. No amount of seed treatment would bring these seed back to life. Other possibilities would be mechanical damage and/or reduced seed vigor.

There are various fungicides that will do a very good job in managing seed-borne Fusarium. Specifically, products containing difenconazole (Dividend formulations), tebuconazole (Raxil formulations), and thiabendazole (various products) tend to perform the best. Products containing carboxin (Vitavax formulations) and fludioxonil (Maxim 4FS) will also provide some relief, but not as much as the previously mentioned materials. When possible, it is best to have the seed treatments applied commercially. Professional applicators have the proper equipment and experience to get excellent coverage of seed. This is essential for getting an acceptable response to fungicides. Most products, however, may

also be applied on the farm. Check with your ag supply dealer or pesticide salesman to determine your treatment options. Be sure to CHECK THE PESTICIDE LABEL to determine exactly what you may and may not do, and exactly how to proceed with on-farm treatment.

Some producers have a simple plan to deal with possible germination issues. The plan is to increase seeding rates to compensate for less than desirable germination. That tactic can work under a limited set of circumstances, but it can also backfire. If germ needs to be brought up a few percentage points, this should be no problem. However, if a seed lot has a significant germination problem, the tactic will begin to backfire. For example, at unusually high seeding rates, some planters will not be able to deliver as much seed, consistently, as is needed. Plus, since good and bad seed will be mixed at rather high percentages, there is the likelihood of very uneven stands developing due to groups of predominantly dead seed being planted here, and groups of predominantly good seed being planted there. Thin areas will not yield well and thick areas may lodge and have a variety of other problems. The worse case scenario would be to dump a lot of seed in the ground without having any idea of the seed lot's germination. This kind of "shot in the dark" approach has a high probability of failure. Hopefully, few farmers will consider that option if they are interested in anything but cover crop wheat.

WINTER WHEAT PLANTING DATES

Chad Lee—Grain Crops Extension Specialist
David Van Sanford—Wheat Breeding

The delayed corn and soybean planting this spring will likely push back corn and soybean harvest dates. The domino effect continues as the late harvest dates will delay winter wheat planting this fall.

The ideal planting dates for winter wheat in Kentucky typically are from October 10 through October 30. As reported in "ID-125, A Comprehensive Guide to Wheat Management in Kentucky", the ideal planting dates were chosen as the best compromise between earlier planting to ensure adequate fall growth and later planting to decrease disease and insect infestations.

The Kentucky Agricultural Statistics Service reports that 60% of the wheat is planted on time, 20% is planted early and 20% is planted late. The positive side of this report is that most of our wheat acres in Kentucky are being planted on time. The negative side of this report is that 20% of our wheat acres are being planted late, and are most likely seeing yield reductions.

Yield reductions in late-planted wheat are most likely to due to a decrease in fall tiller production compared with earlier plantings. Fall tillers produce heads of grain, so fall tiller production is essential to high yields. Late plantings of winter wheat often result in low tiller development. Applying up to 50 pounds per acre of nitrogen in the fall to late-planted wheat can help some with tiller production. But, that additional fall nitrogen will not compensate completely for late plantings. In addition, spring management practices on late plantings will not restore full yield potential.

If wheat was the primary crop for a farmer, we would suggest that the farmer plant all of the wheat on time to ensure maximum yields. However, we know that wheat can be planted only after the corn and soybeans are harvested. As a result, farmers are forced to plant wheat late in some situations.

Knowing the challenges that farmers face with wheat planting dates, a study was initiated at the University of Kentucky last year to address planting date. The goal of this research was to find varieties with tolerance to winter damage and late plantings. Six wheat varieties were planted at three dates near Princeton in western Kentucky and at three dates near Lexington in central Kentucky. Although we had very little winter damage last year, we observed that later plantings of wheat reduced head counts and yields. Wheat head counts were 25 to 48% lower for wheat planted after November 1 than for wheat planted within the ideal dates. Those lower head counts corresponded to wheat yields of 12 to 22% less than wheat planted within the ideal dates (Figure 1).

We expected to see lower wheat yields from late planting dates. However, we did not expect to see wheat varieties respond differently to planting date. Pioneer '25R37' planted on October 24 near Lexington yielded higher than any other variety planted at that date. Conversely, Kentucky American 'Allegiance' yielded lower than any other variety at that planting date. But, Allegiance yielded higher than any other variety while 25R37 was among the lowest-yielding varieties when planted in November (Figure 1). This flip-flop in variety performance across the different planting dates is a curious observation. With this observation occurring only at one site and only one year, we are in no way ready to recommend different wheat varieties for different planting dates. The possibility that, eventually, we could select winter wheat varieties based on planting date is tantalizing. As mentioned earlier, 20% of the wheat acres were planted late last year and we observed an average of 17% yield reduction for late-planted wheat. If we could match a wheat variety to later planting dates, then we could improve performance at late plantings and we could have a very positive impact on 20% of our acres.

As we continue to investigate wheat varieties and planting dates, we cannot match certain varieties for certain planting dates. However, we can recommend wheat varieties based on their performance across the state. The 2003 Kentucky Small Grains Variety Trials report is now available in print and online at http://www.uky.edu/Ag/GrainCrops/varietytesting.htm. In addition to help with variety selection, we can emphasize the importance of planting wheat on time. Do as much as possible to get the wheat planted on time. If the wheat will be planted late and tiller development is slow, then 30 to 50 pounds of nitrogen per acre can be applied. Fields with tiller counts

below 70 tillers per square foot will need a fall application of nitrogen. Although, this fall nitrogen does not always improve yields. Remember, that most management practices cannot compensate for late plantings and poor fall tiller development. If tiller counts remain below 70 tillers per square foot in the spring, then lower yields should be expected. Management inputs should be budgeted accordingly.

The 2003 Kentucky Small Grains Variety Trials results and "ID-125: A Comprehensive Guide to Wheat Management in Kentucky", can be found online at the University of Kentucky Extension Wheat Information page at: http://www.uky.edu/Ag/GrainCrops/Publications/smallgrains_pubs.htm. Once in the site, click on the "Production" heading to get to either publication.

Figure 1. Wheat yields from six varieties planted at three dates near Princeton, Ky and near Lexington, Ky.

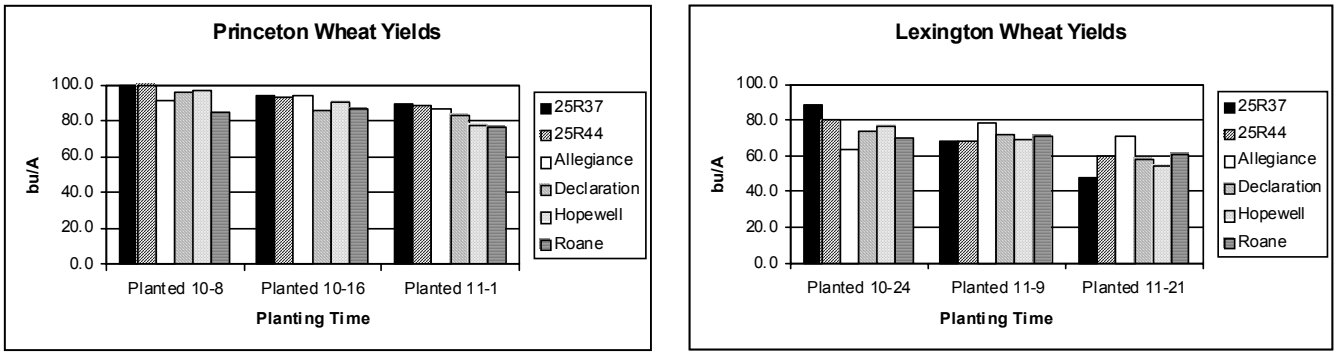

Table 1. Scenario of predicted income based on wheat yields of two varieties planted at different dates at Spindletop Farm in Lexington, Kentucky.

Planting all 25R38

Planting Date[1]	Percent Planted[2]	Acres	Yield (bu/a)[3]	Wheat Price[4]	Income
On-Time	60%	300	88.2	$3.16	$83,613.60
Late	20%	100	48.1	$3.16	$15,199.60
Totals	80%	500			$98,813.20

Planting all Allegiance

Planting Date	Percent Planted	Acres	Yield (bu/a)	Wheat Price	Income
On-Time	60%	300	63.7	$3.16	$60,387.60
Late	20%	100	71.3	$3.16	$22,530.80
Totals	80%	500			$82,918.40

Planting 25R37 Early and Allegiance On-Time, Late

Planting Date	Percent Planted	Acres	Yield (bu/a)	Wheat Price	Income
On-Time	60%	300	88.2	$3.16	$83,613.60
Late	20%	100	71.3	$3.16	$22,530.80
Totals	80%	500			$106,144.40

[1] "On-Time" was October 24 and "Late" was November 21, 2002 at Spindletop Farm in Lexington, Kentucky.

[2] Based on 5-year average planting progress reported by Kentucky Agricultural Statistics Service.
[3] Yields are based off of 2003 yield data at Spindletop Farm. Only the "On-Time" and "Late" planting dates are used in this example, since no wheat was planted early at Spindletop in 2002.
[4] Prices are based on July 31, 2003 bids at Louisville, Kentucky.

NITROGEN PRICES—BIG CHANGE

Lloyd Murdock & Greg Schwab
Extension Soils Specialists

There is presently a shortage of natural gas, which has caused the price to escalate. The price forecast for this coming year is at least 50% higher.

Almost all nitrogen fertilizers are made by converting natural gas into anhydrous ammonia. Urea, ammonium nitrate and liquid nitrogen are then manufactured from anhydrous ammonia. The other fertilizers are then made from anhydrous ammonia. About 80% of the cost of making anhydrous ammonia is in the cost of natural gas. Therefore, we can expect a large increase in the price of nitrogen during this coming year.

Of the N sources commonly used in KY, the price of anhydrous ammonia will have the largest percentage increase and should closely parallel the price of natural gas. The percentage price increase of the other N fertilizers should not be as high due to two factors: 1) the costs of converting anhydrous ammonia into urea and UAN are not as greatly affected by the natural gas price and 2) these fertilizers can be easily imported from other countries where natural gas is cheap. Although natural gas is less expensive in other countries this does not mean cheap nitrogen. We know from importing oil, that the price is based on what the market will bear. It will probably also be true in this case.

How long will the price of nitrogen remain elevated? Some estimate that the natural gas shortage will persist for at least two to four years and maybe longer. This means higher nitrogen prices for that long. The Fertilizer Institute reports that 45% of the nitrogen production capacity within the U.S. has already been "shut down" for the coming year. This is caused by companies projecting a loss from older, inefficient manufacturing facilities given the current price of nitrogen. Approximately 21% of U.S. production capacity has been permanently "shut down" according to the report.

All of this means higher nitrogen prices to the farmer. What alternatives does the farmer have? Not many. Really the only alternative is to use nitrogen as efficiently as possible in an effort to reduce the total amount nitrogen used in order to minimize the effect of the cost increase.

Methods of increasing efficiency are not new and we have discussed and thought about them over the years, but they become more valuable as N prices continue to escalate.

1. Legumes in the rotation will have an extra dollar benefit. Corn after corn will be a little less attractive.
2. Manure and other organic sources of nitrogen will be worth more now. We will need to do a good job of applying these so that availability and plant growth will be uniform throughout the field. The manure should be analyzed so that nitrogen content and its availability to the plant is known and credit can be given for every pound that we expect the plant to use. Injected or incorporated spring applied manure and cover crops with fall applications increases efficiency.
3. Use nitrogen rates that are proven to be sufficient. Many studies have been conducted to determine optimum N rates for crops under conditions common to KY. Fertilizer recommendations have been developed based on the results of these studies. Fertilizer recommendations can further be refined by on-farm tests using scales, weigh carts or yield monitors to measure crop yield on different nitrogen rate strips in the field. This will help prevent the use of extra nitrogen for "insurance"; which will become increasingly expensive in the future.
4. For wheat, fall application of nitrogen on timely plantings could be eliminated in most cases and this would save money and not affect yields.
5. For corn, sidedressing on many soil types can reduce total nitrogen application rates. The following practices can be effective in specific cases: injecting nitrogen on no-till production, using Agrotain when urea is surface applied at sidedressing and using of nitrification inhibitors with preplant nitrogen on wet soils can all help reduce total nitrogen rates.

Now is a good time to reevaluate your N practices. Calculating the cost or savings might change your mind when we see what the new nitrogen prices will be. The new price of nitrogen is not clear right now, but should become more so in the next few months

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FUSARIUM HEAD BLIGHT (HEAD SCAB) MANAGEMENT TACTICS

Don Hershman—Extension Plant Pathologist

Due to the rather serious Fusarium head blight (FHB) situation last spring, I thought it was prudent to outline some tactics which may help moderate the risk of FHB in the next wheat crop. I want to say up front, that no single tactic, or combination of tactics, will ensure that FHB will not be a serious problem next spring. The individual and collective tactics simply improve the chances for escaping serious FHB. Also, keep in mind that FHB is not a significant disease every year. In fact, limited FHB is the more common situation in Kentucky. Nonetheless, none of the tactics I am going to mention are very costly in terms of dollars spent. Consequently, you might consider many or all of the following tactics as a matter of course when producing your next wheat crop. The main "cost" is how they may limit some of your production decisions and options.

Plant High Quality Seed with Known High Germination: Planting certified seed is your best option because certified seed will have high germination and purity, and will be treated with a fungicide that will promote excellent stand establishment. The same results can be achieved when planting saved seed. However, the onus is on you to have the seed properly cleaned, tested for germination, and treated with a fungicide active against seed-borne Fusarium (i.e., materials containing difenconazole, tebuconazole, or thiabendazole).

Planting seed that has not been properly cleaned, tested for germination, and treated with a fungicide is be highly risky.

Plant Moderately Resistant Varieties:
There are a number of commercially-available wheat varieties that have moderate resistance to FHB. Resistance limits the spread of FHB within the head once infection has taken place. To my knowledge there are no varieties that resist the infection process. Nonetheless, planting varieties that reduce FHB symptom expression may help to limit yield losses due to FHB when disease pressure is light to moderate. Under heavy disease pressure, these varieties may still develop unacceptable levels of FHB. In addition, there is no guarantee that DON levels will be acceptable compared with non-FHB-resistant varieties. Thus, resistant varieties are not a "silver bullet, but they can help in a limited sense. Check with your local county Extension office or seed dealer for assistance in selecting varieties suitable for Kentucky that possess resistance to FHB.

Plant Varieties with a Range of Maturities at Different Times:
Last spring there was an approximate two-week window during which the majority of the wheat crop in central and west Kentucky flowered. Depending on the variety and planting date, some fields flowered more or less in the first week, and some in the second week. The first week was very favorable for FHB infection/development; the second week was unfavorable. The result was that fields differed greatly in FHB development simply due to the fact that they flowered at different times. This scenario was especially evident at some of the UK variety test locations scattered around the state. Unrelated to FHB resistance, some varieties were hammered by FHB and others where more or less disease-free. This disease management tactic is called "escape". Escape from FHB is the principle means of FHB management in Kentucky. Planting a range of varieties at different times is one way to encourage escape.

Rotation and Tillage:
Because the fungi that cause FHB also cause disease in corn and survive in corn stubble, there is considerable discussion within the wheat industry that one should avoid planting wheat into fields with any level of corn stubble. Planting no-till wheat into corn stubble is almost uniformly condemned within the industry because of the perceived increased risk of FHB and DON in harvested grain. This admonition may be appropriate in areas that normally grow wheat behind soybean, or in states where corn acreage is not widespread in the same area where wheat is produced. However, for Kentucky where corn and wheat acreage overlap, where most wheat is planted following corn (for logistics reasons), where there is almost always a harvested corn field within a short distance to any wheat field, and where a significant amount of corn stubble typically remains in fields following tillage operations; the link between no-tillage and planting wheat into corn stubble is not clear cut.

There is evidence for slight increases in FHB symptom severity, and for small increases in visually scabby kernels (VSK) and DON in harvested grain, when wheat is planted no-till into corn stubble. However, there is no evidence that there will be ***major*** differences in either FHB symptoms or DON accumulation. This statement is based on a three-year survey of commercial fields in Kentucky, on large-scale research plots over a two-year period, and on multi-year field observations. We have the least information on DON accumulation under different production scenarios. However, the limited data we have collected supports the notion of only slight increases in DON associated with no-till wheat production. The bottom line is this: the increased risk for modest increases in FHB severity, VSK, and DON appear to be offset by the comparatively greater advantages associated with no-till wheat production systems. That this statement is accurate is suggested by the increases in no-till wheat acreage over the last decade. It is also supported by conversations with certain producers who have planted no-till wheat during the last two years. The essence of these conversations is that FHB hurt their wheat yields little, and that they had little difficulty marketing their wheat at the same price as was given for wheat produced using other tillage systems.

Foliar Fungicides:
There is a great deal of data from across the United States showing that certain fungicides, when applied during early flowering, often suppress FHB symptoms and/or DON accumulation in harvested grain. Suppression of FHB symptoms and DON is typically in the range of 30-50 percent. Data also indicate that in situations where moderate to severe disease pressure exists, fungicide-treated wheat is likely to have unacceptably high levels of FHB symptoms, DON, or both.

Few wheat disease specialists in the country embrace the concept of applying foliar fungicides to manage FHB. This is due to lingering questions over treatment economics (i.e., how much good it is actually doing) and a serious lack of data on how treatments perform when applied using commercial application equipment. In addition, there are unanswered questions regarding when spraying for FHB is warranted and when the sprayer should be left in the shed. These questions are due to the sporadic occurrence of FHB in most wheat states, and our limited ability to forecast FHB epidemics.

Presently, there are no fungicides in the United States with a federal label which allows for application to wheat at early flowering or later. Five states (MI, MN, MT, ND, SD) have pursued, and where granted, section 18's for the use of Folicur (tebuconazole) for managing FHB in 2003.

Harvest:
When FHB symptoms are evident, adjust the combine so that the lighter, diseased grain is blown out the back of the combine along with the chaff. In some instances, aggressive "field cleaning" may help to reduce DON levels in harvested grain. However, high test weight grain may also have unacceptably high DON levels. This was the situation during the spring of 2003.

SELECTING WHEAT VARIETIES

Dave Van Sanford—Wheat Breeder

Choosing wheat varieties is frequently the most important management decision the Kentucky wheat producer will have to make. This key decision is complicated by such factors as the need for disease resistance, the extreme year to year climatic variation that we face in Kentucky, and the need to spread out the harvest maturity date so that every variety is not ready to combine at once. While the decision will never be simple, it can be made easier by following several principles.

Variety Performance

Wheat varieties are evaluated at seven locations throughout Kentucky in a combination of conventional tillage and no-tillage tests. Performance data were recently published in Progress Report 482 "2003 Kentucky Small Grain Variety Trials", available online at http://www.uky.edu/Ag/GrainCrops/Publications/smallgrains_pubs.htm. Many growers will ask about the variety that looked best in this year's test. It is more useful to know which varieties have performed well over a range of conditions. In evaluating the variety bulletin, the grower should recall the following: 2003 – very wet fall resulting in late planting, cool temperatures during grain fill leading to good yields but abundant head scab; 2002- excessive amounts of BYDV and a devastating May freeze in the central part of the state; 2001- record setting year in Kentucky. Wheat varieties that performed well under these conditions are more likely to perform well again. For growers who want to try a new variety, Kentucky data may be limited. However, you should be able to obtain data from the state or company releasing the variety. By comparing that variety with one that has done well in Kentucky, you will have some idea of its potential in our environment. Consider a new wheat variety that has been in the UK test for only one year. Now is the time to start researching it more thoroughly. Acquire performance data from surrounding states that may have tested the variety. Then, by the fall of 2004, you will be able to make a more informed decision on that and other varieties. For this fall, choose from among the excellent public and private varieties that have a proven track record in our state.

Sources of Information

In addition to the Variety Bulletin, growers should investigate other sources of information. It is very difficult to adequately sample all of the micro-environments in our state in the variety testing program. If your neighbor, who has similar soil types and a similar management style to yours, has had good success in growing a certain variety, you may want to give it a try on a small part of your acreage. Seed companies, consultants and agribusiness dealers have trials around the state; see if you can get a copy of their data. The ultimate decision is yours, and you must evaluate the information, testing conditions, and the source of the data.

Economic Analysis

Farmers are always interested in high yields, but the highest yielding wheats may not always be the most profitable. One needs to consider other economic factors such as disease susceptibility (may require fungicides), lodging (costs more to harvest), late maturity (delays soybean planting), and especially, low test weight (severe discounts at the elevator). After the 2003 harvest, it is clear that varieties with high vomitoxin levels (from head scab) represent a potentially huge discount for growers. All of these factors require study to determine the most profitable varieties for your operation.

Risk Management

It is **always** a good idea to minimize your risks by planting more than one wheat variety. In doing so, you hope to plant several varieties that complement one another in terms of disease resistance, maturity, and susceptibility to spring freeze damage. With regard to maturity, you want a combination that will allow you to harvest continuously. In thinking about maturity, it is important to think about susceptibility to spring freeze and the order in which you plant the varieties. If your choice for an early variety is also one that reaches jointing very early in the spring, then you will **not** want to plant this variety early because you will be setting yourself up for potentially major losses from spring freeze damage. Instead, the first variety you plant should be the one that breaks dormancy latest in the spring, and the variety that breaks dormancy earliest should be the last to be planted in the fall.

REMEMBER THAT STORED WHEAT?!

Sam McNeill—Extension Agricultural Engineer

With corn harvest gearing up to full speed, grain farmers should not forget to keep a watchful eye on stored wheat (especially 'scabby' wheat) to be sure it remains in stable condition during the fall. Stored grain managers can apply four watchwords—Sanitation, Loading, Aeration and Monitoring—that are widely used to distill diligent chores to a brief acronym (SLAM).

Sanitation—sanitation in the fall consists of cleaning up spilled corn or wheat that has been moved into or away from storage facilities. When cleaning, pay particular attention to the areas around portable auger hoppers, pits, dryers, bin doors and handling equipment. Grain left in these areas provides a readily accessible food source for insects and rodents which may invade storage structures after the loose grain is consumed. Certainly, thorough bin cleaning procedures should be implemented if wheat is removed from a bin to allow room for the incoming corn crop.

Loading—how storage bins are loaded can have an important influence on the local storage environment in the top of a bin during the fall. Bins that are filled much above the top ring will not ventilate well in the headspace above the grain surface. Overfilled bins can lead to poor air flow and condensation problems when grain is cooled by aeration. Wheat will store better when the center peak is removed because it allows more uniform air movement through the top portion of the bin. Form an inverted cone by removing some wheat to reduce grain depth in the center of all bins.

Aeration—stored wheat should be kept within 10 to 15 degrees of the average monthly temperature (70 in September, 60 in October, 50 in November and 40 in December) to help control mold and insect activity. One of the finer points to cooling wheat in the fall is to be sure and run the fan long enough to remove any condensed water from the bottom of the bin roof. Otherwise, it can drip back on the grain surface where it will be absorbed by the wheat and cause spoilage. After cooling grain to 40 degrees in December, seal all fans with a tarp or plastic sheet to block cold winter air drafts from moving through the bin.

Monitoring—when checking stored wheat pull grain from three to five locations just below the surface in the top of the bin to gather a representative sample. Check grain temperature and moisture content and look for surface moisture, signs of 'roof drip' or condensation. Inspect grain closely to look for signs of insect activity, especially if they have caused damage to individual kernels. Consider using pit traps as an inexpensive tool for monitoring insect activity and remember that it's best to check wheat every two weeks during the fall to be sure the grain remains in good condition. Most importantly, always be mindful of the safety hazards involved with stored grain inspections.

Wheat prices are high enough to provide sufficient incentive for diligent management. With a little luck prices will increase so that good managers will be rewarded for their efforts. More information on stored wheat management is available at the UK Cooperative Extension Service office in your county

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