AGRICULTURAL PRODUCTION, YIELD, AND ACREAGE PROJECTIONS TO 1985 FOR THE SOUTH

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INTRODUCTION

A systematic approach to projecting supply and demand for agricultural commodities is to: (1) estimate what the demand for agricultural products will be at some date in the future, (2) estimate the capacity of United States farmers to produce that output in terms of cropland availability and projected crop yields, and then (3) distribute estimated United States production requirements to states and regions according to some historical trend or some estimate of comparative advantage. The object of this paper is to relate the expected demand for United States farm products in 1985 to the South[1] and determine its production needs and acreage requirements.

The National Interregional Agricultural Projections (NIRAP) system [10] developed by Economic Research Service, USDA, utilizes projections of population, income, consumption, net exports, state shares of production, and yields to determine the future production and land use requirements for any state or region. By using common or "most likely" levels of the above factors which influence supply and demand, a "baseline" set of projections was made. Baseline levels of population, consumption, exports, etc., are largely guided by historical trends, but are adjusted by professional judgment which takes into account recent structural shifts, farm program policy changes, and other pressures likely to be felt in the United States farm sector. Alternative futures with regard to any of the factors can be used to determine a range of projected outcomes.

BASELINE PROJECTIONS

The population series currently considered the most likely in the long term is the series E projection by the Bureau of the Census (revised December 1972). According to this series, United States population is projected at 235.7 million in 1985 or 12.9 percent greater than the 208.8 million population in 1972. In the 14 southern states, the population is expected to grow at a slightly greater rate than the national level and is projected at about 27.6 percent of the national population in 1985.

Historically, domestic and foreign demand for food has increased a little faster than population because, as incomes rise, people consume more. But more importantly, as incomes rise, people tend to change their diets, favoring meats. Agriculture must then shift its commodity mix from such crops as cereals to feed grains and meat animals. From 1972 to 1985, per capita consumption of beef and veal is projected to increase from 118 to 143 pounds, pork from 67 to 71 pounds, and chicken from 43 to 51 pounds. But wheat consumption is projected to fall from 150 to 144 pounds per capita and milk consumption from 561 to 500 pounds during the same period.

Projections of agricultural exports complete the baseline assumptions for 1985 levels of demand.

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[1] For our analysis, "the South" refers to the following four FPED regions and 14 states: Appalachian – Virginia, West Virginia, North Carolina, Kentucky, Tennessee; Southeast – South Carolina, Georgia, Florida, Alabama; Delta – Mississippi, Arkansas, Louisiana; Southern Plains – Oklahoma, Texas.

Exports of wheat are projected to increase from a 1969-1971 base of 18.0 million metric tons per year to 21.2 in 1985. Feed grain exports will likely increase from 20.9 to 34.5, and soybean exports from 11.6 to 25.8 million metric tons over that 15 year period. Since export levels are volatile, we will analyze later the effect on production requirements of an alternatively higher level of exports.

THE SOUTH'S SHARE OF COMMODITY PRODUCTION

The assumptions and methodology contain some abstract elements that become more critical when disaggregating to the regional level. But for much of our policy and resource planning assistance research, we must have these kinds of projections derived in an interregionally consistent framework.

Table 1 summarizes the South's projected 1985 production for 22 commodities both relative to United States production and in absolute quantities under our projected baseline with comparisons to the 1970-1972 average. The shift-share diagram in Figure 1 is a useful way of summarizing these projections.[2]

Points plotted above the horizontal line at an index of 100 represent commodities with increasing production projected for the United States from the 1970-1972 average. Similarly, points plotted to the right of the vertical 100 index line indicate increasing commodity production in the South by 1985 relative to the 1970-1972 average. Commodities plotted to the right of the 45-degree line indicate that production in the South is projected to increase relative to the total United States production by 1985.

Table 1 and Figure 1 indicate that the production of all of the 22 commodities except oats, tobacco, sweet potatoes, and sheep is projected to increase in the United States by 1985. In the South, the following commodities are projected to decline in production by 1985: corn, oats, cotton, tobacco, sweet potatoes, sheep, and milk. The South is projected to obtain a significantly larger share of total

Table 1. BASELINE PROJECTION TO 1985 OF COMMODITY PRODUCTION, U.S. AND SOUTHERN STATES, COMPARISONS WITH 1970-1972*

Commodity	Units	1970-72 average			1985 projections			U.S. 1985 relative to U.S. 1970-72	South 1985 relative to south 1970-72
		U.S.	South	South/U.S.	U.S.	South	South/U.S.		
		million units		percent	million units		percent	percent	percent
Wheat	bu.	1,505	188.4	12.5	1,528	264.9	17.3	101.5	140.6
Rye	bu.	38.6	4.7	12.2	43.3	6.9	15.9	112.2	146.8
Rice	lbs.	8,491	6,647	78.3	10,487	7,992	76.2	123.5	120.2
Corn	bu.	5,089	420.8	8.3	6,613	393.5	6.0	129.9	93.5
Grain sorghum	bu.	795.3	373.0	46.9	1,148	570.4	49.7	144.3	152.9
Oats	bu.	831.1	49.7	6.0	752.3	43.9	5.8	90.5	88.3
Barley	bu.	434.4	33.0	7.6	556.9	50.6	9.1	128.2	153.3
Hay	ton	128.2	20.6	16.1	137.6	20.8	15.1	107.3	101.0
Soybeans	bu.	1,193	326.8	27.4	1,800	541.4	30.1	150.9	165.6
Peanuts	lbs.	3,091	3,073	99.4	4,408	4,369	99.1	142.6	142.2
Cotton	lbs.	5,478	4,300	78.5	5,702	4,232	74.2	104.1	98.4
Sugarcane	ton	25.9	14.3	55.2	29.0	17.1	59.0	112.0	119.6
Tobacco	lbs.	1,788	1,662	93.0	1,665	1,558	93.6	93.1	93.7
Irish potatoes	cwt.	313.2	18.5	5.9	356.5	21.2	5.9	113.8	114.6
Sweet potatoes	cwt.	12.5	11.4	91.2	9.1	8.0	87.5	72.8	70.2
Cattle, calves	lbs.	40,020	12,305	30.7	55,051	17,129	31.1	137.6	139.2
Hogs	lbs.	22,174	3,826	17.3	27,484	3,815	13.9	123.9	99.7
Sheep, lambs	lbs.	1,051	311	29.6	407	73	17.9	38.7	23.5
Chickens [a]	lbs.	1,173	553	47.1	1,452	806	55.5	123.8	145.8
Turkey	lbs.	2,297	738	32.1	3,381	1,027	30.4	147.2	139.2
Eggs	eggs	69,400	28,533	41.1	75,484	35,074	46.5	108.8	122.9
Milk	lbs.	118,640	20,020	16.9	118,850	17,536	14.8	100.2	87.6

*Source: Economic Projections and Analytical Systems, National Economic Analysis Division, ERS, USDA. These preliminary projections are working materials only and not official USDA projections. The 1970-1972 data for crops are computed from [1]. The 1970-1972 data for livestock, poultry, and milk are from [2, 3, 4, 5].

[a]Does not include broilers.

[2]We adopted use of the shift-share diagram from the Special Cornell Series 2. See for example [7].

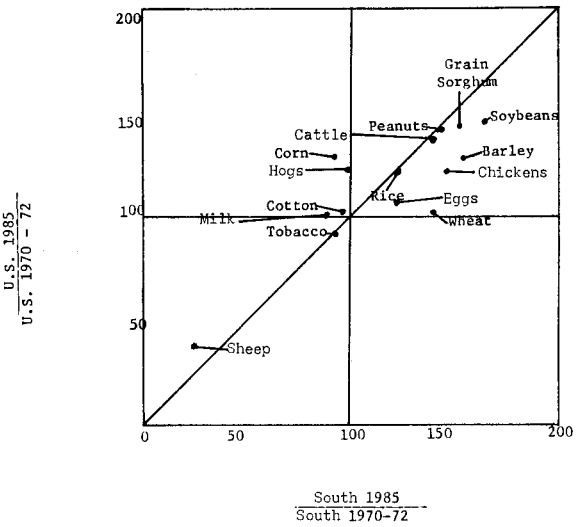

Figure 1. PRODUCTION OF SPECIFIED ENTERPRISES, 1985 RELATIVE TO 1970-1972, SOUTHERN REGIONS AND UNITED STATES.

United States production by 1985 in wheat, rye, grain sorghum, barley, soybeans, sugar cane, and chickens.

Tables 2 and 3 indicate the projected production and yields for the four regions in the South. The crop yield projections used in our analysis are from the 1972 OBERS Projections [8] and assume a continued but dampened rate of increase in research and development and, therefore, a reduced rate of technological change in agriculture. In other words, historical yield trends by state and by commodity were projected into the future, but dampened slightly by use of a Spillman exponential-type function [9], and in some cases adjusted by our own judgment.

CROPLAND AVAILABILITY IN 1985[3]

Cropland potentially available for crops is projected to increase 10.6 percent in the South from 79.1 million acres in 1973 to 87.5 million acres in 1985 (Table 4). In Table 5, these totals are disaggregated by region to major uses of cropland in 1973 and 1985. These figures are not the acreages that necessarily will be used for crops in 1985, but indicate the acreages available for use if high demand and favorable commodity prices warrant their use. (Discussed later are the acreage requirements to produce the projected production presented in Tables 1, 2, and 3, given the assumed yield levels.)

The maximum acreage which has been used for crops in the four southern regions is 122 million acres. Compare this with 1973's 79 million acres. The USDA Conservation Needs Inventory of 1967 [11] shows 136 million acres of Land Use Capability Classes I-III in uses other than cropland. About 75 million acres of this is in forest and another 56 million acres is in pasture and rangeland. Thus, the productive potential is great, but the economic potential may be greatly limited under current prices,

Table 2. PRODUCTION AND YIELDS, SOUTHERN REGIONS, 1970-1972 AVERAGE*

Commodity	units	Appalachian		Southeast		Delta		Southern Plains		Total Southern	Weighted Southern
		Production	Yield per acre	Production	Yield per acre	Production	Yield per acre	Production	Yield per acre	production	yield
		Million		Million		Million		Million		Million	
Wheat	bu.	31.5	37.7	11.8	29.4	14.1	32.4	131.0	22.8	188.4	26.4
Rye	"	.9	24.4	2.3	22.2	---	---	1.5	17.1	4.7	21.0
Rice	lbs.	---	---	---	---	4,413.	4,421.	2,234.	4,776.	6,647.	4,540.
Corn	bu.	234.3	65.9	127.9	44.3	13.9	41.3	44.7	68.9	420.8	58.8
Silage [a/]	ton	9.4	13.3	2.5	11.0	1.6	11.7	10.4	7.8	23.9	10.6
Grain sorghum	bu.	8.9	54.5	3.5	34.2	16.8	45.4	343.8	54.6	373.0	54.0
Oats	"	10.9	48.8	8.5	43.2	8.6	61.2	21.7	32.7	49.7	43.0
Barley	"	12.5	48.6	1.6	41.3	.1	46.0	18.8	32.1	33.0	38.8
Hay	ton	7.8	1.71	2.6	2.53	3.1	1.84	7.1	1.86	20.6	1.88
Soybeans	bu.	80.8	25.0	54.1	21.7	184.2	21.8	7.7	23.9	326.8	22.6
Peanuts	lbs.	649.	2,480.	1,767.	2,317.	14.1	1,162.	644.	1,555.	3,073.	2,187.
Cotton	"	303.	504.	573.	450.	1,743.	568.	1,682.	313.	4,300.	448.
Sugarcane	ton	---	---	6.9	33.9	7.4	24.8	---	---	14.3	29.2
Tobacco	lbs.	1,378.7	2,162.9	283.1	2,029.6	.2	783.3	---	---	1,662.	2,140.
Irish potatoes	cwt.	7.0	129.8	7.3	139.6	.5	50.4	3.7	151.0	18.5	135.7
Sweet potatoes	"	4.9	146.6	1.2	82.3	4.4	91.0	.9	73.3	11.4	112.5

*Source: [1].

[a]Includes corn silage, sorghum silage, and sorghum forage. Assumes 1 ton sorghum forage equals 3 tons silage.

[3] This material on projected cropland was prepared by Orville Krause, Tom Fry, and Bob Otte, Resource Inventory and Use Program Area, Natural Resources Economics Division, ERS.

Table 3. PRODUCTION AND YIELDS, SOUTHERN REGIONS, 1985*

Commodity	units	Appalachian		Southeast		Delta		So. plains		Total southern prodn.	Weighted Southern yield
		prodn.	yield per acre	prodn.	yield per acre	prodn.	yield per acre	prodn.	yield per acre		
		Million		Million		Million		Million		Million	
Wheat	bu.	25.0	44.62	10.2	37.43	33.5	39.03	196.4	31.81	265.1	34.1
Rye	bu.	1.4	28.18	3.4	29.81	--	--	2.1	22.37	6.9	27.2
Rice	lbs.	--	--	--	--	5,525	5,597	2,467	5,930	7,992	5,700
Corn	bu.	220.4	82.72	146.9	58.26	10.2	47.75	16.0	61.82	393.5	71.8
Silage [a]	ton	11.5	15.19	3.4	13.52	2.3	14.17	3.7	7.89	20.9	13.5
Grain Sorghum	bu.	5.6	66.19	0.470	46.87	20.2	58.41	544.1	76.21	570.4	75.5
Oats	bu.	8.7	56.91	4.4	52.25	7.0	69.35	23.8	38.96	43.9	49.0
Barley	bu.	15.5	57.31	2.2	50.37	0.133	36.96	32.8	39.05	50.6	45.2
Noncitrus fruits & Nuts	ton	0.462	5.41	0.409	1.47	0.044	0.40	0.032	--	.947	.99
Citrus fruit	ton	--	--	10.7	11.94	--		0.535	4.65	11.2	11.6
Vegetables	cwt.	10.4	76.25	52.5	134.93	2.4	78.77	26.9	123.29	92.2	123.5
Hay	ton	7.4	1.90	2.2	2.36	2.8	2.04	8.4	2.14	20.8	2.06
Soybeans	bu.	127.98	29.00	92.9	28.22	296.5	26.77	24.0	31.47	541.4	27.8
Peanuts	lbs.	964	3,045	2,363	2,402	1.4	950	1,041	2,000	4,369	2,448
Cotton	lbs.	206.8	596.27	366.3	515.40	1,787	744.63	1,872	481.40	4,232	601
Sugarcane	ton	--	--	7.6	34.80	9.5	30.35	--	--	17.1	32.3
Tobacco	lbs.	1,290.8	2,704	267.1	2,556	0.133	906	--	--	1,558	2,678
Irish potatoes	cwt.	5.1	149.54	10.3	180.63	0.164	92.71	5.6	233.21	21.2	186.1
Sweet potatoes	cwt.	3.5	170.77	0.571	111.33	3.4	102.66	0.493	96.62	8.0	132.9

*Source: Economic Projections and Analytical Systems, National Economics Analysis Division, ERS, USDA. These preliminary projections are working materials and not official USDA projections.

[a]Includes corn silage, sorghum silage, and sorghum forage. Assumes 1 ton sorghum forage equals 3 tons silage.

Table 4. CROPLAND USED FOR CROPS, U.S. AND BY REGION, HISTORICAL HIGH, 1973 ESTIMATE, AND ACREAGE POTENTIALLY AVAILABLE IN 1985*

Region	Historical high	1973 estimate	Potentially available in 1985
	----------Million Acres----------		
Appalachian	26.6	16.6	17.0
Southeast	25.5	13.2	14.0
Delta states	19.4	16.5	18.5
Southern plains	50.5	32.8	38.0
Subtotal	122.0	79.1	87.5
Mountain	36.6	35.7	38.0
Pacific	20.8	20.4	21.5
Northeast	25.4 [a]	12.9	13.0
Lake	39.5	36.2	38.5
Cornbelt	85.3	78.3	84.0
Northern plains	95.5	91.6	98.5
Subtotal	303.1	275.1	293.5
Sum 48 states	425.1	354.2	381.0

*Source: Unpublished data compiled in Natural Resource Economics Division, Economic Research Service, USDA. These preliminary projections are working materials only and not official USDA projections.

[a]All-time high acreage for the northeast is set at the 1910 level. Previous years may have been slightly greater.

Table 5. MAJOR USES OF CROPLAND IN THE SOUTH AND IN THE U.S., 1973 AND PROJECTED TO 1985*

Cropland Category	Appalachian		Southeast		Delta		So. plains		Total south		48 states	
	1973	1985	1973	1985	1973	1985	1973	1985	1973	1985	1973	1985
	Million Acres											
Crops harvested [a]	16.8	17.1	13.4	14.1	16.6	18.7	30.8	35.3	77.6	85.2	323.1	354.0
Double cropped	.4	.4	.4	.4	.3	.4	.5	.5	1.6	1.7	4.6	5.3
Cropland harvested	16.4	16.7	13.0	13.7	16.3	18.3	30.3	34.8	76.0	83.5	318.5	349.3
Crop failure	.2	.3	.2	.3	.2	.2	1.1	1.2	1.7	2.0	4.8	5.7
Summer fallow	0	0	0	0	0	0	1.4	2.0	1.4	2.0	30.9	26.0
Total cropland used for crops	16.6	17.0	13.2	14.0	16.5	18.5	32.8	38.0	79.1	87.5	354.2	381.0
Soil improvement & idle cropland	2.4	2.4	1.5	1.1	1.4	1.5	5.4	3.1	10.7	8.1	28.1	19.1
Total cropland excluding cropland pasture	19.0	19.4	14.7	15.1	17.9	20.0	38.2	41.1	89.8	95.6	382.3	400.1
Cropland pasture	7.7	6.7	3.3	2.8	3.7	3.0	8.2	8.2	22.9	20.7	46.0	40.0
Total cropland	26.7	26.1	18.0	17.9	21.6	23.0	46.4	49.3	112.7	116.3	428.3	440.1
Diverted acres											19.0	
Irrigated acres	.2	.2	1.3	1.5	2.0	2.2	7.1	7.2	10.6	11.1	35.5	38.4

*Source: Resource Inventory and Use Program Area, Natural Resource Economics Division, ERS, USDA. These preliminary projections are working materials only and not official USDA projections.

[a]Includes acreage double cropped.

costs, and levels of technology.

During the past 25 years as much as 1.8 million acres per year have been taken out of crop production in the South, with about 0.2 million acres per year being converted to urbanization and highways and the remainder to forest, permanent pasture, or rangeland. In projecting 87.5 million acres of cropland in the South in 1985, it is assumed that urbanization and abandonment will be counterbalanced by reclamation and return to production of enough land to add about 0.7 million acres per year to the cropland base.

HARVESTED CROPLAND REQUIREMENTS IN 1985

Though an abundance of acreage will be potentially available in the South in 1985, by no means will all of it be needed, under the baseline assumptions used in this analysis. In fact, because of increased yields and some shifts in commodity production to other regions in the United States, less harvested acres in the South will be needed in 1985 than were used in the 1970-1972 period (Table 6). In the United States as a whole, about 5 million additional acres will be needed in 1985. In Table 6, we have taken into account the baseline production requirements, assumed yields, and historical trends in state shares of production and determined the harvested cropland requirements by region for 16 crops.

Crops for which fewer harvested acres will be required in the South to meet 1985 baseline production projections are rice, corn, silage, oats, hay, cotton, tobacco, Irish potatoes, and sweet potatoes. Crops for which more acres will be required include wheat, rye, grain sorghum, barley, soybeans, peanuts, and sugar cane. Crops for which acreage needs in the South differ in direction from those of the United States in 1985 as compared to 1970-1972 include wheat, corn, and sugar cane.

POTENTIAL FOR MEETING GREATER EXPORT DEMANDS

The above analysis, using conservative crop yield and export demand projections, indicates that the South will have adequate cropland to produce its projected share of United States crop output. The baseline export alternative assumed in the preceding analysis assumes continued barriers to freer trade and a conservative growth in United States exports.

An alternative level of exports for feed grains and soybeans (the commodities making up the bulk of

Table 6. HARVESTED CROPLAND REQUIREMENTS FOR THE SOUTH AND THE U.S. in 1985, BY REGION, BY COMMODITY, WITH COMPARISONS TO 1970-1972 AVERAGE*

Commodity	Appalachian		Southeast		Delta		Southern Plains		Total South		48 States	
	1970-72	1985	1970-72	1985	1970-72	1985	1970-72	1985	1970-72	1985	1970-72	1985
	Thousand acres											
Wheat	841	561	408	268	436	858	5,721	6,175	7,406	7,862	46,180	41,264
Rye	38	49	106	116	---	---	88	95	232	260	1,427	1,438
Rice	---	---	---	---	1,013	987	468	416	1,481	1,403	1,816	1,765
Corn	3,584	2,664	2,897	2,522	347	215	588	259	7,416	5,660	59,573	64,084
Silage	717	754	235	250	141	163	1,713	472	2,806	1,639	11,682	10,640
Grain sorghum	166	84	103	10	378	346	6,358	7,140	7,015	7,580	14,485	15,066
Oats	217	153	195	88	142	102	630	612	1,184	955	16,007	12,358
Barley	282	270	39	44	1	4	579	839	901	1,157	9,861	11,003
Hay	4,596	3,869	1,362	933	1,643	1,359	3,875	3,924	11,476	10,085	60,893	57,802
Soybeans	3,250	4,414	2,523	3,293	8,469	11,077	330	763	14,572	19,547	43,569	58,217
Peanuts	262	316	772	984	8	1	420	521	1,462	1,822	1,469	1,836
Cotton	602	347	1,272	712	3,126	2,399	5,359	3,889	10,359	7,347	11,927	8,660
Sugarcane	---	---	202	219	296	312	---	---	498	531	649	532
Tobacco	644	477	140	104	1	---	---	---	785	581	860	638
Irish potatoes	56	34	52	57	6	2	24	24	138	117	1,357	1,351
Sweet potatoes	34	20	15	5	49	33	12	5	110	63	119	72
Total, above crops	15,289	14,012	10,321	9,605	16,056	17,858	26,165	25,134	67,841	66,609	281,874	286,726

*Source: Economic Projections and Analytical Systems, National Economic Analysis Division, ERS, USDA. These preliminary projections are working materials only and not official USDA projections. Data for years 1970-1972 were calculated from [1].

United States exports) has been developed by ERS [6]. It assumes an optimistic high export demand requiring continued movement toward freer trade and a United States comparative advantage in international trade of food and fiber commodities. Specifically, feed grain exports would reach 56.3 million metric tons by 1985 as opposed to the 34.5 baseline assumption used in the above analysis, and soybean exports would reach 30.6 as opposed to the 25.8 million metric tons assumed above.

To produce these higher export quantities would require an additional 10.1 million harvested acres for feed grains and 4.5 million acres for soybeans in the United States. To produce the same share of United States production in 1985 as assumed earlier, additional acreage requirements in the South would be about 1.5 million acres for feed grains and another 1.5 million acres for soybeans. This increased acreage is well within the productive capacity of the South and the United States and would require only a moderate increase in feed grain and soybean prices from historical levels to provide the incentive for the required production.

SUMMARY

Production of the following commodities is expected to decline by 1985 in the 14 southern states: corn, oats, cotton, tobacco, sweet potatoes, sheep, and milk. However, the South is projected to obtain a larger share of United States production in wheat, rye, grain sorghum, barley, soybeans, sugar cane, and chickens.

Cropland in the South potentially available for crops is projected to increase from the 79.1 million acres used in 1973 to 87.5 million acres in 1985. However, under the baseline assumptions, fewer harvested acres will be needed in the South in 1985 than were used in the 1970-1972 base period due to increased yields and some shifts in production to other regions.

A somewhat higher export demand reflecting freer trade would require an additional 3 million acres over the baseline level assumed for 1985 in the South and 14.6 million additional acres in the United States as a whole. The increased acreage requirements for both the South and the United States are well within the productive capacity projected for 1985, and would require only a moderate increase in commodity prices to encourage the reclamation or return to production of the required acreage.

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