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FIVE-YEAR OLYMPIC AVERAGE YIELDS AND ACRE

Five-year Olympic average yields will enter into the calculation of eligibility and amount of payments received under Average Crop Revenue Election (ACRE), an option made available in the 2008 Farm Bill for receiving commodity program payments. In this paper, differences in 2009 Olympic average yields across farms are examined using Illinois Farm Business Farm Management (FBFM) yield data. Given typical state ACRE payments, corn payments will vary by \$15 per eligible planted acre across Illinois farms, soybean ACRE payments will vary by \$12 per eligible planted acre, and wheat ACRE payments will vary by \$33 per eligible planted acre. Over time, farm Olympic average yields will increase, but there will be some years in which Olympic averages will decline. On a state basis, farm Olympic average yields will decline in about one-third of the years, given that history provides a reasonable guide for the future.

Farm Olympic Average Yields and ACRE

This paper focuses on how five-year Olympic average yields impacts ACRE payments. More detail on ACRE provisions is provided in "Questions and Answers about the ACRE Provision of the 2008 Farm Bill" and "The ACRE Program Decision and Some Illustrative Examples". Both papers are available from the archive of Illinois Farm Economics: Facts and Opinions newsletter in the management section of *farmdoc* (www.farmdoc.uiuc.edu).

The farm Olympic average yield is calculated using the previous five-years of yields from a farm. When calculating the Olympic average, the lowest and highest yields are not used and the middle three yields are averaged. Take, for example, five yields of 150, 160, 170, 180, and 190 bushels per acre. The 150 and 190 bushel yields are not used in the average calculation and the Olympic average is 170 bushels (e.g., 170 bushels = $(160 + 170 + 180) / 3$).

Farm Olympic average yields enter into two calculations related to ACRE payments. The first is determining eligibility for ACRE payments. Each year, a farm must meet two triggers before ACRE payments are received: 1) state revenue must be below a state guarantee and 2) farm revenue must be below a farm guarantee. The farm Olympic average yield influences the second trigger.

The farm guarantee in the second trigger equals:

$$\text{Five-year farm Olympic average yield} \times \text{benchmark price} + \text{crop insurance premium}$$

Farm revenue -- which equals the farms yield times season average price -- must be below the guarantee for a farm to be eligible for ACRE payments. A higher Olympic average yield increases the guarantee, potentially making it easier to meet the farm-level trigger.

Once both triggers are met, a farm receives an ACRE payment. The farm Olympic average yield will influence ACRE payments. ACRE payments will be received for each eligible planted acre of a crop. Total eligible acres are restricted to be no more than total base acres times .833 (.85 in 2012). The payment per eligible planted acre is:

$$\text{State payment} \times \text{five-year farm Olympic average yield} / \text{five-year state Olympic average yield}.$$

Farms with higher Olympic average yields will receive higher payments than those with lower Olympic average yields. To illustrate, take a state-level payment equal to \$68 per acre. This \$68 per acre payment is our estimate of average state payment in years in which ACRE makes a payment. The state Olympic average yield for corn in Illinois in 2009 is 172 bushels per acre (see Table 1). A farm with a 190 bushel farm Olympic average yield will have a payment of \$75 per acre ($\$68 \text{ state payment} \times 190 \text{ farm Olympic average yield} / 172 \text{ bushel state Olympic average yield}$). A farm with a farm Olympic average yield of 153 bushels per acre will receive an ACRE payment equal to \$60 per acre ($\$68 \text{ state payment} \times 153 \text{ bushel average yield} / 172 \text{ bushel state Olympic average yield}$).

Table 1. 2009 State Olympic Average Yields for Illinois.

Crop	Yield
Corn	172.0
Soybeans	47.0
Wheat	60.2

Source: Farm Service Agency

Farm Olympic Average Corn Yields

Farm Olympic average yields were calculated for 2009 using yield data made available from Illinois Farm Business Farm Management (FBFM). Averages were calculated for 2,238 farms having complete, usable yield data from 2003 through 2008. These yield data represent "farm averages" for the entire corn acres farmed by an operation. These farm yield data differ from yields that will be used by the Farm Service Agency (FSA). The FSA will use yields from FSA units. Most farms have more than FSA units as part of their operations. When calculating an average, lower acres usually cause more variability in the average. Hence, ranges shown in the following tables likely understate variability of Olympic averages across FSA units.

The farm Olympic average yield across all FBFM farms is 178 bushels per acre (see Table 2). Ten percent of the farms have farm Olympic averages below 153 bushels per acre while ten percent of the farms have Olympic averages above 199 bushels per acre (see Table 2).

Table 2. Statistics on 2009 5-Year Olympic Average Yields for Corn on Farms Enrolled in Illinois Farm Business Farm Management.

	All Illinois	Region of Illinois		
		North	Central	South
Average Farm-Level Olympic Yields	178	180	182	163
Percentile breakdowns of Farm-Level Olympic Average Yields: ¹				
		Bushels per Acre		
10%	153	153	163	130
20%	165	166	171	139
30%	172	173	176	149
40%	177	178	180	158
50%	182	182	184	166
60%	185	186	186	172
70%	189	190	190	181
80%	193	194	194	188
90%	199	201	199	194
Average Yield by Year:		Bushels per Acre		
2004	183	183	185	174
2005	148	142	151	143
2006	171	177	173	154
2007	186	187	193	162
2008	191	190	195	178
Percent of Farms with Minimum Yielding Year In:				
		Percent of Farms		
2004	5	3	6	5
2005	75	86	75	55
2006	15	6	16	23
2007	4	3	2	14
2008	5	4	5	4
Sum ²	103	101	105	102
Percent of Farms with Maximum Yielding Year In:				
		Percent of Farms		
2004	20	22	16	32
2005	2	1	2	2
2006	3	5	3	3
2007	30	30	34	15
2008	49	47	49	51
Sum ²	103	104	103	104

¹ The interpretation of the 153 bushel yield associated with the 10% break is that 10% of the farms have yields below 153 bushels and 90% have yields above 153 bushels.

² The sum will be greater than 100% because some farms have the same minimum yield in more than one year.

Source: Original calculations using Illinois Farm Business Farm Management data.

Some of the difference in Olympic averages is regional. Olympic average yields are 180 for northern Illinois and 182 for central Illinois (see Table 2). Southern Illinois has an average of 163 bushels per acre. There are, however, large variations within region. Southern Illinois, for example, has a lower average, but 10% of southern Illinois farms have Olympic averages above 194 bushels per acre (see Table 2). This diversity suggests that farms in all regions need to evaluate ACRE decisions individually as there can be wide variations in Olympic averages within a region.

The placement of yields in a the five-year period influences how Olympic averages change over time. For example, the first year in the 2009 Olympic average is 2004. The 2004 year will be dropped in the calculation of the 2010 Olympic average yield. If 2004 is the lowest yielding year, the 2010 Olympic average may increase because the minimum year will be eliminated and a new minimum year will be selected. The reverse occurs if 2004 is the highest yielding year.

For 75 percent of all farms in the farms, the low yield occurred in 2005. During 2005, a drought occurred that had its largest impacts in parts of northern and western Illinois. As a result more of the farms in northern Illinois had their worst year in 2004 than farms in central and southern Illinois. The worst year is 2005 for 86 percent of northern Illinois, 75 percent of farms in central Illinois, and 55 percent of farms in southern Illinois. This suggests that there is a potential for the 2011 Olympic averages to increase, given that yield shortfalls do not occur in 2009 and 2010.

About 49 percent of the farms had their highest yielding year in 2008 (Table 1). There is little variation in this percentage across regions: 47 percent in northern Illinois, 49 percent in central Illinois and 51 percent in southern Illinois. Following 2008, farms have their highest yields in 2007 (30 percent) and 2004 (20 percent).

Differences in farm Olympic average yields will impact ACRE payments across the state. A typical state ACRE payment likely will be \$68 per planted acre. Using 153 bushels (10% of the farms are below this yield) and 190 bushels (10% of the farms are above this yield) as a range that will capture 90% of the farms, farm-level ACRE payments will range from \$60 per planted corn acre up to \$75 per corn planted acre (see calculations in the previous section). This is a range of \$15 per acre from the low 10% breakpoint up to the high 10% breakpoint.

Olympic Average Soybean and Wheat Yields

FBFM data indicate that five-year Olympic average soybean yields average 52 bushels per acre in 2009 (see Table 3). Ten percent of the farms have Olympic averages below 46 bushels per acre and 10% of the farms will have Olympic averages above 58 bushels per acre.

Our estimate of the average, state-level soybean ACRE payments is \$50 per acre in years in which ACRE payments occur. Given the farm Olympic acreage yield of 52 bushels per acre for 2009 (see Table 3) and the 2009 state Olympic average yield of 47 bushels per acre (see Table 1), the average ACRE payment is \$55 per acre ($\$50 \text{ state payment} \times 52 \text{ bushel farm average yield} / 47 \text{ bushel state Olympic average yield}$). Given that 10% of the farm Olympic average yields are below 46 bushels, ten percent of the farms will receive payments below \$49 per acre ($\$50 \text{ state payment} \times 46 \text{ bushel farm average yield} / 47 \text{ bushel state Olympic average yield}$). Given that 10% of the farm Olympic average yields are above 58 bushels per acre, ten percent of the farms will receive payments above \$61 per acre. Hence, there is a range of \$12 per acre from the low 10% breakpoint up to the high 10% breakpoint.

FBFM data indicate that five-year Olympic average wheat yields average 67 bushels per acre in 2009 (see Table 4). Ten percent of the farms have Olympic averages below 52 bushels per acre and 10% of the farms have Olympic averages of 81 bushels per acre.

Like corn and soybeans, farm ACRE payments will vary across farms. Our estimate of the average state ACRE payment is \$89 per eligible acre when ACRE payments occur. Using this state payment, FBFM farms will have an average ACRE payment of \$75 per planted acre ($\$89 \text{ state payment} \times 67 \text{ bushel farm average yield} / 60.2 \text{ bushel state Olympic average yield}$). Given that 10% of the farm Olympic average yields are below 52 bushels, ten percent of the farms will have payments below \$58 per planted acre ($\$89 \text{ state payment} \times 52 \text{ bushel farm average yield} / 60.2 \text{ bushel state Olympic average yield}$). Given that 10% of the farm Olympic average yields are above 81 bushels per acre, ten percent of the farms will receive payments above \$91 per acre. This is a range of \$33 per acre from the low 10% breakpoint up to the high 10% breakpoint.

Table 3. Statistics on 2009 5-Year Olympic Average Yields for Soybeans on Farms Enrolled in Illinois Farm Business Farm Management.

	All Illinois	Region of Illinois		
		North	Central	South
Average Farm-Level Olympic Yield	52	52	53	50
Percentile breakdowns of Farm-Level Olympic Average Yields: ¹				
	Bushels per Acre			
10%	46	45	47	43
20%	48	48	50	45
30%	50	50	51	47
40%	52	51	53	49
50%	53	52	54	50
60%	54	53	54	52
70%	55	54	55	53
80%	56	56	57	54
90%	58	58	58	56
Average Yield by Year:	Bushels per Acre			
2004	53	52	54	52
2005	52	50	53	51
2006	53	54	53	49
2007	51	51	53	43
2008	51	50	52	40
Percent of Farms with Minimum Yielding Year In:				
	Percent of Farms			
2004	12	16	13	5
2005	24	30	27	10
2006	14	5	18	14
2007	31	27	25	59
2008	30	32	33	18
Sum ²	113	110	115	106
Percent of Farms with Maximum Yielding Year In:				
	Percent of Farms			
2004	31	24	31	40
2005	22	19	23	25
2006	24	36	20	18
2007	20	22	22	11
2008	19	12	20	23
Sum ²	116	113	116	118

¹ The interpretation of the 46 bushel yield associated with the 10% break is that 10% of the farms have yields below 46 bushels and 90% have yields above 46 bushels.

² The sum will be greater than 100% because some farms have the same minimum yield in more than one year.

Source: Original calculations using Illinois Farm Business Farm Management data.

Table 4. Statistics on 2009 5-Year Olympic Average Yields for Wheat on Farms Enrolled in Illinois Farm Business Farm Management.

	All Illinois	Region of Illinois		
		North	Central	South
Average Farm-Level Olympic Yield	67	72	69	61
Percentile breakdowns of Farm-Level Olympic Average Yields: ¹				
	Bushels per Acre			
10%	52	59	52	51
20%	58	65	59	53
30%	61	67	62	58
40%	63	71	67	60
50%	67	73	73	61
60%	70	76	76	63
70%	73	79	77	65
80%	78	82	79	67
90%	81	84	82	70
Average Yield by Year:	Bushels per Acre			
2004	65	65	71	59
2005	67	71	68	62
2006	73	80	76	64
2007	60	74	60	51
2008	68	69	69	66
Percent of Farms with Minimum Yielding Year In:				
	Percent of Farms			
2004	13	33	6	10
2005	21	28	26	11
2006	4	0	3	8
2007	54	18	59	73
2008	10	25	9	2
Sum ²	103	103	103	103
Percent of Farms with Maximum Yielding Year In:				
	Percent of Farms			
2004	15	8	22	11
2005	18	8	17	24
2006	43	50	41	40
2007	11	30	7	2
2008	19	10	14	29
Sum ²	104	105	101	106

¹ The interpretation of the 52 bushel yield associated with the 10% break is that 10% of the farms have yields below 52 bushels and 90% have yields above 52 bushels.

² The sum will be greater than 100% because some farms have the same minimum yield in more than one year.

Source: Original calculations using Illinois Farm Business Farm Management data.

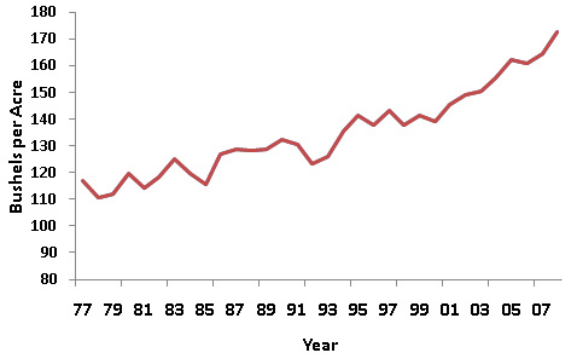
Olympic Average Yields over Time

Tables 2, 3, and 4 show farm Olympic average yields for 2009. Over time, Olympic averages will vary. In most years, Olympic averages will increase as productivity gains cause higher yields. However, Olympic averages will not always increase and some years will decrease.

Past changes in Olympic averages may provide guidance as to how yields will change in the future. Figure 1 shows Olympic average yield calculated from 1977 through 2008 using FBFM data. As can be seen in Figure 1, farm Olympic averages have increased. From 1977 through 2008, the average increase is 1.7 bushels per year. During the last ten years, the average increase has been 3.5 bushels per year. Between 1977 and 2008, there have been eleven years out of 31 in which the average declined, or about one-third of the years. The last year in which there was a decline is 2006, having a decline of 1.1 bushels per acre. The largest decline of 7.4 bushels per acre occurred in 1992.

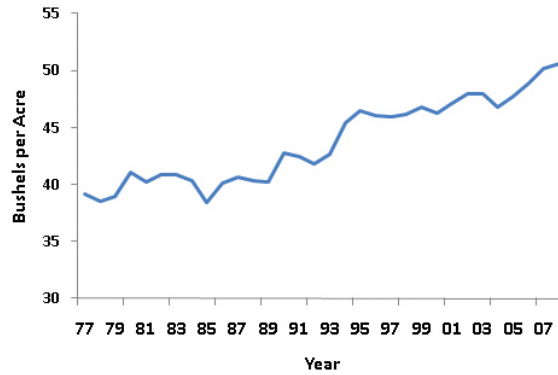
For soybeans, Olympic average yields have increased by .38 bushels between 1977 through 2008 (see Figure 2). During the last ten years, the average increase has been .42 bushels per year. Since 1977, there have been 13 out of 31 years in which farm Olympic average yields have declined. The last year in which the Olympic average declined is in 2004. The decline in 2004 is 1.2 bushels per acre, the worst of the thirteen declines between 1977 through 2008.

Figure 1. Average 5-Year Olympic Average Corn Yields Across Farms in Illinois, 1977 through 2008



Source: Original calculations from Illinois FBFM data.

Figure 2. Average 5-Year Olympic Average Soybean Yields Across Farms in Illinois, 1977 through 2008



Source: Original calculations from Illinois FBFM data.

Summary and Conclusions

Olympic average yields vary across farms in this state. Some of the variation is geographically related, but even within areas, there are large variations of farm Olympic average yields across farms in Illinois.

In general, farms with higher farm Olympic average yields will have higher ACRE payments than farms with lower Olympic averages. However, it is likely that farms with lower farm average yields will also have lower direct payments. Since 20% of direct payments are given up with a switch to ACRE, farms with lower farm Olympic average yields may also give up less in direct payments with a switch to ACRE. The weighing of direct payment reductions with ACRE payments need to occur when deciding which commodity program to select.

In most years, farm Olympic average yields will increase due to productivity gains that lead to increasing yields. There will be years in which actual yields lead to decreasing Olympic average yields. From 1977 through 2008, five-year Olympic average yields averaged across FBFM farms decreased about one-third of the time for corn and soybeans.

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