The 1988 Drought and Market Prospects for Soybeans and Soybean Products in 1988-89[a]

In one year's time, the soybean market has shifted from concern about large supplies, low prices and a depressed soybean oil market to expectations of critically short supplies. This abrupt change of market psychology has been heightened by the most widespread and severe U.S. drought since the 1930's. However, its origin goes back at least three years to the 1985 Food Security Act, which provided income signals to crop producers (through the target price system for feed grains, food grains and cotton) that did not match price signals in the market place. The result of distorted income signals and the 10-year conservation Reserve Program has been a substantial decline in U.S. soybean acreage in the last several years, along with growing world demand for protein meal. Even with normal yields, soybean supplies were expected to be tight in the year ahead, with upward pressure on prices. The drought has greatly increased the prospective tightness in soybean supplies, and changing day-to-day weather conditions have re-kindled market volatility similar to that of the early 1970's.

Production Prospects

At this writing (July 22), 1988 soybean production prospects are clouded by both uncertainty about acreage and yields. USDA's July crop report included acreage planted and intended to be planted to soybeans, based on its early June survey along with a July 1 update in five states. At the time of both the June survey and the July update, a large part of the potential wheat-soybean double crop area was dry. However, recent rains through parts of the area

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since then and producer expectations of $9 or more per bushel for this year's soybean crop may have pushed actual plantings at least slightly above levels shown in the July report. Changes in double-crop acreage probably will have only marginal impact on this season's soybean supplies, and probably should be only a slightly tempering influence on prices. For example, a one million acre increase in double cropping, with a 20 bushel per acre average yield would add only 20 million bushels or slightly over one percent to total supplies. Similarly, the amount of abandoned acreage because of severe drought damage is another unknown with a potential marginal effect on supplies. At prices in the $8 to $9 per bushel range, however, producers can afford to harvest some very low yields including those down to or below 5 bushels per acre. It is my expectation that a slight increase in double-cropping will about offset increased abandonment, leaving bean acreage for harvest near USDA's July estimate.

That brings us to the biggest uncertainty, potential yields. Table 1 shows percentage changes from normal in U.S. average soybean yields in previous drought years dating back to the 1930's. Soybeans have the ability to wait for a considerable length of time for rains, and for this reason can tolerate more drought than corn. But the most critical month in the soybean growth cycle for most of the U.S. soybean belt is August. Previous midwestern droughts have shown a strong tendency to break up in late July or early August, thus allowing soybeans to partially recover from earlier drought damage. As table 1 indicates, the most severe yield reductions in the past were in the range of 15 to 20 percent below normal. In the 1930's, soybeans were only a very minor crop, with only a few acres harvested for soybeans. Thus, the 1934 and 19836 yields are not necessarily a good indication of the crop's ability to withstand a 1930's type of drought.

Table 1. U.S. Soybean Yields and Percentage Changes from Normal, Previous Drought Years

	% Change from Normal	Bu./A.
1934	-1	14.9
1936	-5	14.3
1947	-20	16.3
1966	-2	25.4
1970	-3	26.7
1974	-12	23.7
1976	-7	26.1
1980	-11	26.5
1983	-15	26.2

A further indication of soybeans' ability to withstand drought is shown in Table 2, with yield data from Central Iowa in 1977. That year, a small, localized drought struck several counties in Central Iowa and persisted from winter until later July. By late June, corn in the area was severely damaged beyond the potential for recovery. However, rains moved into the area in late July and August and allowed soybean yields to recover somewhat. The 1977 Central Iowa drought appears, as of late July, to be similar to the drought experienced this year over a large part of the central and eastern cornbelt. Drought conditions in these areas are partially offset by much better crop conditions in central, northern and western Iowa, Nebraska and North Carolina. With good late July and August rains, the U.S. average soybean yield thus might not be down as much as the nearly 24 percent decline experienced in Central Iowa in 1977. And with a dry August, yields, could be down considerably more.

Based on these previous responses of soybean yields to drought, I have projected 1988 U.S. soybean production using yield reductions of 12, 20 and 30 percent from a normal average yield of 32.5 bushels per acre. The smallest reduction in yields compares with an implied 11 percent reduction in USDA's World Agricultural Outlook Board projection on July 12.

Table 2. Central Iowa Yields, 1977 Drought

	Corn (Bu./A)	Soybeans
Story	32.4	22.2
Boone	33.6	24.0
Marshall	42.5	28.8
Polk	61.3	30.3
Jasper	51.4	34.9
Dallas	52.3	30.3
Average	45.6	28.4
Percent Drop from Normal	-60	-23.5
Corn/sb Ratio	1.6 To One	
Normal Ratio	3.2 To One	

Supply-Demand Balance, Alternative Yield Scenarios

Table 3 shows the potential supply-demand balance with the three alternative yield levels, and comparisons with 1987-88 and 1983-84 (the last major U.S. drought). Supplies under all three yield levels would be below those of 1983-84, although alternative 1 would be within two percent of that year's supply. Alternative 1 appears to be a possibility with good rains and moderate temperatures from the last week of July through the month of August in most of the soybean belt. Alternatives 2 and 3 represent potential outcomes with drought continuing into early to mid August in the Central and eastern cornbelt and south.

With continued drought, minimum pipeline carryover stocks would determine the level of utilization, with prices rationing usage to insure adequate ending stocks on August 31, 1989. An almost absolute minimum pipeline stocks level would be about 100 to 110 million bushels, or about a three week's supply on September 1. In past short-crop years, the market generally has tended to over-ration usage early in the season so that ending stocks ended up at least

slightly above absolute minimum working levels (1976-77 was an exception, in which the trade did not anticipate extremely tight supplies until spring). Because of minimum carryover constraints, yields at these levels would require reductions in total utilization of U.S. soybeans of 14, 19 and 28 percent from the current season in 1987-88.

My projections indicate exports under all three yield situations would be likely to be reduced more than domestic crushings, because of increased competition from South American soybeans from April 1989 onward. Strong prices this fall could boost Brazilian and Argentina soybean plantings this fall by 18 to 22 percent or more above a year earlier. Carryover stocks under all three situations would be 9 to 10 percent of annual utilization, with prices trading in an extremely wide range for the marketing year. Highest prices of the season would be likely at or before harvest, with the lowest prices likely occurring in the summer quarter. At this writing (July 22), the production potential appears to be between alternative 1 and alternative 2.

Table 3. Soybean Balance Sheet (Mil. Bu.)

			Proj. 1988-89		
Supplies:	1983-84	1987-88	Alt. 1	Alt. 2	Alt. 3
Carryover	345	436	303	303	303
Bu./A.	26.2	33.7	28.6	26	22.75
Production	1,636	1,905	1,632	1,485	1,300
	1,981	2,341	1,935	1,788	1,603
Utilization:					
Crush	938	1,162	1,020	993	877
Other Domestic	79	96	96	92	91
Exports	743	780	639	558	500
Total	1,805	2,038	1,755	1,643	1,468
Carryover, Sept. 1	176	303	180	145	135
Carryover % of Use	10	15	10	9	9
U.S. Ave. Farm Price	$7.83	$6.15	$7.90	$8.60	$10.00
Seasonal Price Range	$6.50-8.28	$4.50-10.70	$5.80-9.50	$6.00-10.60	$6.25-12.00

Prospects for Soybean Products

Supply-demand prospects for U.S. soybean oil and meal under alternative soybean production scenarios are shown in tables 4 and 5. For soybean oil, part of the adjustment to reduced U.S. supplies likely will be a sharp reduction in exports stemming from much better South Asia oilseed crop prospects than in 1987, expanded South American competition and less aggressive use of the Export Enhancement (EEP) and PL-480 export assistance programs. In addition, slight to moderate reductions in domestic soybean oil consumption and sharp reductions in carryover stocks are projected. Tighter soybean oil supplies almost certainly will push the 1988-89 season average soybean oil price well above a year earlier, with increases ranging from 24 to 60 percent, depending on the crop size. Carryover stocks of soybean oil under alternative 3 would be very tight by historical standards.

Meal supplies as projected in Table 4 would require a sharp reduction in both domestic use and exports in 1988-89. The largest reduction likely will occur in exports due to an expected sharp increase in competition from new-crop South American meal in the spring and summer of 1989. Meal prices under all three yield levels are projected to be above a year earlier, but by smaller percentages than beans or oil. That's because of the tightening soybean oil supply situation is likely to substantially increase soybean oil's share of the value of soybeans. Average cash crushing margins are projected to be in the $.50 to $.75 per bushel range; slightly less than half the levels of 1987-88. Margins early this past season were increased partly as a side-effect of large CCC soybean sales which were purchased aggressively by processors. As with soybeans, unusually wide ranges in soybean meal prices from the season high to the season low are expected in the year ahead.

Table 4. U.S. Soybean Meal Balance Sheet (Mil. Short Tons)

			Proj. 1988-89		
Supplies:	1983-84	1987-88	Alt. 1	Alt. 2	Alt. 3
Carryover	474	240	300	300	300
Production	22,756	27,810	24,480	23,830	21,045
Total	23,230	28,050	24,780	24,132	21,345
Utilization:					
Domestic	17,615	21,000	18,800	18,350	16,630
Exports	5,360	6,700	5,800	5,622	4,570
Total	22,975	27,750	24,600	23,972	21,200
Carryover, Oct. 1	255	300	180	160	145
Ave. Price, Decatur $/Ton, 44% Protein	$188.20	$225	$245	$260	$280
SBM/Corn Price Ratio	1.64	3.28	2.27	2.27	2.27

Table 5. U.S. Soybean Oil Balance Sheet (Mil. lbs.)

			Proj. 1988-89		
Supplies:	1983-84	1987-88	Alt. 1	Alt. 2	Alt. 3
Carryover	1,261	1,725	1,659	1,659	1,659
Imports		152	50	100	200
Productions	10,872	12,782	11,200	10,900	9,647
Total	12,131	14,659	12,909	12,659	11,506
Utilization:					
Domestic	9,588	10,900	10,509	10,409	9,956
Exports	1,824	2,100	1,300	1,250	1,050
Total	11,412	13,000	11,809	11,659	11,006
Carryover, Oct. 1	721	1,659	1,100	1,000	500
Ave. Price, Decatur, ¢/lb.	30.60¢	22.50¢	27.5¢	29.0¢	36¢

Timing of Price Peaks, Previous Short-Crop Years

Table 6 shows the timing of the peak in November soybean futures and price action after the peak for most other widespread U.S. droughts since 1970. There is a strong tendency of soybean prices to show a counterseasonal price pattern in years of short crops, and in the four years shown in Table 6, the timing of the price peak ranged from August 25 to November 5. While 1970 was not a major drought and not a severely short crop, parts of the western

cornbelt were dry and the soybean market also reacted in sympathy with corn prices. The corn crop that year was sharply reduced by an epidemic of Southern Corn Leaf Blight. Price action in the next two to four weeks after the peak typically could be described as a sharp downward plunge. This year, with no daily price limits on nearby futures contract months, large speculative trading activity and the increased role of commodity pools, downward price reactions can be and already have been more severe than those of 1974-75, 1980-81 and 1983-84. Chart actions in late June and the week of July 18 suggest we may already have seen the high in 1988-crop soybean prices, provided August rainfall is near or above normal. But with a dry August, a re-test of June high and perhaps the June 1973 high of $12.90 per bushel would be possible.

Table 6. Soybean Futures Price Behaviors, Previous Droughts

Time of peak	Price action after peak
1970-71 Oct. 28	-15¢ in one mo.
1974-75 Oct. 4	-$1.30 in one mo.
1980-81 Nov. 5 & 20	-$2.26 in 2.5 wks.
1983-84 Aug. 25 & Sep. 13	-$1.02 in one mo.

The one major exception to the counter-seasonal price pattern for short soybean crops was in 1976-77. That year, October crop estimates placed production about 18 percent below a year earlier as a result of reduced acreage and yields, with total supplies down 13 percent. Prices in the first few months of the year were $1 to $1.50 per bushel above a year earlier but resulted in insufficient rationing of usage. When that became apparent in the

spring, prices moved up briefly to over $10 on the futures market, possibly influenced some by alleged large long positions in the soybean market by a well-known family.

Soviet Protein Importing Patterns

The Soviets are emerging as a major potential swing factor in world protein meal and soybean markets. After several years of relatively static protein imports, Soviet meal purchases increased sharply in 1987, beginning with South American purchases in mid-year and ending with record combined purchases of U.S. beans and meal in late fall. USSR soybean and meal imports since the early 1980s are shown in Table 7. As can be seen from data in Table 7, the Soviets increased protein imports sharply for one year in 1982-83 (under a different administration than at present). Its imports the following two years dropped sharply, apparently because of inadequate domestic transportation and handling capacity to effectively move the imported meal where it was needed and lack of knowledge of how to use soybean meal effectively. The present Soviet administration appears to be overcoming these problems, and apparently is serious about increasing average protein contents of livestock and poultry rations. My 1988-89 project are based on 1988-89 Soviet protein imports near or slightly below the level of the past year, on the assumption that Soviet agricultural officials will want to review and evaluate the results of this season's sharply increased protein meal feeding before adjusting protein contents of rations to a still higher level.

Foreign Oilseed Crop Prospects

Tables 8, 9 and 10 show projected 1987-88 EC oilseed production, and world production of major protein meals and oils. Global supplies of oilseeds and products this season are moderately tight and carryover stocks likely will

Table 7. Soviet Imports of Soybeans, Soybean Meal and Soybean Oil from all Sources, 1981-81 to Date and Soybean Meal Consumption, in Millions of Metric Tons.

	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
Soybean imports	1.50	1.10	0.95	0.85	2.00	1.10	1.80
Soybean meal imports	1.10	2.80	0.83	0.55	0.60	2.60	3.20
Soybean oil imports	0.20	0.18	0.10	0.32	0.11	0.17	0.10
Soybean meal consumption	2.85	3.30	1.82	1.41	2.35	3.85	5.06

Source: FAS and ERS, USDA

decline substantially by late summer 1989. South American soybean production last spring, despite a late season drought in southern Brazil, was substantially above 1987 and will continue to compete aggressively with U.S. exports until at least early fall. Canadian rapeseed plantings were up this spring but adverse weather is expected to reduce its production substantially from 1987. EC rapeseed acreage is large and yield prospects there are favorable. Competition from these sources will help the world oilseed economy adjust to tight U.S. supplies.

Table 8. EC Oilseed Production and Protein Meal Consumption, Mil. Tons, 1982-1988 Marketing Years.

	1983	1984	1985	1986	1987
Domestic Oilseed Production	4.6	6.3	7.2	8.4	11.9
Protein Meal Consumption 44% SBM Equiv.	26.2	27.9	29.7	30.5	29.7

Source: USDA World Oilseed Situation and Market Highlights, June 1988, for 6-88.

Table 9. World Production of Major Protein Meal, Mil. Metric Tons 44% Protein Equivalent

	1984-85	1985-86	1986-87	Proj. 1987-88	% Change 1987 vs. 86
Soybean	58.10	60.08	66.66	67.67	+1.5
Cottonseed	10.24	8.99	7.95	8.79	+10.6
Rapeseed	6.70	7.21	7.89	8.78	+11.2
Sunseed	6.93	7.25	7.16	7.69	+7.4
Fish	8.66	9.13	8.57	8.82	+2.9
Peanut	4.80	4.92	4.98	4.49	-9.8
Others	2.04	2.23	2.26	2.13	-5.8
Total	97.47	99.81	105.47	108.37	+2.7

Source: FAS, USDA

Table 10. World Production of Major Oils in Mil. Metric Tons

	1984-85	1985-86	1986-87	Proj. 1987-88	% Change 1987 vs. 86
Soybean	13.34	13.78	15.10	15.26	+1.1
Palm	6.92	8.16	8.10	8.40	+3.7
Sunflower	5.17	6.63	6.60	7.15	+8.3
Rapeseed	5.60	6.18	6.78	7.47	+10.2
Cottonseed	3.87	3.48	3.05	3.34	+9.5
Peanut	3.04	2.94	3.11	2.82	-9.3
Coconut	2.63	3.32	2.99	2.71	-9.4
Olive	1.60	1.62	1.34	1.71	+27.6
Fish	1.37	1.49	1.34	1.41	+5.2
Palm Kernel	0.96	1.11	1.09	1.13	+3.7
Linseed	0.64	0.60	0.64	0.66	+3.1
Animal Fats,Oils	11.91	11.98	11.59	11.38	-1.8
Total	57.05	61.29	61.93	63.44	+2.4

U.S. Drought Impact in a World Perspective

World production of protein meals in 1987-88 and comparisons with recent years are shown in Table 9, along with world fats and oils production in Table 10. The projected decreases in U.S. soybean supplies for 1988-89 have the potential to decrease world protein meal supplies by 5.7 to 11.5 percent, and fat and oil supplies by 2.2 to 4.5 percent, if not offset by increased production elsewhere. The lower end of these ranges would be comparable to the

percentage decreases in world supplies that occurred in 1983-84 with the last major U.S drought. With no changes in oilseed production elsewhere, South American soybean production in 1989 would have to increase by 26 to 53 percent over 1988 if it were to fully offset the currently indicated decline in U.S. soybean production. The next spring after the 1983 U.S. drought, South American production was an estimated 19 percent above a year earlier. With favorable weather for U.S. soybeans during the rest of the growing season and favorable weather in the South American soybean belt from November through March, there is some chance increased South American production could offset much of this year's U.S. drought losses. But with a dry August in the mid-section of the nation, it would be almost impossible for increased production in Brazil and Argentina to offset the sharp decline in the U.S. soybean crop.

Table 11. South American Soybean Production

	Mil.Bu.
1979	528
1980	716
1981	718
1982	658
1983	734
1984	864
1985	974
1986	828
1987	951
Prelim. 1988	1,075

U.S. Acreage Prospects for 1989

U.S. soybean prices appear likely to follow a short-crop pattern in 1988-89, but three important necessary conditions for that include (1) substantially increased South American production next spring, (2) increased U.S. soybean acreage in 1989 and (3) favorable U.S. weather in 1989.

U.S. soybean acreage responses one year after critically tight soybean supplies were as follows for the years since 1972

1973	+21.9%
1977	+17.4%
1981	- 3.0%
1984	+ 6.7%

Thus, U.S. farmers have shown a strong tendency to increase soybean plantings in response to the previous season's tight supplies and high prices. A drought-relief bill now in Congress would facilitate such acreage adjustments by permitting farmers to plant soybeans on 10 to 35 percent of their corn and other program crop acres without losing base history for farm program purposes. In addition, it is almost certain that 1989 set-aside requirements and diversion alternatives will be sharply reduced from those of last year. In corn alone, almost 21 million acres were idled under the 1988 farm program, along with 2 million acres of cotton land and almost 23 million acres of wheat land. Some of these acres, particularly from the corn program, are likely to be returned to soybean production in 1989. Iowa State University cost estimates show a soybean/corn cost ratio of 2.17 for soybeans following corn versus corn following corn.[1] That would place the break-even soybean price at $7.38 per bushel with $3.40 corn corn prices or $6.51 for $3.00 corn. Given the potentially tight supply for soybeans this season (with soybean carry-in stocks much smaller than those for corn), soybean prices appear likely to be competitive with corn for former set-aside acres in 1989, provided program rule changes remove farmer concerns about future reductions in a farm's corn base.

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[1]Mike Duffy, Estimated Costs of Crop Production in Iowa--1988, FM1712 Revised, Iowa State University (Ames, Iowa), December 1987.