

July 31, 2006**FEFO 06-12****Has Variability in Corn Yields Been Reduced?**

Some suggest that corn yields have exhibited less variability in recent years than in the past. Less variability could be caused by favorable weather conditions in recent years, advances in corn genetics caused by improved breeding and biotechnology, and general improvements in farming technology. Yields from farms enrolled in Illinois Farm Business Farm Management (FBFM) were used to evaluate whether yield variability has been reduced. Evidence suggests that widespread yield losses occurred in 1983 and 1988. Losses as large as in 1983 and 1988 did not occur in the 1990s or early 2000s. Yield shortfalls, however, are still possible.

Relative yields

Corn yields from farms enrolled in Illinois Farm Business Farm Management (FBFM) were used to calculate “relative yields”. A relative yield equals a year’s actual yield divided by the average of the previous four-years of yields, times 100. A farm with a yield of 120 bu. whose previous four-year average yield is 150 bu. has a relative yield of 80% (i.e., $120 \text{ bu.} / 150 \text{ bu.} \times 100$). A relative yield of 100% means that the yield is equal to the previous four-year average, a 120% relative yield means that the yield is 20% higher than the previous four-year average, and an 80% relative yield means that yield is 20% lower than the previous four-year average.

Relative yields have crop insurance interpretations. The four-year average yield used to calculate the relative yield is the same as is used to calculate the Actual Production History (APH) yield (Up to ten years can be used to calculate the APH yield). Relative yields can be compared to coverage levels to see if yield insurance would make payments. Take, for example, a relative yield of 78%. Yield insurance would pay if an 80 or 85% coverage level had been selected while payments would have occurred for coverage levels of 75% or below. These comparisons are valid only for yield insurances as price changes have to be considered when determining payments from revenue insurances.

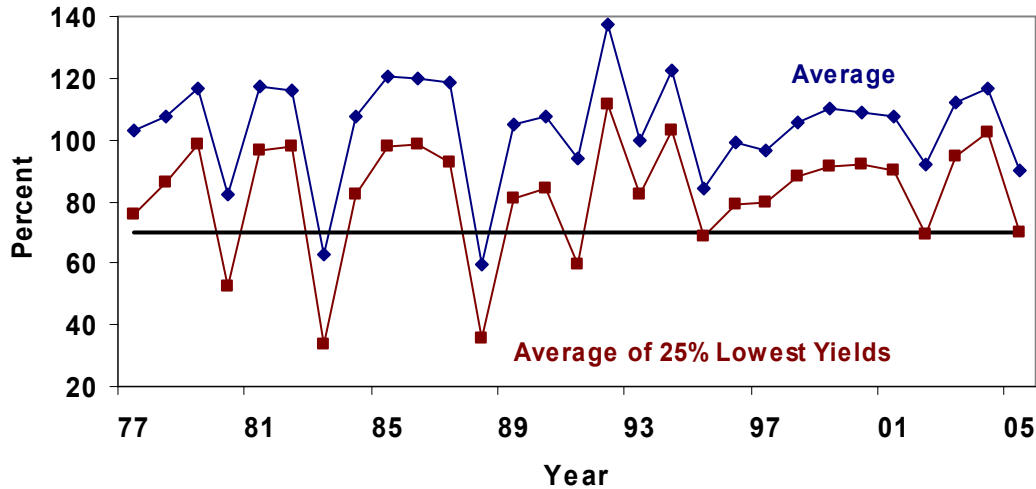
Relative yields across Illinois

Figure 1 shows relative yields averaged across all farms for 1977 through 2005. Over all years, relative yields averaged 104%, indicating that yields are increasing over time. However, there is a great deal of year-to-year variability. The year with the highest relative yield is 1992 with an average of 138% while the lowest year is 1988 with an average relative yield of 60%.

The average line in Figure 1 shows year-to-year yield variability. It does not quantify the worst yields faced by farmers. To gain more of a feel for the downside, the average of farms having the lowest 25% of yields also are shown in Figure 1. In 2005, the lowest 25% yields have an average relative yield of 79%, 20 percentage points below the average relative yield for all farms (90%). Across all years, the lowest 25% range from 20 to 34 percentage points below the average of all yields.

Both the average of all farms and the average of the 25% lowest yields indicate that the worst yielding years occurred in the 1983 and 1988 (see Figure 1). The average of the 25% lowest yields is 33% in 1983 and 35% in 1988. Compared to these two years, yields have been relative stable since 1991. Since 1991, the average of the 25% lowest yields has not been below 70%.

Figure 1. Corn Yield as a Percent of Previous Four-Year Average Yield, Illinois FBFM Farms, 1977 - 2005.



Relative yields by region

Averaging yields across the entire state masks variability that exists within Illinois. Relative yields are further broken down in Figure 2 for northern (Panel A), central (Panel B), and southern (Panel C) Illinois.

For Northern Illinois, 2005 was the fourth lowest yielding year between 1976 through 2005 (see Panel A). In 2005, relative yields average 65% for the lowest 25 percent of yields. Years with lower yields include 1988 (the lowest 25% relative yields average 31%), 1983 (52%), and 1991 (61%).

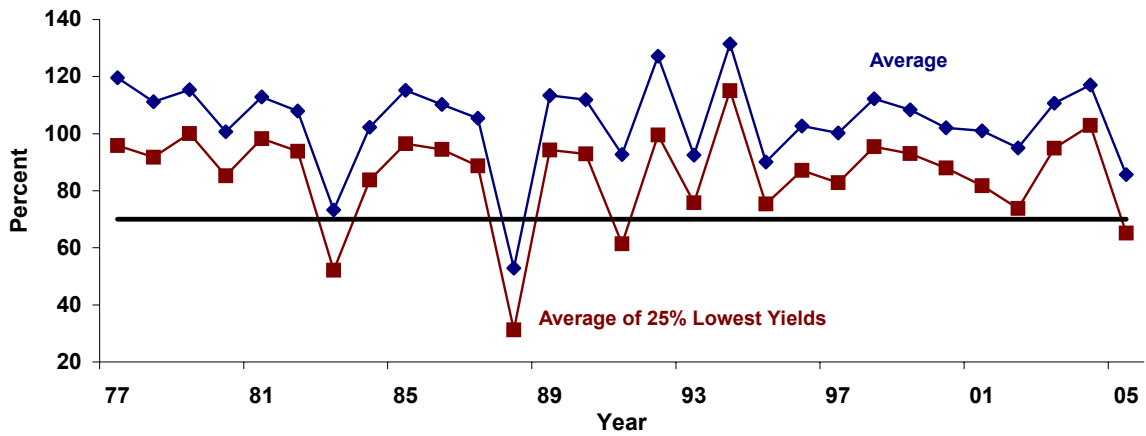
Central Illinois had relatively stable yields between 1995 and 2005 (see Panel B). Low yielding years include 1988 (the lowest 25% of yields average 32%), 1983 (41%), 1980 (50%), 1991 (62%), and 1995 (70%). In 2005, 70% is the average of the 25% lowest yields.

Yields in southern Illinois were close to average in 2005 (see Panel C). The average relative yield in 2005 is 101% while the lowest 25% of yields average 78%. Southern Illinois had a drought in 2003, resulting in an average 47% relative yield for the 25% lowest yields. Other low yielding years in southern Illinois included 1983 (the lowest 25% of yields average 22%), 1980 (45%), 1988 (54%), 1991 (55%), and 1995 (61%).

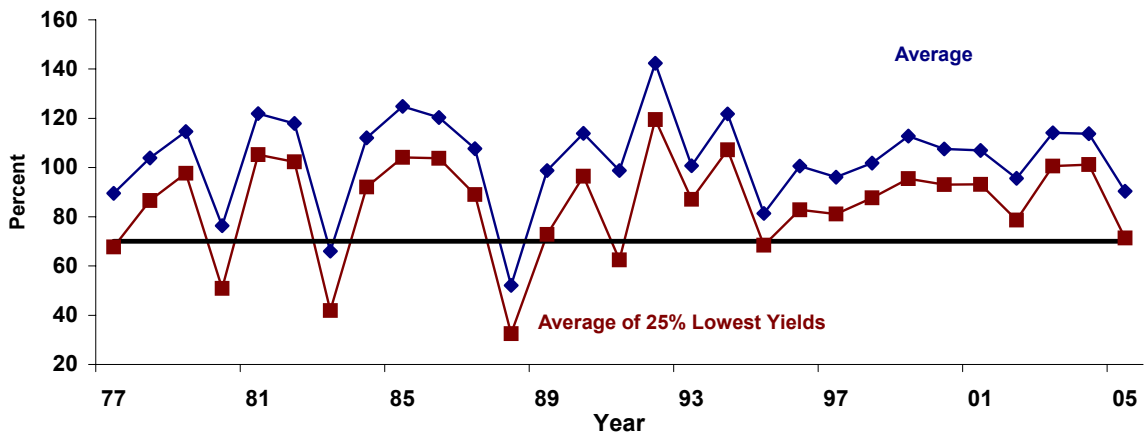
A different view of yield shortfalls is shown in Table 1. Results in Table 1 were computed by finding the lowest relative yield for each farm for three time periods: 1976 through 1985, 1986 through 1995, and 1995 through 2005. The worst yields for each farm were averaged and then reported in Table 1.

Figure 2. Corn Yield as a Percent of Previous Four-Year Average Yield by Region of the State, Illinois FBFM Farms, 1977 - 2005.

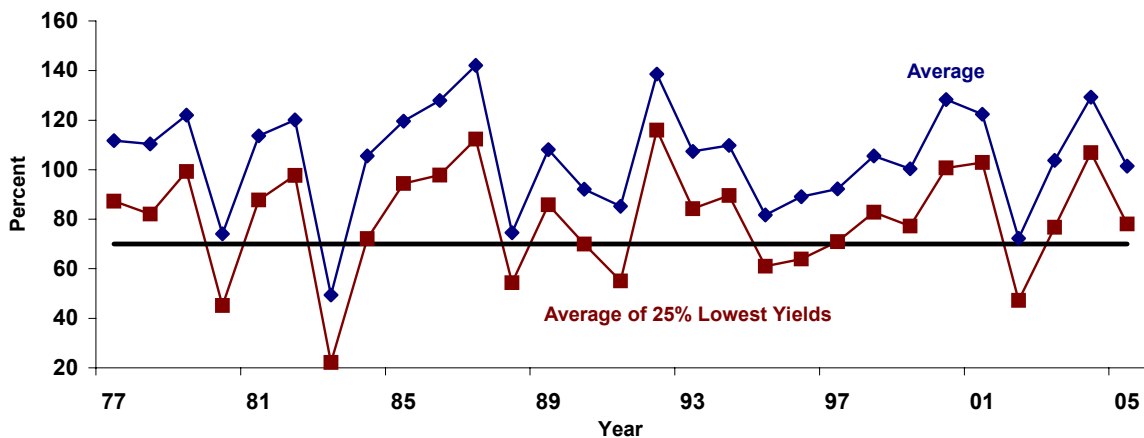
Panel A. Northern Illinois



Panel B. Central Illinois



Panel C. Southern Illinois



For northern Illinois, the worst relative yields average 76% for 1976-1985, 65% for 1986-1995, and 80% for 1996-2005 (see Table 1). The 1986-1995 average is lower than the other two periods because of 1988. Taking 1988 out of the 1986-1995 period causes the average for the 1986-1995 to rise towards the other two periods.

For central Illinois, the average worst yields for the 1976-1985 period (66%) and 1986-1995 period (64%) are significantly lower than the average for the 1996-2005 period (82%). Eliminating 1983 from the 1976-1985 period and 1988 from the 1986-1995 period would cause the averages for all three periods to be much closer. Central Illinois did not have a low yielding year in the 1996-2005 period comparable to low-yielding years in the previous two periods.

For southern Illinois, most farms had their worst yield in the 1976-1985 period. During this period, the average worst yield is 52%. Averages for the latter two periods are higher: 68% for 1986-1995 and 67% from 1996-2005.

Table 1. Average Worst Yields as Percent of Previous Four-Year Averages, Illinois FBFM Farms by Region and Time Period.

Region	Years		
	1976-1985	1986-1995	1996-2005
	Percent of Four-Year Average		
Northern	76%	65%	80%
Central	66%	64%	82%
Southern	52%	68%	67%

Summary

The years 1983 and 1988 were two of the worst yielding years over much of Illinois. Since 1988, years of lower yields have occurred, but they have tended to be regional in nature. For example, many northern farms had low yields in 2005 while many southern Illinois farms had low yields in 2003. When viewed using averages, these low yielding years have been less severe than previous years. Compared to the 2005 relative yield, Northern Illinois had lower yields in 1988, 1983, and 1991. Compared to the 2003 relative yield, southern Illinois had lower yields in 1983 and 1980.

Better genetics and farming practices may have caused less severe losses in recent years. It also may be that weather conditions that resulted in low yields in 1983 and 1988 have not occurred since 1988.

Acknowledgements

Data used in this study comes from the local Farm Business Farm Management (FBFM) Associations across the State of Illinois. Without their cooperation, information as comprehensive and accurate as this would not be available for educational purposes. FBFM, which consists of 6,000 plus farmers and 60 professional field staff, is a not-for-profit organization available to all farm operators in Illinois. FBFM field staff provides on-farm counsel with computerized recordkeeping, farm financial management, business entity planning and income tax management. For more information, please contact the State FBFM Office located at the University of Illinois Department of Agricultural and Consumer Economics at 217-333-5511 or visit the FBFM website at www.fbfm.org.

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