Review of County Loan Rates for Sorghum and Corn

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Agricultural and Food Policy Center

The Texas A&M University System

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AFPC

Department of Agricultural Economics
Texas Agricultural Experiment Station
Texas Cooperative Extension
Texas A&M University

College Station, Texas 77843-2124
Telephone: (979) 845-5913
Fax: (979) 845-3140
http://www.afpc.tamu.edu

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Agricultural and Food Policy Center
Department of Agricultural Economics
Texas A&M University
College Station, TX 77843-2124

or call 979-845-5913.

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James W. Richardson
Joe L. Outlaw
George M. Knapek
Brian K. Herbst

Agricultural and Food Policy Center
Department of Agricultural Economics
Texas Agricultural Experiment Station
Texas Cooperative Extension
Texas A&M University

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The Agricultural & Food Policy Center (AFPC) updated the comparison of corn and sorghum county loan rates following the general methodology outlined in the October 2002 Food and Agricultural Policy Research Institute (FAPRI) study on corn and sorghum loan rates. The study answers two questions:

1. Are the 2006 county loan rates established by USDA consistent with the Congressional mandate that national average loan rates for both commodities be $1.95 per bushel?

2. What would be the impact if USDA were to adopt a different weighting scheme in setting county loan rates while continuing to maintain the mandated national average loan rate? Specifically, what would be the impact on sorghum loan rates if each county's loan rate were weighted by the county's share of national production of sorghum and corn combined, rather than by each county's share of national sorghum production alone?

Background

Section 1202 of the Farm Security and Rural Investment Act (FSRIA) establishes a $1.95 per bushel loan rate for both sorghum and corn for the 2006 crops. Section 1606 of FSRIA provides the Secretary of Agriculture with authority to make appropriate adjustments in the loan rates for any commodity for differences in grade, type, quality, location and other factors. These adjustments, if any, are to be made in such a way that the average loan level for the commodity will, based on the incidence of the factors used, be equal to the loan rates provided in Section 1202.

USDA translates the national average rate to loan rates for each county using a complex procedure (see appendix for a description of the formula). Figures 1 and 2 illustrate the spatial distribution of the 2006 loan rates for sorghum and corn.

Also, it should be noted that the mandated national average loan rate for both corn and sorghum changed from $1.98 to $1.95 in 2004. However, for purposes of this report, an evaluation of the 2006 loan rates is used. Therefore for consistency and clarity, only references to the $1.95 loan rate level are used in this report.

Issue 1: Do county loan rates "add up" to $1.95 per bushel?

AFPC used 2002-2005 county production data from the National Agricultural Statistics Service (NASS) of USDA to establish weights for each county that reflect the county's share of national production. In the case of sorghum, the heaviest weights go to major producing counties in Kansas and Texas. Similarly, the heaviest weights for corn go to counties in Iowa and Illinois.

When these production-based weights are multiplied by each county's loan rate and summed across all counties, the result is an estimate of national average loan rates (Table 1).

Table 1. National average of 2006 county loan rates for corn and sorghum

	Weighted average of 2006 county loan rates using county shares of national production in:				
	2002	2003	2004	2005	2002-2005 Average
			dollars per bushel		
Sorghum using county shares of national sorghum production	1.96	1.95	1.93	1.93	1.94
Corn using county shares of national corn production	1.95	1.95	1.95	1.95	1.95

The estimated national averages of the 2006 county loan rates vary a small amount by year, reflecting historic production data are used to develop the county weights. For sorghum, the national average of 2006 county loan rates ranges from $1.96 per bushel using 2002 sorghum production data to $1.93 per bushel using 2004 and 2005 sorghum production data. Constructing county weights based on a simple average of 2002-2005 sorghum production data results in an estimated 2006 national average sorghum loan rate of $1.94 per bushel. The computed national average loan rates for corn using corn production weights average $1.95 in all four years.

Based on this analysis it appears that the 2006 county loan rates are consistent with the mandated national average sorghum loan rate, if county loan rates are weighted by each county's share of national sorghum production. Similarly, 2006 county corn loan rates are consistent with the mandated national average corn loan rate, if county loan rates are weighted by each county's share of national corn production.

The results may seem counterintuitive, given the fact that sorghum loan rates are lower than corn loan rates in most counties (Figure 3). These results are possible given the fact that county loan rates for corn are lowest in the Corn Belt allowing for higher corn loan rates in the rest of the country where production is lower.

Using 2002-2005 average production weights, Table 2 reports average 2006 corn and sorghum loan rates in the top ten states. These states account for over 96 percent of national sorghum production.

State-average loan rates for sorghum are lower than those for corn by as little as $0.05 per bushel in Illinois to as much as $0.18 per bushel in Oklahoma. Across all counties that produce sorghum, the average corn loan rate is about $0.13 per bushel above the sorghum loan rate. This result is possible because most sorghum production occurs in counties that have corn loan rates above the national average.

Setting each county's sorghum loan rate equal to the 2006 county loan rate for corn would result in a national average sorghum loan rate of $2.06 per bushel if counties are weighted by their shares of national sorghum production. This level would be in excess of the statutory $1.95 per bushel.

Table 2. 2006 State-average loan rates in the top ten sorghum states

	Sorghum	Corn	Difference
		dollars per bushel	
1. Kansas	1.87	2.04	0.17
2. Texas	2.03	2.13	0.10
3. Nebraska	1.83	1.93	0.10
4. Missouri	1.90	2.02	0.12
5. Oklahoma	1.99	2.17	0.18
6. Arkansas	2.06	2.09	0.03
7. Louisiana	2.00	2.10	0.10
8. Illinois	1.95	2.04	0.09
9. South Dakota	1.74	1.84	0.10
10. Mississippi	2.00	2.07	0.07
All states, weighted by county shares of national sorghum production*	1.94	2.07	0.13^
All states, with sorghum weighted by sorghum production shares and corn weighted by corn production shares*	1.94	1.95	0.01
Official national rate	1.95	1.95	0.00

*Estimates use average of 2002-2005 production data to derive weights.
^Actual difference is 0.1267

Note: Estimates imply that setting the sorghum loan rate in each county equal to the 2006 corn loan rate would result in a weighted average sorghum loan rate of $2.06 per bushel, $0.11 per bushel above the mandated $1.95.

Issue 2: How much difference would an alternative weighting scheme make?

To address the issue regarding the difference between sorghum and corn loan rates at the county level, one could compute each county's loan rate based on the combined production of sorghum and corn. Weights for each county would then depend on the county's share of national production for the two crops combined, rather than just on the county's share of national sorghum production. Given the relative sizes of the corn and sorghum crops in this country, this would greatly reduce the weights assigned to counties in Kansas and Texas, and greatly increase the weight assigned to counties in the Corn Belt (Table 3). The approach even changes estimates of state-average loan rates, depending on differences in loan rates across counties within each state that produce a different mix of corn and sorghum.

Table 3. Alternative weighting schemes to estimate national weighted averages from 2006 county loan rates for sorghum

	Current Approach: Using sorghum production only		Alternative: Using sorghum + corn production	
	Share of national prod.	Weighted loan rate	Share of national prod.	Weighted loan rate
		$/bu		$/bu
Kansas	41.8%	1.87	5.0%	1.88
Texas	31.9%	2.03	3.1%	2.04
Nebraska	6.2%	1.83	10.9%	1.81
Missouri	3.6%	1.90	3.3%	1.89
Oklahoma	3.0%	1.99	0.4%	1.99
Arkansas	2.8%	2.06	0.5%	1.96
Louisiana	2.6%	2.00	0.6%	2.00
Illinois	1.9%	1.95	16.3%	1.94
South Dakota	1.3%	1.74	4.0%	1.74
Mississippi	1.0%	2.00	0.6%	2.00
10-state subtotal	96.2%	1.94	44.6%	1.89
Iowa	0.0%	n/a	18.9%	1.82
Minnesota	0.0%	n/a	10.0%	1.74
Indiana	0.0%	n/a	7.4%	1.98
Ohio	0.0%	n/a	3.9%	1.92
Wisconsin	0.0%	n/a	3.6%	1.83
5-state subtotal	0.0%	n/a	43.7%	1.84
Estimated weighted average*		1.94		1.87
Official national rate		1.95		1.95
Difference from official rate		-0.01		-0.077

*Estimates use 2002-2005 production data.

The weighted average of 2006 county sorghum loan rates under this alternative weighting scheme is $1.87 per bushel, less than the statutory $1.95 per bushel. Many combinations of county loan rates could yield a weighted average of $1.95 per bushel using this approach. For example,

1) each county's 2006 sorghum loan rate could be increased by approximately 7.7 cents per bushel, or
2) each county's sorghum loan rate could be set equal to the county's 2006 corn loan rate, minus 0.34 cents per bushel.

This alternative weighting scheme would mean that loan rates in counties accounting for the bulk of the nation's sorghum production could be systematically greater than the national loan rate. Mathematically, this could not happen under the current weighting scheme, where county weights depend only on the county's share of national sorghum production. For example, Kansas accounted for approximately 42 percent of national sorghum production between 2002 and 2005. Under the current weighting scheme, if counties in Texas, Oklahoma, Louisiana, and Arkansas are to have loan rates that exceed the national average, then loan rates in counties in Kansas must average slightly less than the national average rate.

If the alternative weighting scheme is used, then county loan rates in all major sorghum producing states, including Kansas, could be set above $1.95 per bushel, so long as sorghum loan rates in states with significant corn production but limited sorghum production are set below $1.95 per bushel. Note that Iowa, Minnesota, Indiana, Ohio, and Wisconsin account for 44 percent of national production of corn and sorghum combined, even though they account for less than 1 percent of national sorghum production (Table 3). Under the alternative weighting scheme, setting a low loan rate for sorghum in these states that produce little or no sorghum but a lot of corn would lower the weighted average sorghum loan rate. This, in turn, would make it possible to set a higher loan rate in counties that produce a lot of sorghum but little corn.

These points are supported by a comparison of state-average loan rates under the two options mentioned above that raise weighted-average loan rates to $1.95 per bushel (Table 4). Note that under the option raising each county's loan rate by 7.7 cents per bushel, the state-average loan rate is above $1.95 in all major sorghum producing states except Nebraska and South Dakota. Under the option setting the county loan rate for sorghum equal to the 2006 corn loan rate for each county minus 0.34 cents, the state-average loan rate is above $1.95 in every major sorghum producing state except Nebraska and South Dakota. The weighted average for the 10 major sorghum states accounting for 96 percent of sorghum production (but only 45 percent of corn plus sorghum production) is $1.98 per bushel. This is only possible because the weighted average for 5 major corn states that account for less than 1 percent of national sorghum production (but 44 percent of corn plus sorghum production) is $1.89 per bushel.

Table 4. Two options to raise the weighted average of county loan rates to $1.95 per bushel under the Alternative weighting scheme (using corn + sorghum production to determine county weights)

	Current Sorghum Loan	Option 1: Current Sorghum Loan +7.7 Cents/bu	Option 2: Current Corn Loan -0.34 Cents/bu
		dollars per bushel	
Kansas	1.88	1.96	2.03
Texas	2.04	2.12	2.16
Nebraska	1.81	1.88	1.91
Missouri	1.89	1.97	1.98
Oklahoma	1.99	2.07	2.16
Arkansas	1.96	2.04	2.09
Louisiana	2.00	2.08	2.10
Illinois	1.94	2.02	2.00
South Dakota	1.74	1.82	1.85
Mississippi	2.00	2.08	2.07
10-state subtotal	1.90	1.97	1.98
Iowa	1.82	1.89	1.87
Minnesota	1.74	1.81	1.84
Indiana	1.98	2.06	1.98
Ohio	1.92	2.00	1.97
Wisconsin	1.83	1.91	1.88
5-state subtotal	1.84	1.91	1.89
Estimated weighted average*	1.87	1.95	1.95
Official national rate	1.95	1.95	1.95
Difference from official rate	-0.08	0.00	0.00

*Estimates use 2002-2005 production data.

If this weighting scheme were used to set loan rates for both sorghum *and* corn, then average county corn loan rates would have to be reduced for the same reason that county sorghum loan rates would be increased. If weights reflect both corn and sorghum production, the result is a slightly heavier weight on production in states like Kansas and Texas, where corn loan rates are above the national average. We calculate that county corn loan rates would have to be reduced by approximately 0.34 cents per bushel on average to maintain a $1.95 national average loan rate if this alternative weighting scheme were adopted for setting both sorghum and corn loan rates.

Summary points

1. Section 1202 of FSRIA sets national loan rates at $1.95 for corn and $1.95 for sorghum. The analysis indicates that the county loan rates for each commodity appear to "add up" to these national averages (Table 1).

2. Only 22 counties that recorded sorghum production between 2002 and 2005 had a sorghum loan rate greater than the corn loan rate. These 22 counties accounted for 5.2% of national production.

3. In the top ten sorghum-growing states, state average sorghum loan rates continue to be less than the state average corn loan rates (Table 2). The average difference for all sorghum-producing states is $0.13 per bushel.

4. If the sorghum loan rate were set equal to the corn loan rate in every county, the national weighted-average sorghum loan rate would be $2.06 per bushel, $0.11 above the $1.95 specified in law (Table 2).

5. Using an alternative weighting scheme that uses combined sorghum and corn production to weight county loan rates, the weighted average of 2006 county loan rates for sorghum is $1.87 per bushel (Table 3).

6. Two of many possible options to raise national average sorghum loan rates to $1.95 per bushel under the alternative weighting scheme would be to raise each county's 2006 sorghum loan rate by $0.077 per bushel, or set each county's sorghum loan rate to equal the 2006 corn loan rate minus $0.0034 per bushel (Table 4).

7. The alternative weighting scheme would allow an increase in average county loan rates for sorghum of about $0.077 per bushel above 2006 levels to give a national weighted-average sorghum loan rate of $1.95 per bushel. If the same weighting scheme were applied to corn, county loan rates for corn would have to be reduced by $0.0034 per bushel from 2006 levels to average $1.95 per bushel.

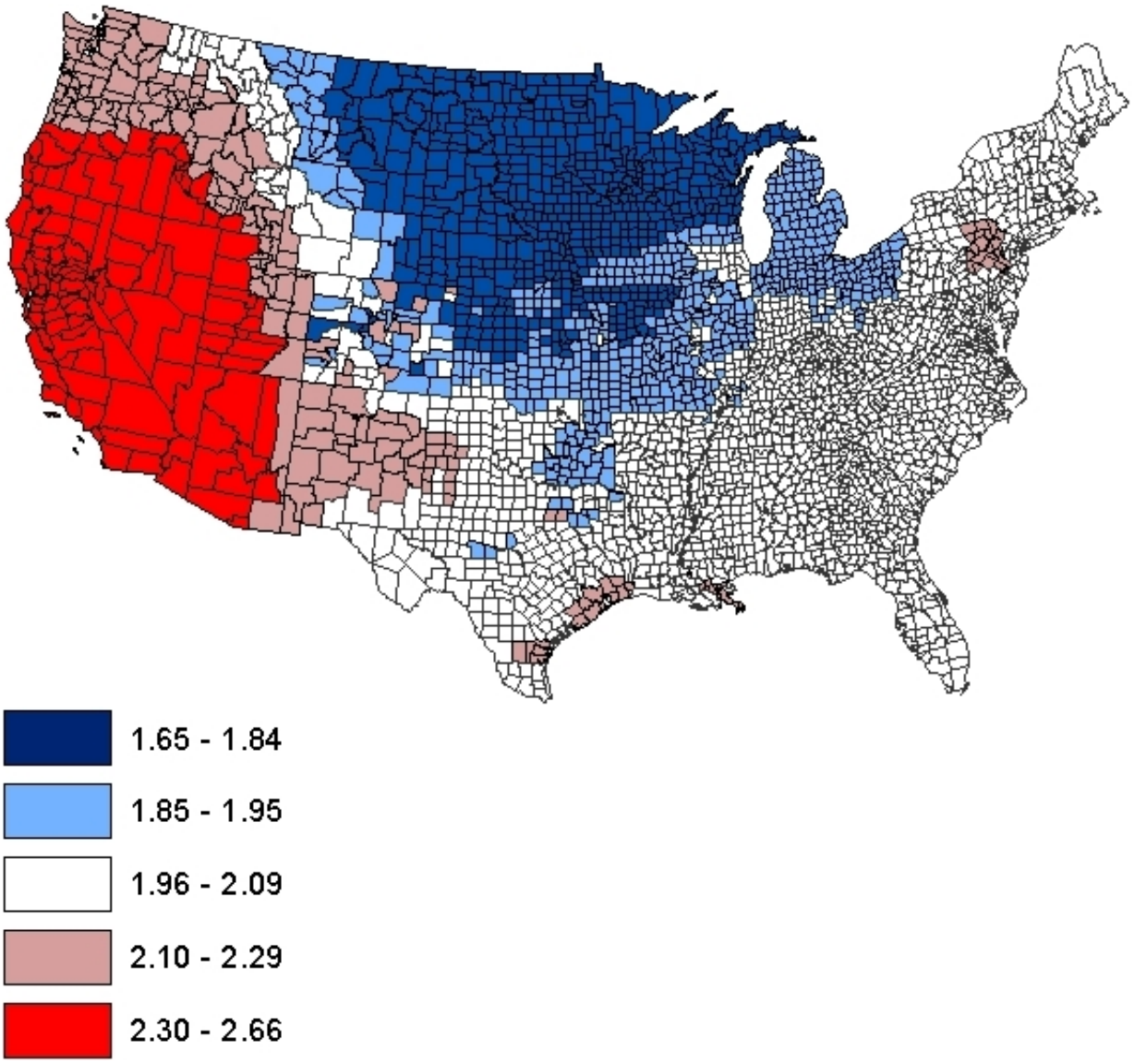
8. The results from this report differ slightly from the results in the FAPRI report. Under the alternative weighting scheme, this study found the average county loan rates for sorghum would have to be increased by $0.077 per bushel compared to $0.06 in the previous FAPRI study. Also, the difference in the amount the county corn loan rates would have to be reduced if the alternative weighting scheme was applied to corn, and the county corn and sorghum loan rates were set equal, changed from $0.007 (previous study) to $0.0034 per bushel. These differences are primarily due to the large increase in corn production from 2002 to 2005 with corn production going from just under 9 billion bushels in 2002 to 11.1 billion in 2005.

Appendix: A brief description of USDA procedures for setting county loan rates

In their 2002 analysis of loan rate determination, FAPRI reported the following:

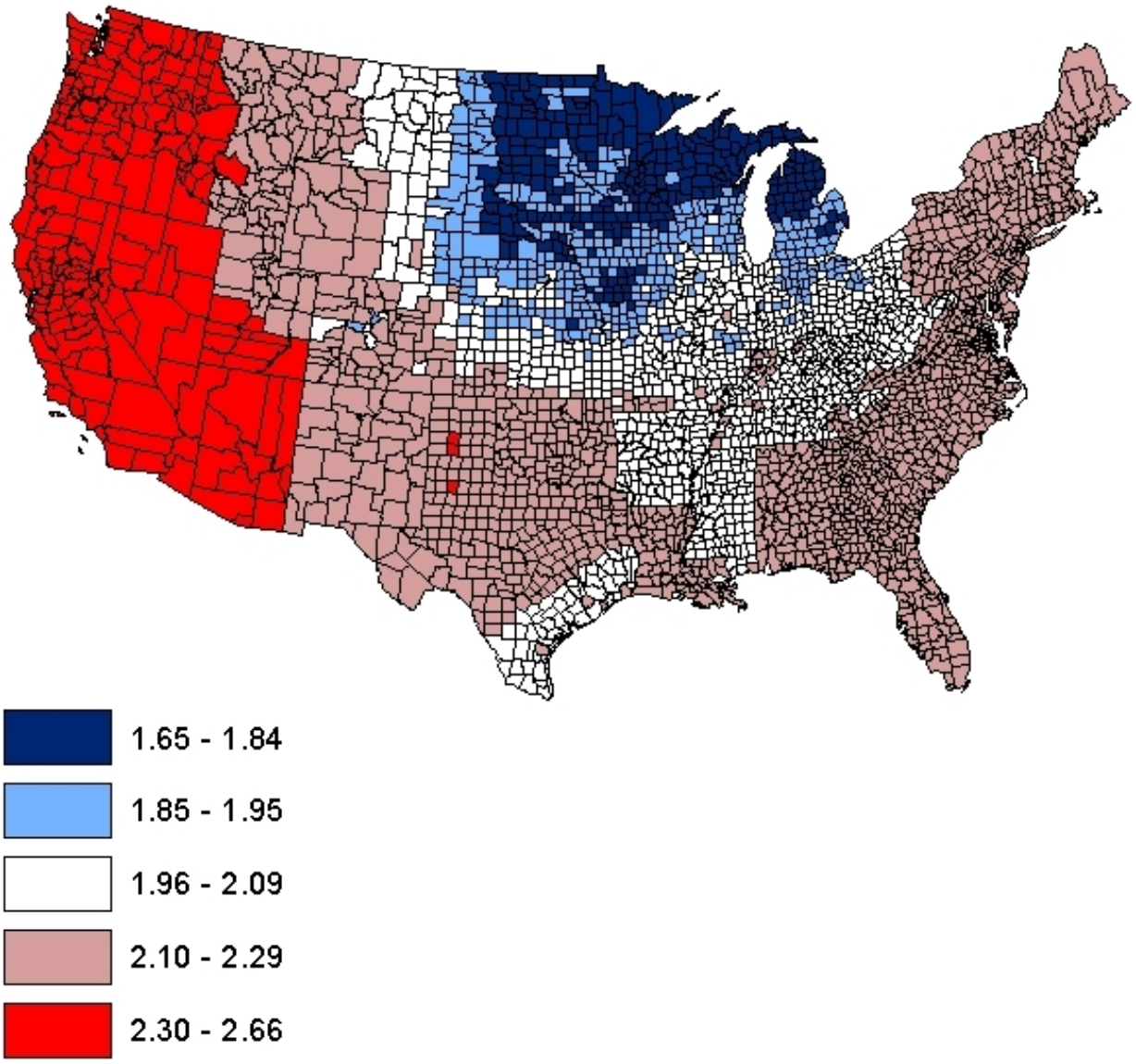
> "Under current USDA procedures, county loan rates for wheat, corn, sorghum, barley, oats, soybeans, and minor oilseeds are set based on the national loan rate and each county's historical posted county prices (PCPs are proxies for local market prices) and historical production.
>
> For each sorghum-producing county, USDA effectively multiplies the average sorghum PCP by the average sorghum production to estimate the county's average value of sorghum production. The value of sorghum production for all counties is summed to calculate the national value of sorghum production. Dividing the national value of sorghum production by national sorghum production gives a national average sorghum PCP. Dividing the national sorghum loan rate by the national average sorghum PCP gives a county loan rate factor. Multiplying the county loan rate factor by the sorghum PCP for a county gives the sorghum loan rate for the county.
>
> Loan rates in each county are affected by both the county's PCP and the county's average level of sorghum production. For county loan rates to accurately reflect relative market prices, PCPs must accurately reflect relative market prices. This analysis does not consider the question of whether PCPs accurately reflect local market prices."

Figure 1. 2006 Sorghum Loan Rates by County.



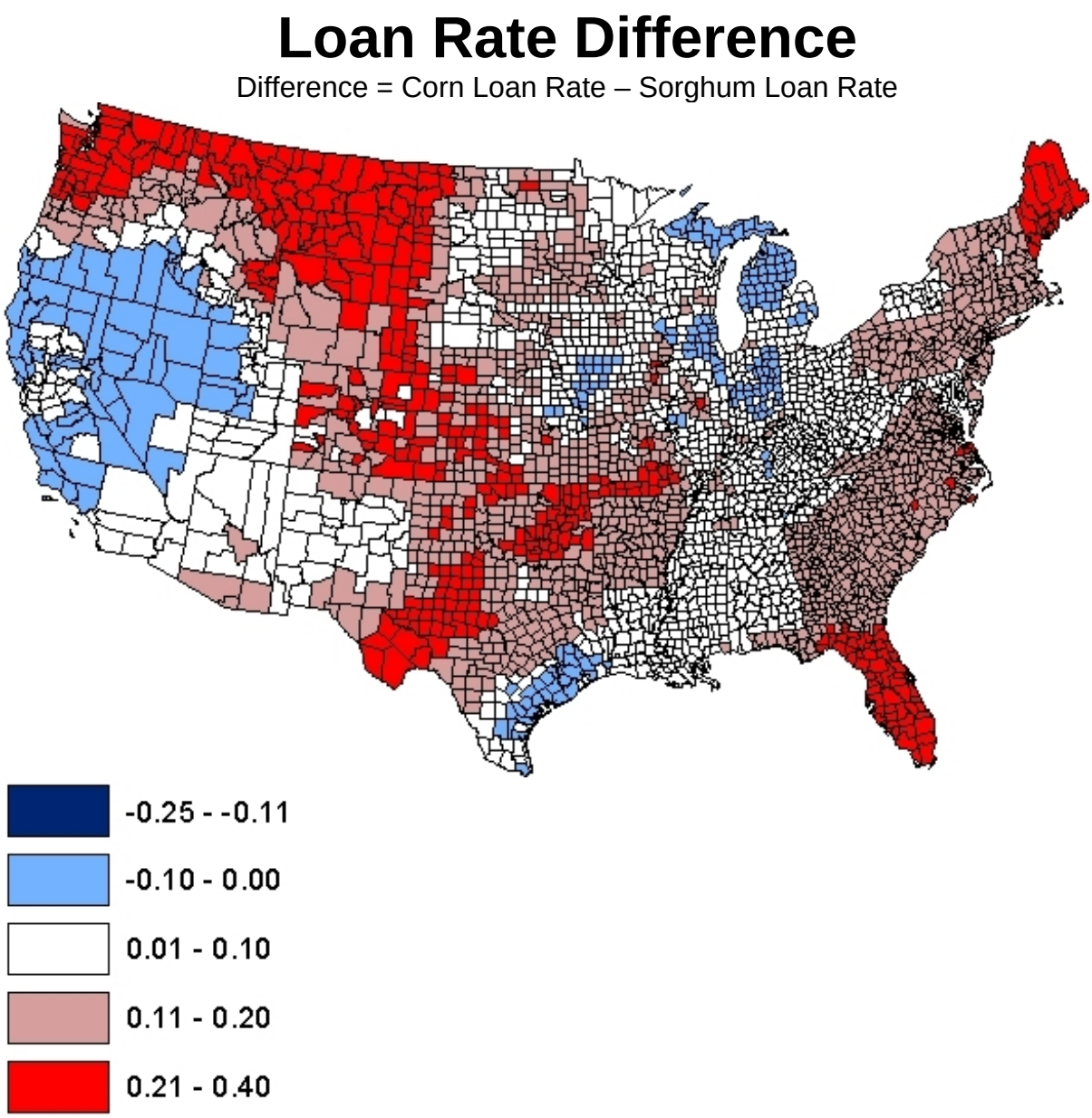
Note: Counties in light or dark blue are counties where the county loan rate is less than or equal to the national average rate of $1.95 per bushel. Counties in white are counties where the county loan rate is between $0.01 and $0.14 per bushel greater than the national average rate. Counties in light or dark red are counties where the county loan rate is at least $0.15 per bushel above the national average rate. The same categories and colors are used in the corn loan rate map.

Figure 2. 2006 Corn Loan Rates by County.



Note: Counties in light or dark blue are counties where the county loan rate is less than or equal to the national average rate of $1.95 per bushel. Counties in white are counties where the county loan rate is between $0.01 and $0.14 per bushel greater than the national average rate. Counties in light or dark red are counties where the county loan rate is at least $0.15 per bushel above the national average rate. The same categories and colors are used in the sorghum loan rate map.

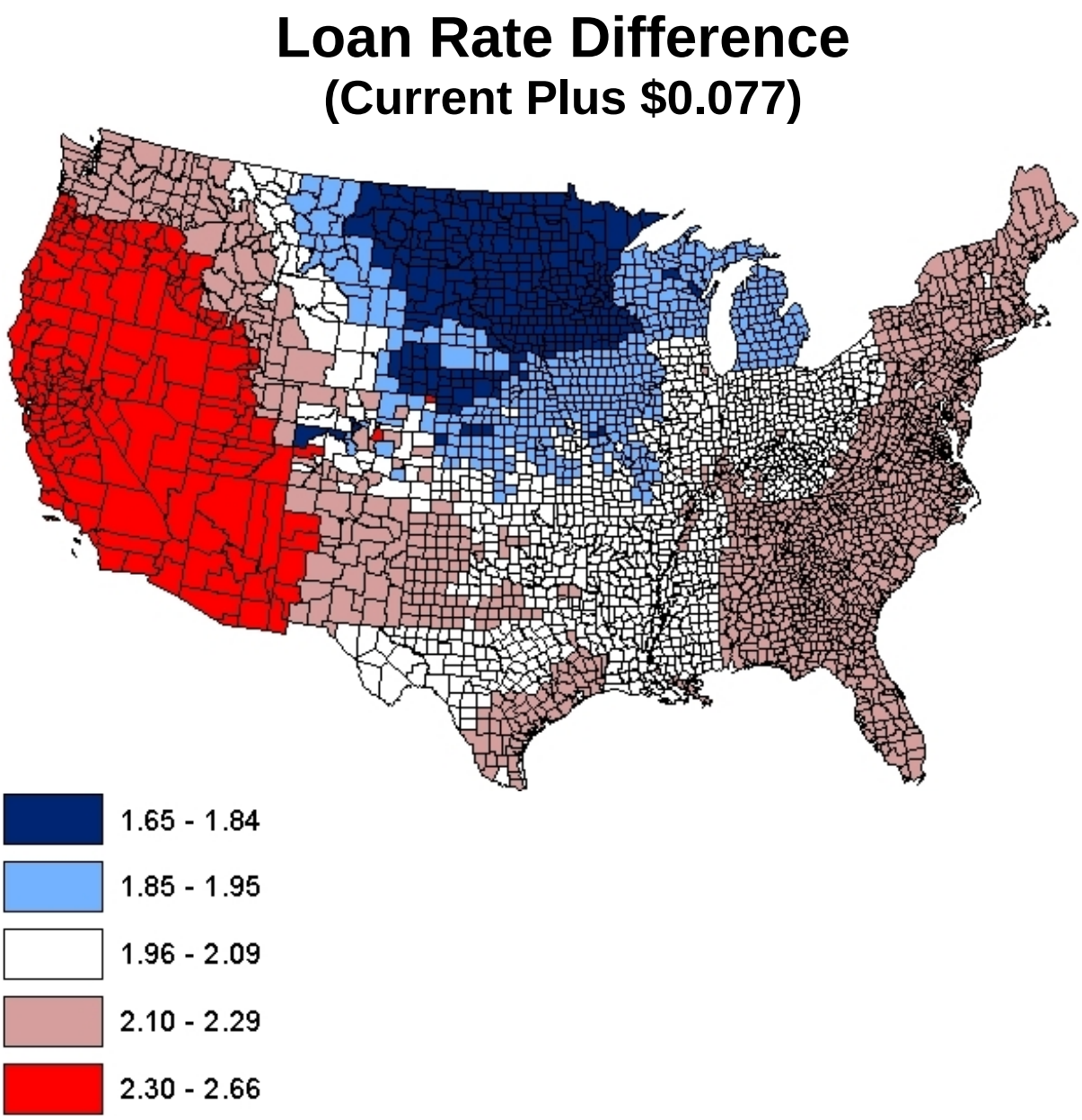
Figure 3. Differences in 2006 County Corn and Sorghum Loan Rates.



Note: Counties in light or dark blue are counties where the sorghum loan rate is equal to or greater than the corn loan rate. Counties in white are counties where the sorghum loan rate is between $0.01 and $0.10 per bushel below the corn loan rate. Counties in light or dark red are counties where the sorghum loan rate is at least $0.11 per bushel below the corn loan rate.

Also, only 22 counties that recorded sorghum production between 2002 and 2005 had a sorghum loan rate greater then the corn loan rate. These 22 counties accounted for 5.2% of national sorghum production.

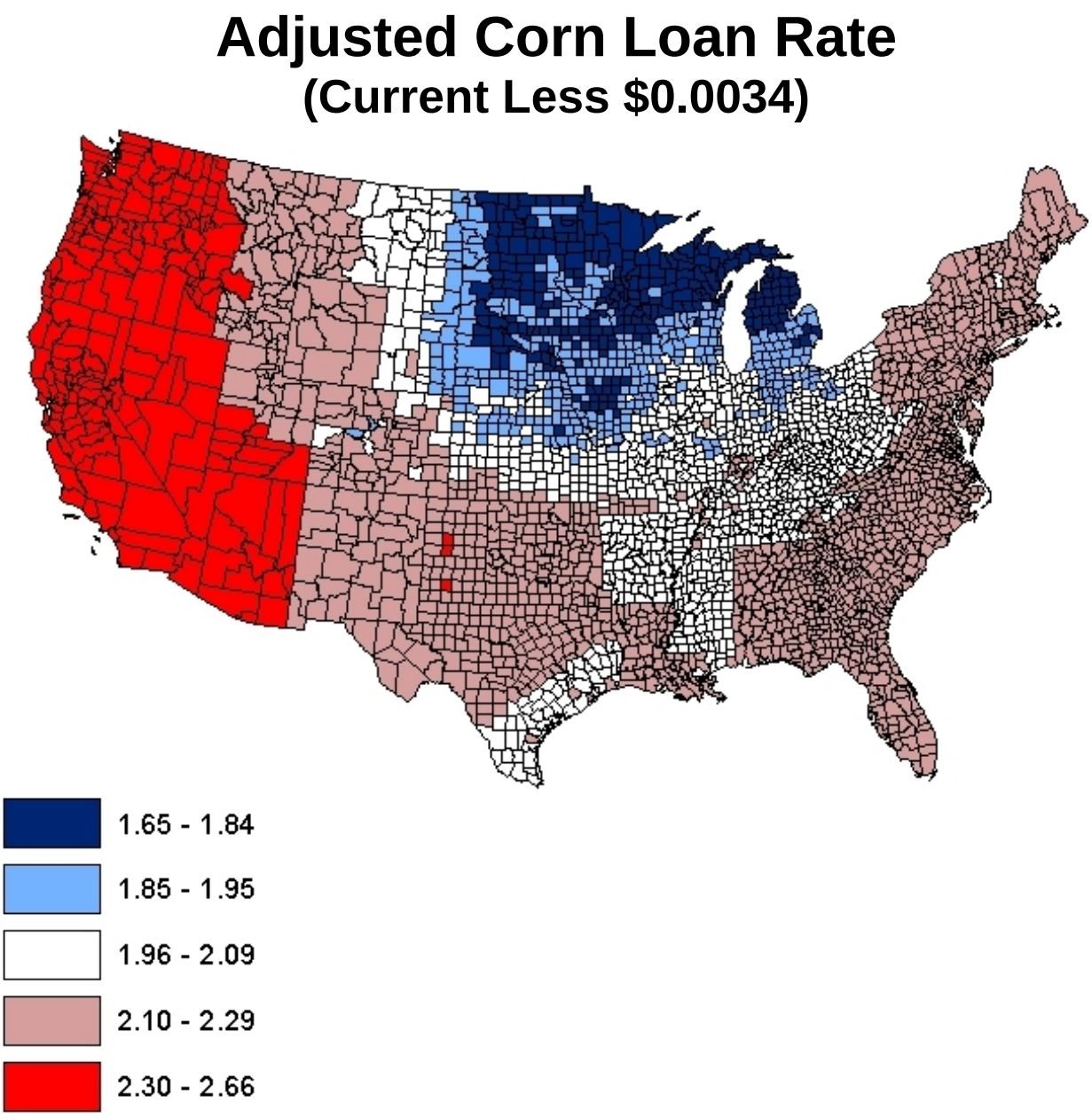
Figure 4. 2006 Sorghum Loan Rate Plus $0.077 per Bushel.



Under the alternative weighting scheme, the weighted average of 2006 county loan rates for sorghum is $1.87 per bushel. If this alternative weighting scheme were used, one of many ways to achieve a weighted average of $1.95 per bushel would be to increase loan rates in every county by 7.7 cents per bushel relative to the 2006 county loan rates.

This figure uses the same scale as Figures 1 and 2. If this across-the-board increase were implemented, counties in dark or light blue would have loan rates at or below $1.95 per bushel; counties in light or dark red would have loan rates above $2.10 per bushel.

Figure 5. 2006 Corn Loan Rate Minus $0.0034 (0.3 cents) per Bushel.



If the alternative weighting scheme were applied to corn as well as sorghum loan rates, the weighted average of 2006 county loan rates for corn would be just above $1.95 per bushel. One of many ways to achieve a weighted average of $1.95 per bushel would be to set corn loan rates in every county to be $0.0034 per bushel less than the 2006 county loan rate for corn.

This figure uses the same scale as Figures 1 and 2. If this approach were implemented, counties in dark or light blue would have loan rates at or below $1.95 per bushel; counties in light or dark red would have loan rates above $2.10 per bushel.