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Mules in Southern Agriculture: Revisited

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ABSTRACT

This article provides additional empirical evidence concerning the choice of the mule as the dominant draft animal in southern agricultural production in the latter 19th and early 20th century. While the mule was uniquely suited to the crops and climate of the region, two divergent arguments have been presented as to why the mule was the dominant draft animal in southern agricultural production. This research reevaluates these arguments and provides evidence that it was, in fact, the characteristics of this hybrid that made it the preferred draft animal for the South.

Key Words: *mule, land owners, part owners, and managers, share tenants, sharecroppers, principal agent problem.*
JEL: N51, O13, Q12, Q13.

References to the use of draft animals in the United States abound in oral histories, folklore literature, and in the works of academic geographers and historians. The vast majority of these references are consistent in their accounts of the virtues and drawbacks in comparisons of draft animals—horses, mules, and oxen—for particular uses. However, the conclusions relating to why certain draft animals were used for particular tasks as opposed to others, especially in the South, are not always consistent with oral histories or existing empirical evidence.

In the seminal work on the mule in southern agriculture, Lamb (26) argues that "The use of the mule in the South, eventually to the virtual exclusion of all other draft animals, is an example of cultural preference." In the same year Genovese argues that the use of the mule during slavery was but another example of retarding technological progress in the South since mules replaced the faster horse because they could withstand harsh treatment by slaves better than the horse. Kirby (198) continues the cultural inference: "[it is] a wonderful, generations-long mules-versus-horses debate, which reveals so much of southerners' old rural culture and their powerful affection for mules."

Recently, economists have begun to test hypotheses and provide analysis comparing the uses of draft animals for specific tasks. In many cases, recent analysis corroborates accounts in oral histories and folklore literature, while lack of corroboration occurs in some cases. For example, Garrett (1990) and Kauffman attempted to refute the notion that southerners used the mule for cultural reasons. Garrett argued that southerners preferred the mule as a draft animal because of certain characteristics peculiar to this hybrid compared with the horse, especially in row crop production including cotton. In addition, he showed evidence of a strong relationship between sharecroppers and the use of mules in the South. Kauffman agrees that certain characteristics of the mule can be attributed to its preference in southern agriculture and also finds a close cor-

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relation between sharecroppers and the use of mules. Kauffman's (337) primary argument, however, is that the southern preference for mules was the result of a principal-agent problem entailing sharecroppers and to some extent wage hands. Since sharecroppers and wage hands did not own physical capital, the principal-agent problem arises because the workstock was provided by owners who found it difficult and costly to monitor the treatment of the animals.

More recently Ellenberg (385–6) has used numerous statements from both oral histories and academic historians to make the argument that "Over time, mules became an integral part of southern culture; symbolizing not the pomp and finery of southern civilization, but the "other" side of southern culture. In general horses symbolized authority and wealth; mules connoted low status." Specifically he focuses on the notion that racism provided a stimulant for equating African-Americans and mules: "White southerners bound mules and blacks so closely, and they had done so for so long, that it may have been necessary, in a sense, for blacks to leave the land in order to break the mental association held by whites. From the white perspective, the power of the mule/African-American nexus provided a powerful justification for keeping blacks in the fields." (390). Moreover, Ellenburg argues, through statements from Delta and Pineland employees and academic historians, that southern whites not only viewed African-Americans and mules as possessing common physiological characteristics, but saw them as bound together by nature. Racist statements obviously pervade southern literature. But to combine racist statements to propose the argument that "Blacks driving mules . . . *became* an ingredient that set the region apart from the rest of the nation" (391) is an effort to create a myth that lacks foundation. Here it will be shown that mules were used by the vast majority of all southern farmers, irrespective of race. As Rockoff (243) states, "One of the main functions of the economic historian, from the point of view of economics, is to examine the foundation of these myths."

The purpose of this paper is to demonstrate that the primary use of the mule in southern agricultural production was attributable to the characteristics of this hybrid compared to other draft animals. I will show that the use of mules per acre of improved land was independent of land tenure. Thus, if there is no difference in the use of mules among farms operated under various forms of land tenure, the predominant use of the mule in many parts of the South cannot be attributed to the principal-agent problem. This analysis is not to imply that the principal-agent problem did not exist. While there are several attributes of the mule compared to the draft horse that would encourage the provision of mules over horses by owners that might give rise to the principal-agent problem, if mules are used equally per improved acre irrespective of the type of land tenure their use cannot be attributed solely to the principal-agent problem. Moreover, if mules were used as the primary draft animal throughout the South by all farmers, why create a myth that it was the mule/African-American nexus that was a distinguishing part of southern culture? Mules were indeed the primary draft animal in the South, but it was because of the attributes of the mule that made it economically more efficient, not a cultural reason and not one with a racial connotation.

This essay is divided into three sections beginning with a brief enumeration of the virtues of the mule as a draft animal in southern agriculture. Section II provides an explanation of the data including the geographic area. Section III includes the test of the hypothesis that there is no difference in the use of mules by land tenure. This section is followed by a conclusion.

The Virtues of the Mule as a Draft Animal

The mule is a hybrid that results from the cross between a female horse (mare) and a male donkey (ass). The mule is missing a sex chromosome because of the difference between the number of chromosomes in a horse and an ass; hence the mule is rendered sterile. The mule is presumed to have originated among the Edomites and Hosites of Asia Mi-

nor around 2000 B.C., but was then roughly four feet high and clearly not capable of heavy draft work. Spain developed a jack large enough, when mated with a mare, to produce a good draft mule, and by 1800 large jacks existed in the bluegrass region of Kentucky.

Being a hybrid, the mule exhibits some of the traits of both parents in addition to certain traits that are peculiar to it. In the mule general characteristics of the head, ears, voice, tail, and temper are asinine while the size of the progeny more nearly resembles the dam. The mule has a flatter back and smaller foot than the horse. It enjoys an extraordinary immunity from disease compared to the horse, takes longer to tire, and when fatigued will recover more quickly; it withstands warm climates better than the ox or horse; it is also less excitable than the horse, hence uses less energy under stress or unskilled handling. And the mule is more easily trained to voice commands than the horse, making it easier to maneuver in draft work.[1]

Two characteristics of the mule often alluded to, however, probably have been overrated: its longevity relative to the horse and its ability to live and work on smaller rations. Experiments in Ohio and Illinois demonstrated that under comparable work loads mules and horses need feed in proportion to their weight (Burkhart, 30–3). While the notion of the longevity of the mule pervades the literature, the average work life of the horse is roughly 12 to 15 years which is probably comparable to that of the mule under normal working conditions. For example, under a heavy work regime in the Mississippi Delta around 1900, mules worked from six to eight years (Chittenden, 725).

Perhaps, however, the major virtue of mules as a draft or pack animal is that they possess a characteristic of resisting injury or avoiding harmful situations. For example, a mule will eat and drink only what is necessary whereas a horse will over-consume, causing colic or founder; hence horses must be rationed and separated at feeding time. A mule will not overheat, that is, it will set the work pace or on occasion completely stop work until it has rested, whereas a horse will work itself to death if driven (Anderson and Hooper, 925; Bradley, 70; Moore, 51–2; Olson, 70; Warder, 183). While there are many stories and quotes that portray this particular characteristic of mules compared with horses, the following epitomizes as well as any this characteristic of the mule.

In working with army mules, Lieutenant James Steele perhaps understood this aspect of the mule that was so difficult to fathom. Steele observed that the horse is "the special pet of man," the "plebian mule" was infinitely superior to the horse in "that particular knowledge that has never been classified," that "sense" that is neither memory or mind, which is inadequately described by the term *sagacity*. The mule was docile yet devilish, tricky yet faithful, was always in difficulty yet never injured, and was as hardy and vigorous on the last day of the campaign as on the first day (Bourke 313).

Because troops rarely fought mounted, and most of them were only adequate riders, the sturdy mules would have performed better as cavalry mounts. While many officers would agree, and some did ride mules, the Calvary would never accept mules as mounts.[2] As John Bourke (324) put it:

> For one thing, mules won't learn to drill. The mule will go ninety miles for you in a day and night without water, but he sees no sense in wheeling around and doing fours right and left and back and forth and over and over a parade ground. It is his opinion that it doesn't get him or anybody else anywhere. So he quits. For another thing, mules draw the line on headlong breakneck charges on the enemy. They figure it is a silly way to get killed . . . Don't think the mule lacks

[1] Although there is no data on the relative incidence of disease between horses and mules in southern agriculture, see Fraser for a comparison during World War I. For a discussion of working mules on warm days see Moore; for stamina see Olsen. The intelligence of the mule compared to the horse, especially in training to voice commands, is found throughout the literature; for example see, Skinner, Hood, Crittenden, and Moore.

[2] For Calvary officers riding mules, see Bourke.

courage, though. He stands fire better than most horses, all recruits, and many a western soldier.

Data

We do not have individual farm data; therefore, all variables are defined on a per-county basis. Each hypothesis, although stated in terms of farms, can be tested using county data providing the sample is sufficiently large. For example, a county with a large number of owner or part owner operated farms, farms rented for a fixed money value, or farms rented for a share of products will have characteristics consistent with the proportion of farms by type in that county.[3]

Sharecroppers, *per se*, were not included separately until the 1920 census. The 1890 Census of Agriculture includes county data that lists land tenure by percentage for land cultivated by owners, land rented for fixed money value, and land rented for share of products. Yet we know agriculture production took place under a variety of tenures including labor directed by owners and paid set wages, sharecropper labor that was closely supervised paid an incentive-share, labor that was less closely supervised paid a larger share, renters not directed by owners but restrained from certain practices, and those who owned the land (Reid 39).

The variety of land tenure contracts in 1890, however, does not preclude the use of county data for 1890 in order to test the hypothesis. Share tenants and wage hands were furnished mules, and farmers who rented for a fixed money value primarily used mules. If, however, mules were the primary draft animals in agricultural production throughout most of the South, owners, part owners, and managers would also have used mules in agriculture production. In addition, 1890 provides an excellent cross section test of draft animals since it is the last year in which oxen, also used as draft animals, were included in census data. For example, Virginia data are not included because the number of oxen exceeded mules as draft animals in that state in 1890. The data are from the 1890 census and include all counties in the southern states of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Tennessee, and South Carolina, with certain exceptions.[4] Because oxen were used exclusively in paddy rice production, the major rice producing counties in Georgia, Louisiana, and South Carolina are not included.[5] In addition, the counties in Kentucky west of the Appalachian Mountain chain are included with the exception of the counties in the bluegrass region of Kentucky. By 1890, the bluegrass region of Kentucky was a major breeding ground for thoroughbred race horses and as a consequence may bias any count of draft animals. Those counties included in the bluegrass region of Kentucky, therefore, are not included in this study.[6] In addition, the counties in the

[3] For a theoretical proof that aggregation using county data as a proxy for farm data is valid see DeCanio 1974.

[4] Virginia is not included because oxen exceed mules roughly two to one throughout the State. In every other state in this study mules exceed oxen from a minimum of four to one to over seven to one. Florida is not included because the number of sharecroppers is relatively small compared to the other states: approximately 14 percent of all farms are sharecropped compared to 25 percent for the counties included in the study.

[5] Throughout the world oxen and water buffalo have been used in paddy rice production because they have cloven hooves contrasted to the cupped hooves of horses and mules. Cupped hooves tend to create a suction that makes movement in muddy terrain more difficult. Because of the use of oxen in paddy rice production, the major rice producing counties are not included in the county data. Determination of the major paddy rice producing counties is straightforward since four counties in South Carolina and six counties in Georgia produced roughly 96 percent of the nation's rice produced in paddies in 1860, although by 1890 58 percent of the nation's rice production had expanded into Louisiana, and it had occurred without the use of oxen. Nevertheless, the number of oxen in the paddy rice producing counties was still significant in 1890. The major rice producing counties include Camden, Charlton, Glynn, Liberty, and McIntosh in Georgia; Calcasieu in Louisiana; and Beaufort, Berkeley, Chatham, and Georgetown in South Carolina.

[6] Using Thornbury's map (196) of the Bluegrass Region, I determined the following counties to be in the Bluegrass Region: Anderson, Boone, Bourbon,

Appalachian Mountain chain in eastern Kentucky contain some of the roughest terrain in the eastern United States. These counties include less than one-half the improved acres per farm compared with the other counties in Kentucky. Moreover, the number of oxen in these counties exceeds horses by roughly one and one-half to one, whereas in the other counties (not including those in the Bluegrass region) mules exceed horses more than four to one. Therefore, the counties in the Bluegrass region and those in the Appalachian Mountain Chain of eastern Kentucky are not included in this study.

It should be pointed out that the mule was *not* the preferred animal for all types of draft work in the South. Garrett (1998) has shown empirically that during the great log rafting era in the South (approximately 1870–1910) southern loggers preferred oxen in snaking (dragging) logs from the forest to sluices, streams or rivers, which is consistent with oral history and folklore literature.[7] However, in the majority of these counties, timber production was a sideline to agricultural production and undertaken during the winter months of the year; therefore the data for these counties is included.

Oxen were also the preferred draft animal in certain agricultural work. For example, except for small, interspersed prairies and savannahs, the southern territory east of the Mississippi was originally forest land. Because of the difficulty in removing stumps, planters usually left them to decay, and oxen were better at easing around the stumps than horses or mules because of their shorter legs. Hence, oxen were often preferred in breaking new ground in the South, just as they were preferred in breaking prairie sod in the westward movement. In addition, a significant number of operators of small farms preferred oxen, probably because their initial costs and maintenance costs were lower than either horses or mules, and speed was not a factor on small farms (Liebowitz, 34) and (Welsch, 27–8).[8] Empirical evidence suggests that farms with 30 or fewer improved acres preferred oxen and are included in the small-size farm category (Garrett 1998). There are 55 counties with 30 or fewer improved acres among this data set; these 55 counties are not included in the analysis.[9]

Reid (40) calculated that in 1890 in the South 61.5 percent of farm operators included full owners, part owners, and managers, while 38.5 percent were tenants. Rent tenants accounted for 13.5 percent of all tenants, but included other and unspecified tenants with rent tenants. Share tenants included sharecroppers, share tenants, and livestock share, and accounted for 25 percent of all tenants. The 1890 census of agriculture provides data by land tenure for three classes: 1) owners, 2) land rented for fixed money value, and 3) land rented for share of products. Note the similarity with Reid's calculations and the percentages by classification according to land tenure in the 1890 census in this sample: Class 1, land cultivated by owners, 59.7 percent; Class 2, land rented for fixed money value, 14.6 percent and; Class 3, land rented for share of products, 25.7 percent.

The Hypothesis Test

The hypothesis to be tested is that mules were the primary draft animal throughout the South irrespective of land tenure. That is whether land was cultivated by owners, part owners or managers, or the land was rented for a fixed money value, or the land was rented for a share of product, as classified by the 1890 census, mules were the primary draft animal. Proof of this hypothesis will clearly establish that mules were not used primarily because of

Bracken, Bullit, Fayette, Franklin, Gallatin, Harrison, Henry, Jessamine, Marion, Mercer, Nelson, Oldham, Owen, Scott, Shelby, Spencer Washington, and Woodford.

[7] For a complete discussion of the major timber producing counties in the South in 1890 see Garrett (1998).

[8] The price of an ox was roughly between 20 percent and 40 percent the price of other draft animals and their maintenance was significantly less. These values are calculated from Gray (542) and Danhof (142).

[9] The same results are obtained from the regression if these 55 counties are included as a dummy variable.

Table 1. Regression Results Comparing the Use of Mules Among Southern Farmers by Tenure Type

Name	Regression coefficient	Standard Errors
Dependent Variable		
Mules		
Independent Variables		
B_1 own-man	.0186	.00125
B_2 rent-tnt	.0204	.00179
B_3 share-tnt	.0175	.00197
B_0 intercept	122.43	1.420
Adj. R^2		0.6151
F (3, 439)		236.43
N		443
F (1, 449)		.15
Test for own-man = share-tnt		Prob > F = 0.7027
F (1, 449)		0.72
Test for own-man = rent-tnt		Prob > F = 0.3958
F (1, 449)		0.80
Test for share-tnt = rent-tnt		Prob > F = 0.3708

Mules Number of mules per county.
B_1 own-man Percent owners, part owners, and managers multiplied by improved acres.
B_2 rent-tnt Rent tenants, including other and unspecified tenants with rent tenants multiplied by improved acres.
B_3 share-tnt Share tenants, including sharecroppers, share tenants, and livestock share, multiplied by improved acres.

the principal-agent problem (although this does not imply that the principal-agent problem did not exist), and that race was clearly not the reason for the mule being the dominant draft animal in the South.

The test is a straightforward OLS regression using county data. Recall that county data is a valid approximation of farm data since the proportion of land by type of tenure for a county will have characteristics consistent with the proportion of farms by type in each county.

Although there are 699 counties in the sample, all counties did not have farms operated by all three types of land tenure. Hence, the better test of the hypothesis would include counties that included all types of land tenure. There are 443 counties that contained at least five percent of farms operated by the three classes of land tenure. The test equation is

$$(1) \quad m = B_0 + B_1\text{own-man} + B_2\text{rent-tnt} + B_3\text{share-tnt}.$$

According to the hypothesis cited earlier, we expect all of the coefficients to be significantly related to the dependent variable with a positive sign.

The empirical data strongly confirm the hypothesis that mules were the preferred draft animal in the southern agricultural production irrespective of land tenure (Table 1). The R^2 is 0.6151 and all coefficients have the correct sign and are highly significant. If the principal-agent problem is correct we would expect that the coefficient on the share-tnt variable to be greater than the coefficient on the own-man variable. The null hypothesis is $B_1 = B_2 = B_3$. The coefficient for percent owners, part owners, and managers (own-man) multiplied by improved acres is .0186 compared with .0204 for farms operated by various types of share tenants (share-tnt) multiplied by improved acres, and the test for own-man = share-tnt has an F value of .15 with a probability of 0.7027. Moreover, as shown in Table 1, for the test between any combination of the independent variables we are unable to reject the null hypothesis at any reasonable level of significance. Mules were simply the preferred draft

animal throughout the South for the majority of agricultural production irrespective of land tenure.

Conclusion

Kauffman states that "When faced with the choice of whether to give their workers a mule or a horse, owners gave them 60 mules for each horse. This is very significant in light of the fact that the mule-to-horse ratio for the entire state of Georgia was 2 to 1. It should be clear that for the state ratio to be so low, the mule-to-horse ratio for owner-operated plots had to be quite low. This result should be expected because no principal-agent relationship would exist in such a case (345)."[10] The mule-to-horse ratio for owner-operated farms was low throughout the South, but not because of the principal-agent problem. Horses were a sign of wealth, a consumption good; they were used for riding, pulling a buggy, or pulling a wagon to town, as well as sometimes as a draft animal. Horses were rare among rent tenants and sharecroppers who were usually unable to afford the extra consumption costs. The mule was simply the best draft animal for the South; per improved acre, mules were used roughly proportionally by land owners, part owners, and managers, as well as rent tenants, and owners obviously furnished mules to share tenants and wage hands.

In 1890, 59.7 percent of all farms were operated by owners, part owners, or managers. However, the 1890 census provides data by farms by race at the regional level only, and combines rent tenants and sharecroppers as tenants. In the South Atlantic and South Central regions combined, 19.5 percent of all tenants were African-Americans and 27 percent were white. African-American owners comprised only 4.3 percent of all farmers in these regions. African-Americans thus comprised less than one-fourth of all farmers throughout the South.[11] To argue as Ellenburg does that "Blacks driving mules ... *became* an ingredient that set the region apart from the rest of the nation" (391) is an effort to create a myth that lacks foundation. Race was not the reason that the mule was the dominant draft animal in the South, nor could it have been the thing that set the South apart from the rest of the nation. One did not have to look far to see that of all southern farmers following mules in agricultural production, roughly 75 percent were white farmers.

The argument could be made that because of the attributes of the mule compared with the horse, especially the ability to withstand harsh treatment and the innate ability to set the work pace in the heat of the South that prevented death, the mule was superior to the horse under slavery. It is also true that because the horse is much higher strung than the mule, a horse can be quite frightening to anyone, especially to one who had never been exposed to either a mule or a horse. The mule, being less excitable, would shorten the learning curve in handling and working it as a draft animal; consequently, the mule would be preferable for slavery. However, by the time of emancipation, the learning process would have been completed, and if the horse were preferable as a draft animal it obviously would have been used since the price of a mule was always 10–15 percent higher than that of a horse.

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[10] However, in 1890, in the counties in this study horses only exceeded mules by roughly 20 percent, although in Georgia horses exceeded mules by 50 percent.

[11] The 1890 census provides farm operators by race by region only (Table 63: Report on Farms and Homes, 178).

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