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ASCS PROGRAM YIELDS: POLICY IMPLICATIONS FOR REGIONAL RESOURCE ALLOCATION AND CROP INSURANCE

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ABSTRACT

This paper addresses a number of issues with respect to ASCS program yields. In particular, results from simple regression models suggest that ASCS yields reflect yields per harvested acre rather than yields per planted acre. These results have significant policy implications for both regional resource allocation and crop insurance.

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Policies and programs

ASCS PROGRAM YIELDS: POLICY IMPLICATIONS FOR REGIONAL RESOURCE ALLOCATION AND CROP INSURANCE

As the debate surrounding the 1990 Farm Bill intensified, a major concern of commodity groups was removal of the freeze on the Agricultural Stabilization and Conservation Service (ASCS) yields. The 1985 Farm Bill implemented a freeze on ASCS yields, meaning that farmers could no longer provide records to prove their yields. Growers have been concerned because yields have been effectively frozen at 1984 technology. Due to a positive trend in yields, many growers argue that ASCS yields no longer reflect expected yields. Clearly, producers who could prove higher yields would receive greater deficiency payments if the freeze on ASCS yields were removed. In fact, the costs savings associated with freezing yields was a major motivator in the 1985 Farm Bill decision.

In addition to commodity program payments, ASCS yields influence other government programs. For example, the Federal Crop Insurance Corporation (FCIC) uses a ten year average of certified farm yields as a basis for establishing yield coverage. This ten year average is known as an Actual Production History (APH) yield. For those who do not have a full ten years of certified yields, adjusted ASCS yields are used in place of the missing years. Individual ASCS yields are adjusted downward using a Transitional-yield (T-yield) ratio. The T-yield ratio is the ratio of the ten year average of planted acre yields for a county obtained from the National Agricultural Statistics Service (NASS) to the county-level ASCS yield. Missing years of certified yield data are replaced by the product of the producer's ASCS yield multiplied by the T-yield ratio for the county (Commission for the Improvement of the Federal Crop Insurance Program,

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p. 11). T-yield ratios are not allowed to exceed a value of one so a producer's ASCS yield is generally adjusted downward for crop insurance purposes.

A major debate in the crop insurance reform for the 1990 Farm Bill involved the direct use of ASCS yields to establish crop insurance coverage. The logic was very simple, "If ASCS yields are good enough to make billions of dollars of deficiency payments, then they should be good enough to establish crop insurance yields for a $500 million program."

A 1986 GAO report discussed the consistency problem caused by three different USDA agencies (ASCS, FCIC, Farmers Home Administration) developing farm yield measures. One might wonder which of these often dissimilar yield measures most correctly approximates a true measure of expected yield. This paper will not attempt a general comparison of yield measures used by various agencies. However, given the important uses of ASCS yields to establish commodity program payments and in determination of crop insurance yield guarantees, an investigation of the reliability of ASCS yields is in order. This paper begins that process with some relatively simple comparisons of ASCS yields to NASS data. The paper raises questions regarding the implications of the current system on resource allocation and the determination of crop insurance yield guarantees. At this stage, the analysis is preliminary. Still, the issues raised are significant as they have far reaching implications for U.S. agricultural policy and for research in the agricultural economics profession.

Background on ASCS Program Yields

The ASCS has used a variety of methods to develop yields. Prior to 1985, farmers could bring sales receipts to their local ASCS office in order to prove farmer production. These production totals were then divided into the crop acres as reported on ASCS forms in mid-growing season. Short periods (as few as three years) could be used to establish some ASCS yields. In addition, poor crop years could be dropped. Typically, ASCS yields ignored crop types and farming practices. Farm-level ASCS yields within a county were constrained to a county "check yield". These "check yields" were calculated in three different fashions and the local office was allowed to use the highest of the county average yields. Given the existence of "check yields", there was a mechanism for constraining the total yield in the county (G.A.O., p. 46,47).

Of the more significant issues surrounding these procedures, this paper will focus on the use of mid-season acres as the base for determination of average yields. Since many planted acres in some regions are abandoned before ASCS acreage is established, ASCS yields are much closer to a yield per harvested acre than a yield per planted acre. The difference between yields on a planted acre basis and yields on a harvested acre basis varies greatly between regions. In areas where abandoned acreage is very low (e.g., Iowa and Illinois corn), planted acre and harvested acre yields will be very similar. However, in areas where abandoned acreage is high (e.g., Texas high plains cotton and Oklahoma wheat), planted acre and harvested acre yields can be very different.

These factors have implications for the adequacy of ASCS yields as a measure of expected yield on a planted acre basis. Many producers argue that ASCS yields are too low, since in recent years they have not been adjusted to reflect the technology trend. However, in areas where there is considerable abandoned acreage, ASCS yields may be too high -- measuring something closer to a harvested acre yield rather than a planted acre yield.

Methods

County-level ASCS yields for 1987 were compared to county-level expected yields calculated for 1987. County-level yield data are on a planted acre basis and were obtained from the NASS. Expected yields were calculated as the mean of trend-adjusted county-level yields for the period 1956 through 1986. Trends were estimated using annual mean yields at the level of the crop reporting district. The highest and lowest annual yields were eliminated before fitting the trend. All county-level yields were adjusted to 1987 technology using the trend for the crop reporting district.

Figure 1 shows the relative ratio of 1987 ASCS yields to expected yields for 1987 on a planted acre basis for corn production across the continental United States. Figure 2 shows the same ratio for wheat production. Of particular interest is the fact that for corn, ASCS yields are consistently lower than expected yields in grain belt states such as Indiana, Illinois, and Iowa. By contrast, ASCS yields are significantly higher than expected yields in the upper midwest and in a band from New York state to the Gulf of Mexico (surrounding the Appalachian mountains). ASCS yields for wheat are below expected yields in traditional wheat states like North Dakota but above expected yields in many areas in the southern part of the United States.

Table 1 compares 1987 ASCS yields to expected yields for 1987 by state for both corn and wheat. In addition, the percentage of national production accounted for by each state is shown.

The figures and table show marked regional differences in the extent to which ASCS yields approximate expected yields on a planted acre basis at the county level. In particular the ratio of ASCS yield to expected yield tends to be larger outside of traditional production areas for the respective crops.

A simple regression was run to test the hypothesis that ASCS yields approximate harvested acre yields rather than planted acre yields. The regression took the form:

$$Y_i = \beta_1 + \beta_2 X_i + \varepsilon_i$$

where Y_i is the ratio of ASCS yield divided by expected yield for 1987, X_i is the difference between the sum of planted acres and the sum of harvested acres for the period 1976-84 in percentage terms [(Σ Planted Acres - Σ Harvested Acres) / Σ Planted Acres], and ε_i is a normally distributed stochastic error term. The subscript i represents various counties. The expected sign of β_2 is positive. The model was run for both corn and wheat. Only those counties with expected yields based on at least fifteen years of NASS yields were included in the regression. The estimated regression equations are shown below with t-statistics in parentheses.

Corn: $$\underset{}{Y_i} = \underset{(28.505)}{0.6448} + \underset{(43.854)}{3.0037}\, X_i$$

Wheat: $$Y_i = \underset{(131.256)}{0.8897} + \underset{(59.491)}{2.0253}\, X_i$$

For both commodities the coefficient on the independent variable is significant and of the expected sign. This indicates that in those areas where harvested acres are considerably lower than planted acres, ASCS yields are considerably higher than expected yields on a planted acre basis. In other words, these simple regressions support the contention that ASCS yields are much more akin to yields on a harvested acre basis.

Implications for Regional Production Patterns

The amount of deficiency payment received by a commodity program participant for a given crop in a given year is calculated as shown below:

Payment = (Target Price - Market Price) * ASCS Base * ASCS Yield.

All other things constant, higher ASCS yields generate higher deficiency payments. As long as ASCS yields are equivalent to an expected crop yield that farmers would use in making planting decisions, the addition of the commodity program payments should offer the same relative incentives for production in different regions. However, if the relationship of ASCS yields and producer's expected yields varies across regions, one would anticipate that this would provide incentives for differences in regional production patterns. In areas where ASCS yields exceed expected yields there should be relatively more interest in increasing planted acres (or base program acres) than in areas where ASCS yields are less than expected yields. Thus, if ASCS yields are higher than expected yields in certain regions, we would expect to see a regional influence on planting decisions.

We have shown that the ratio of ASCS yields to expected yields on a planted acre basis varies across geographic regions. As a result of the incentives inherent in the Deficiency Payment Program one might suppose that production would gradually shift to those regions where the ratio of the ASCS yield to the expected yield on a planted acre basis is relatively high. But as demonstrated earlier these regions are also likely to be those regions where in a typical year a significant portion of planted acres will go unharvested. In a general sense, we might consider these to be marginal production regions. Incentives for production in marginal areas are an example of the type of market distortions which often accompany government programs. An extensive literature exists on the social cost of such distortions (Johnson, Wallace, Gardner, Alston and Hurd).

A simple regression model was used to test the hypothesis that increases in planted acreage are directly related to the ratio of ASCS yield to expected yield on a planted acre basis. The regression is of the same form as that shown above except Y_i is now the percentage change in planted acres between 1972 and 1987, and X_i is the ratio of the 1987 ASCS yield divided by the expected yield on a planted acre basis for 1987. The expected sign of β_2 is positive. The model was run for both corn and wheat. Only those counties with 1) expected yields based on at least fifteen years of NASS yields, and 2) at least 1000 planted acres for 1972 and 1987 were included in the regression. The estimated regression equations are shown below with t-statistics in parentheses.

Corn: $$Y_i = 0.1457 - 0.0174\, X_i$$
$$(2.918) \quad (-0.526)$$

Wheat: $$Y_i = -1.5110 + 1.9004\, X_i$$
$$(-6.795) \quad (10.446)$$

In the equation for corn the coefficient on the independent variable is not statistically significant. In the equation for wheat the coefficient is statistically significant and of the expected sign. This indicates that those wheat areas where ASCS yields are considerably higher than expected yields on a planted acre basis have seen production expand through an increase in planted acreage. While recognizing the fact that many other factors influence production decisions, this simple model does suggest that relative misclassification of ASCS yields influences production patterns. As a result, more fully specified models of regional production allocation decisions should incorporate this variable.

Implications for Crop Insurance

In addition to resource allocation questions associated with commodity programs, crop insurance questions are also important. These results justify the FCIC's current practice of using T-yields to adjust ASCS yields for crop insurance purposes. However, they also demonstrate the need to allow T-yields to exceed a value of one as the evidence presented here indicates that there are large regions of the country where ASCS yields are lower than expected yield on a planted acre basis.

The 1990 Farm Bill now allows direct use of ASCS yields to establish crop insurance coverage under certain circumstances. Keeping in mind that crop insurance is purchased based on planted acres rather than harvested acres, it is clear that in areas where harvested and planted acres are different, crop insurance yield guarantees based directly on ASCS yields will be too high. When yield guarantees are too high adverse selection will become a problem as farmers with expected yields lower than the yield guarantee will be attracted to the program. This will result in increased indemnity payments and over time will lead to rate increases and, ultimately, the destruction of the local market for crop insurance.

Conclusions

This paper has addressed a number of issues with respect to ASCS yields. The most significant issue remains the fact that ASCS yields reflect harvested acre yields more so than planted acre yields. The simple regressions, with the ratio of 1987 ASCS yields to expected yields on a planted acre basis for 1987 as the dependent variable, demonstrate significant positive relationships to the historical difference between planted and harvested acreage within a county lending further evidence that ASCS yields are akin to harvested acre yields.

This finding raises many questions. A fundamental question remains the extent to which the relative misclassification of ASCS yields has influenced resource allocation patterns and, in particular, cropping patterns across the United States. The simple regressions presented in this paper provide insight into this question as the model of wheat acreage demonstrates that cropping patterns for wheat have changed in relation to the ratio of ASCS yields to expected yields on a planted acre basis.

Further questions center on the use of ASCS yields in the development of crop insurance yield guarantees. The results of this study justify the FCIC's current practice of using T-yields to adjust ASCS yields for crop insurance purposes but also suggest that T-yields should be allowed to exceed a value of one. Concerns are raised about the potential for adverse selection if unadjusted ASCS yields are used to establish yield guarantees for crop insurance. This study should help extension specialists develop educational materials which explain to producers why T-yields are used to adjust ASCS yields in establishing yield guarantees for crop insurance.

Future research should attempt to incorporate the relative misclassification measure for ASCS yields into regional crop allocation models in order to test how significantly this misclassification may have influenced regional production patterns and resource allocation. In addition, current methods for developing crop insurance yield guarantees may need to be adjusted. At a minimum these results indicate that T-yields should be allowed to exceed a value of one.

Figure 1

Ratio of ASCS Yield to Expected Yield for Corn in 1987

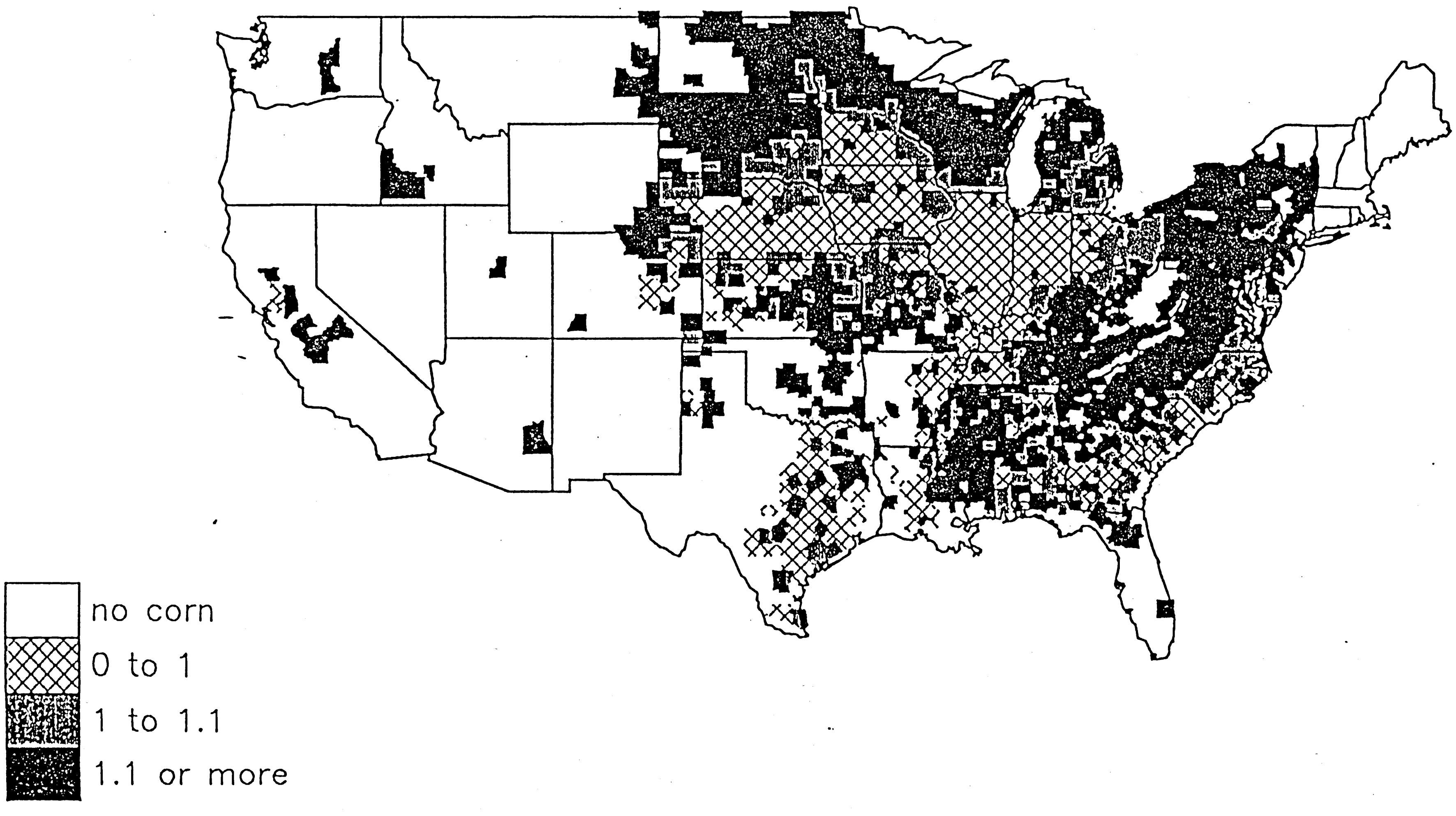

Figure 2

Ratio of ASCS Yield to Expected Yield for Wheat in 1987

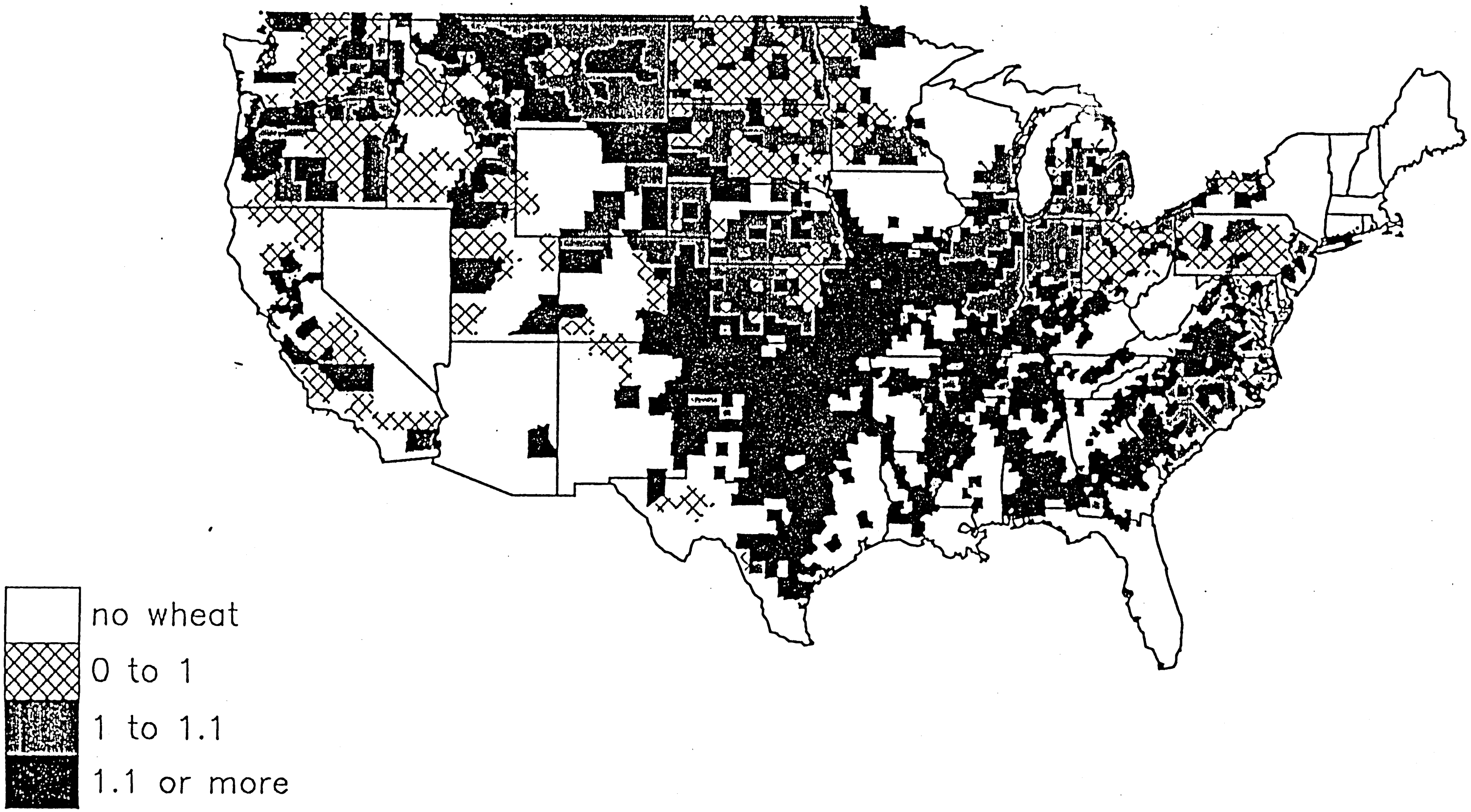

Table 1 -- Comparing 1987 ASCS Yields to Expected 1987 Yields[1]

Corn

	ASCS/EXP	Share of National Acreage
Alabama	1.076	0.5%
Arkansas	1.042	0.1
Arizona	1.216	0.0
California	1.902	0.5
Colorado	1.178	1.1
Delaware	1.143	0.3
Florida	1.105	0.2
Georgia	1.008	1.0
Iowa	0.976	15.8
Idaho	1.912	0.1
Illinois	0.947	14.2
Indiana	0.943	7.4
Kansas	0.994	1.9
Kentucky	1.071	2.0
Louisiana	0.919	0.3
Maryland	1.190	0.8
Michigan	1.153	3.5
Minnesota	1.059	8.4
Missouri	1.006	3.4
Mississippi	1.372	0.3
North Carolina	1.126	2.0
North Dakota	1.704	1.0
Nebraska	0.937	10.0
New Jersey	1.324	0.2
New York	2.216	1.5
Ohio	0.999	4.9
Pennsylvania	1.398	2.4
South Carolina	1.059	0.6
South Dakota	1.178	4.7
Tennessee	1.211	1.1
Texas	0.963	1.7
Virginia	1.722	0.8
Washington	1.050	0.1
Wisconsin	1.255	5.4
West Virginia	1.584	0.1
Wyoming	1.343	0.1
National Avg.	1.078	

Wheat

	ASCS/EXP	Share of National Acreage
Alabama	1.411	0.3
Arkansas	1.143	1.3
Arizona	1.420	0.0
California	0.995	1.7
Colorado	1.136	4.5
Delaware	0.967	0.1
Georgia	1.266	0.7
Iowa	1.250	0.1
Idaho	1.029	1.6
Illinois	1.094	1.6
Indiana	1.053	1.1
Kansas	1.053	15.6
Kentucky	1.345	0.7
Louisiana	1.393	0.3
Maryland	0.940	0.2
Minnesota	0.985	3.7
Missouri	1.203	1.3
Mississippi	1.173	0.5
Montana	1.078	7.1
North Carolina	1.089	0.7
North Dakota	0.980	13.5
Nebraska	1.033	3.2
New Mexico	1.500	0.9
New York	0.997	0.1
Ohio	0.974	1.2
Oklahoma	1.435	9.9
Oregon	1.123	2.5
Pennsylvania	0.950	0.3
South Carolina	1.112	0.4
South Dakota	1.006	5.3
Tennessee	1.272	0.6
Texas	1.510	9.4
Utah	1.052	0.3
Virginia	1.095	0.4
Washington	1.086	6.2
Wisconsin	1.033	0.1
West Virginia	1.047	0.0
Wyoming	1.169	0.5
National Avg.	1.143	

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[1] State averages are weighted by 1987 planted acres. The percent of national acreage planted is presented for each state to show the relative importance of the state.

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