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OUTLOOK FOR FARM INPUTS

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Farmers are expected to spend between $118 and $121 billion in 1990 for agricultural inputs, representing an estimated 1 to 2 percent decline from 1989. Even though planted acreage will rise modestly in 1990 resulting in greater input consumption and slightly higher manufactured input prices paid by farmers, feed cost declines will reduce aggregate input expenses from 1989 levels. On the other hand, capital expenditures are expected to increase 4 to 5 percent continuing a trend which began in 1987.

Agricultural inputs is a diverse topic encompassing land, seeds, fertilizers, pesticides, farm machinery, repairs, feeds, labor, credit, livestock, animal health products, energy, water, farm structures, trucks, and a host of other goods and services purchased by farmers. This presentation will focus on the situation and outlook for planted acreage, seeds, and the major manufactured agricultural inputs. Information on feed and livestock inputs is being presented in other Outlook sessions. In closing I'll briefly review several of the trends and issues affecting agricultural inputs in the near term.

The largest category (28 percent) of agricultural production expenses have a farm origin and include expenditures for livestock, feed, and seed (fig. 1). Expenditures for these inputs are largely influenced by livestock and grain prices. Overhead expenses (depreciation, taxes, and rent) make up about 22 percent of all production costs, and by definition, are not directly linked to agricultural production levels. However, most of the remaining expense categories are correlated with acreage planted and farm output. Operating expenses such as repairs, machine hire, and marketing costs (16 percent); interest (12 percent); and labor (8 percent) are other major production cost categories. Manufactured inputs (fertilizer, pesticides and energy) account for 14 percent of all production expenses. The distribution of production expenses across major categories has remained fairly constant during the last several years.

Acres Planted

Nondurable agricultural input use is highly dependent on the mix and level of crop acres planted. Per acre seeding rates, application rates for fertilizer and pesticides, and tillage practices tend to change slowly from year-to-year leaving acres planted the major determinant of consumption. Small changes in commodity and input prices appear to have only a limited influence on aggregate input consumption. However, some evidence suggests that large changes in input prices, such as the energy price shocks of the 1970's and interest rate jumps of the 1980's, lead to rapid changes in input use.

Planted acreage of the principal crops grew steadily during the 1970's, peaked in 1981, fell dramatically in the PIK-year of 1983, bounced back in 1984 and declined through 1988.[1/] Due to heavy participation in the commodity programs and the Conservation Reserve Program (CRP), planted acreage in 1987 and 1988 was the lowest in nearly 16 years (excluding 1983). Much of the planted acreage variation in the 1980's was due to the input intensive row crops (fig. 2). The less intensively farmed solid seeded (i.e. small grains) crop acreage (which is dominated by harvested winter wheat acreage) showed only modest changes between 1980 and 1989, while hay acreage was nearly constant. Planted acreage of the principal crops increased in 1989 to 325 million acres and is expected to increase to about 328-330 million in 1990.

The acreage reduction programs (ARP) for 1990 feed grains are similar to 1989, while wheat and cotton ARP's have declined. The net effect, even with some limited flexibility in planting non-program crops on base acreage, will likely be an increase in row crop acreage and a slight increase in harvested solid seeded crops, especially winter wheat.

Seed Consumption

In 1989, seed consumption of the eight major field crops was close to 6.4 million tons, down 11 percent from the record acreage year of 1981 when 7.2 million tons were planted (fig. 3). Seeding rates in 1989 for the major crops were similar to 1988, but seed costs per acre were above year earlier levels due to rising seed costs (table 1). For 1990, seed use will likely rise about 4 percent over 1989 due to modest increases in planted acreage of the major field crops.

The combination of greater planted acreage, reduced seed supply, increased commodity prices and more expensive off-season production led to some significant seed price increases in 1989. For example, soybean and hybrid corn seed prices rose about 24 percent and 11 percent, respectively, between 1988 and 1989. Forage seed prices also rose in 1989 as Conservation Reserve

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[1/] Principal row crops include planted area of corn, sorghum, soybeans, flaxseed, peanuts, sunflowers, cotton, dry edible beans, potatoes, sweet potatoes, and sugarbeets, and harvested area of tobacco and sugarcane. Principal solid seeded crops include planted area of oats, barley, durum and other spring wheat, rice and harvested area of winter wheat and rye. All hay area is for harvested acreage only.

Program (CRP) acres continued to increase. USDA's prices paid index for seeds rose 10 percent in 1989 and is likely to increase only 3 to 5 percent in 1990 as the growth in corn and CRP acreage slows and commodity prices weaken (fig. 4). Seed prices for non-hybrid crops tend to follow commercial crop prices.

Fertilizer Consumption

Fertilizer nutrient consumption stood at 19.5 million tons for the 1988 fertilizer year, only slightly less than the forecast 1989 consumption of near 20 million (fig. 5). Fertilizer use in 1990 should be near 20.6 million tons, up 3 to 4 percent from last year.

Our 1989 application rate survey indicates decreased fertilizer use on all the major crops of corn, soybeans, cotton, and wheat (table 2). In the case of corn, the major consumer of fertilizer nutrients, application rates for nitrogen, phosphate and potash fell by 4, 6, and 5 percent, respectively. Fertilizer carryover from the drought stunted crop in 1988 as well as an increase in fertilizer prices in the spring of 1989 may have contributed to the application rate declines. For all crops, the proportion of acreage fertilized was similar to 1988.

With modest increases in demand projected for 1990, increased fertilizer stocks and no significant surge in foreign demand, prices for 1990 will likely be similar to 1989 levels (fig. 6). Fertilizer prices between 1983 and 1987 were well below the peak use years of 1981 and 1982 due to falling demand and lower energy costs. Nominal prices in 1990 will likely remain below 1981/82 levels.

Pesticide Use

Estimates for pesticide use on the 10 major field crops also closely follow planted acreage with herbicides accounting for an estimated 80 percent of all active ingredients, insecticides about 15 percent, and fungicides and other compounds the remainder.[2/] The herbicide market for the major crops of corn, cotton and soybeans is very mature. In 1988, 95 percent of the corn, soybean, and cotton acreages were treated with herbicides--unchanged from 1987.

Consumption of pesticides on the major field crops is estimated at around 400-450 million pounds of active ingredients (a.i.) with year-to-year variations due to shifts in planted acreage (fig. 7). Since corn, soybeans, and cotton account for the largest portion of pesticide use, changes in these crop acres will significantly affect aggregate pesticide use. Hence with the corn and cotton acreage anticipated to increase slightly next year pesticide consumption is expected to rise between 4 and 7 million pounds, which is 1 to 2 percent over estimated 1989 levels. As new products, which require very small amounts of a.i. per acre, are more widely adopted, aggregate pesticide poundage may actually decline even through acres treated remain stable or even increase.

[2/] The 10 major field crops are wheat, barley, oats, rice, corn, cotton, grain sorghum, peanuts, soybeans, and tobacco.

Pesticide prices, as measured by USDA's prices paid index for agricultural chemicals, trended downward between 1984 and 1987 (fig. 8). The price index increased slightly in 1988 and 1989 and is expected to rise further as corn and wheat acreage increases in 1990. A 2 to 4 percent increase in prices would bring the prices paid index up to the level recorded in 1984.

Capital Purchases

Capital expenditures by farmers between 1980 and 1986 fell by nearly 60 percent. Rising real interest rates, declining commodity prices, curtailed agricultural exports, reluctance to take on additional debt, falling land values, reduced planted cropland, and a binge of capital spending in the 1970's led to very conservative levels of capital spending in the 1980's. Tractors and other farm machinery typically make up about 60 percent of all capital expenditures with buildings and land improvements accounting for about 25-30 percent and cars and trucks accounting for the remaining 10-15 percent. Large new tractor purchases have been one of the hardest hit categories with unit sales off 75 percent between 1980 and 1986 (fig. 9).

1986 was the end of a seven year slump for the farm machinery industry. Unit sales of new farm tractors and other large pieces of farm equipment increased in 1987 and 1988 and are likely to show further gains in 1989 and 1990. Sales of new over 40 hp tractors may reach 64 thousand units, up from an estimated 62 thousand in 1989. Combines did not substantially rebound until this year due to the 1988 drought, which led some farmer's to postpone capital expenditures. Self-propelled combine sales, which are closely linked to harvest prospects, began to rise significantly above 1988 levels in April of this year (fig. 10).

With the outlook for net farm cash income to rise in 1990, agricultural interest rates to remain near year-end 1989 levels, and the agricultural sector's debt/asset ratio to stabilize, 1990 capital expenditures are expected to surpass those of 1989 by 4 to 5 percent. Prospects for increased planted acreage and an aging farm machinery stock may also positively influence capital spending by farmers. Furthermore, 1990 will likely be the sixth consecutive year in which net cash income will be near or greater than $50 billion, which should facilitate greater capital expenditures.

Petroleum Products

Consumption of petroleum products by agricultural producers has been steadily declining since 1978 regardless of planted acreage levels (fig. 11). While acres planted obviously influence energy use, other factors are also important. The switch from gasoline to diesel engines, reduced tillage operations, larger multi-function machines, and innovations in crop drying and irrigation have contributed to the decline in fuel consumption. While no-till farming has not been widely adopted, reduced tillage systems are now as prevalent as conventional tillage systems (i.e., including the use of a moldboard plow) in many parts of the country. With only a modest increase in planted acreage forecast for 1990, energy use will likely remain near the forecast levels for 1989.

Just as petroleum consumption in agriculture has been falling, petroleum prices have dropped almost continuously between 1981 and 1986 (fig. 12). Crude oil prices have stabilized since 1986. It is clear that crude oil prices dictate the price farmer's pay for diesel fuel. As of November 1989, DOE was forecasting 1990 crude oil and diesel fuel prices to remain flat, but unpredictable geopolitical forces will likely shape the final 1990 petroleum price structure. Since agriculture directly consumes only 3-4 percent of all energy used in the U.S., changes in the farm sector's usage will have little impact on petroleum prices.

Trends and Issues Shaping Agricultural Input Consumption and Production

- Farms with over $250,000 in sales constitute less than 5 percent of all farms, but produce over 55 percent of all cash receipts. At the same time these farms are responsible for nearly 50 percent of all cash expenses. Input distribution, technology adoption, and perhaps, agricultural productivity will be affected by the smaller number, but larger sized farms.

- While increased concentration in the farm sector is continuing, the trend is even more pronounced in the input industries. Major changes in the industrial organization of the farm machinery, fertilizer, agricultural, chemical, seed, and credit industries have occurred in the last five years. As these input industries have become concentrated they have taken on an international flavor. Agricultural input companies headquartered in Western Europe, Japan, and North America dominate the global input markets.

- Biotechnology research in both the private and public sector promises to transform or replace conventional inputs. Just as the mechanical, chemical,and computer technologies of the past changed input type, mix and intensity, livestock and crop genetic manipulation will do the same in the future. The established seed and chemical industries as well as the newer biotech firms, appear poised to bring a number of genetically engineered products to the market in the next few years.

- Farm programs will continue to exert influence on acres planted, commodity prices, and farm income. The 1985 Food Security Act was innovative in several respects regarding soil conservation issues. The CRP and the conservation compliance provisions of the 1985 Act are designed to protect highly erodible lands. Both these measures affect input use either through a reduction of acres planted, by mandating a change in tillage practices to leave additional residue on the soil, or encouraging a shift in crop rotation patterns.

- Changes were recently made in the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) regarding pesticide testing or retesting for possible health risks. These tests will be costly and if the costs are passed onto farmers, pesticide prices will rise. More changes are being proposed for both FIFRA and the Federal Food, Drug and Cosmetic Act (FFDCA). Pesticide availability and use may also be affected by such issues as patent extension, groundwater contamination, liability issues, farm worker safety, and residues on food. The outcome of the Endangered

Species Act may also influence pesticide usage patterns.

- Groundwater issues also may infringe upon the fertilizer industry especially in areas where nitrates have been detected in drinking water. A number of states have passed or proposed legislation aimed at protecting the drinking water of its citizens. The 1987 Water Quality Act promotes the concept of "best management practices" as a way of maximizing the benefit from using fertilizers yet minimizing the environmental side-effects on surface and ground water.

- While the ongoing GATT negotiations are currently emphasizing agricultural commodity issues, these talks have implications for agricultural inputs. Worldwide shifts in agricultural production in response to changing trade patterns will affect the current mix, intensity, and location of input consumption and resource use. Furthermore, the current round of negotiations will also consider proprietary rights; an issue with implications for technology development and transfer for biotechnology, seeds, pesticides, and other R&D intensive inputs.

- Low input sustainable agriculture is currently an important issue within parts of the agricultural research community. Primarily in response to water quality and food safety problems, new technology development as well as reevaluation of traditional production practices are being encouraged. The substitution of land, labor or management for conventional inputs such as fertilizer and pesticides and the further adoption of reduced tillage systems are proposed as ways to reduce costs of production. At the very least this program should alert farmers to the adverse environmental and economic consequences of input overuse.

Table 1--Seeding rate and cost for selected crops in major producing States, 1989 (Preliminary)

Crop/ State	Acres planted	Per acre Rate	Per acre Cost
Corn for grain	Thous.	Kernels	Dollars
IL	10,900	24,900	20.62
IN	5,500	24,500	20.09
IA	12,700	23,900	20.93
MI	2,300	23,900	20.35
MN	6,200	26,000	22.72
MO	2,400	21,400	18.37
NE	7,500	24,400	20.88
OH	3,300	26,000	22.12
SD	3,400	17,900	14.36
WI	3,600	24,000	17.71
Area	57,800	24,100	20.33
Soybeans		Pounds	Dollars
AR	3,500	54	10.91
GA	1,200	45	9.56
IL	8,800	77	19.48
IN	4,600	59	14.43
IA	8,300	61	15.66
KY	1,200	60	13.90
LA	1,950	54	14.53
MN	5,050	67	14.34
MS	2,500	55	11.84
MO	4,400	59	13.52
NE	2,600	61	15.79
NC	1,550	59	13.88
OH	4,000	75	18.14
TN	1,480	50	10.44
Area	51,130	63	15.26
Cotton			
AZ	460	15	8.27
AR	590	14	7.08
CA	1,069	17	10.99
LA	650	13	7.33
MS	1,100	13	7.32
TX	4,575	19	8.12
Area	8,444	18	8.21

Crop/ State	Acres harvested	Per acre Rate	Per acre Cost
Winter wheat	Thous.	Pounds	Dollars
AR	1,350	128	13.92
CA	570	134	15.11
CO	2,100	44	3.63
ID	810	86	9.78
IL	1,800	105	14.72
IN	880	117	16.86
KS	9,600	61	6.56
MO	1,850	112	12.94
MT	1,700	56	4.91
NE	2,050	63	6.04
OH	1,200	136	18.16
OK	5,700	75	7.04
OR	800	79	9.64
TX	3,000	73	7.91
WA	1,300	66	8.12
Area	34,710	77	9.59
Spring Wheat			
ID	580	101	13.72
MN	2,600	108	11.44
MT	3,500	63	5.73
ND	7,700	92	8.37
SD	2,200	88	7.97
Area	16,580	88	8.82
Durum wheat			
ND	3,000	99	10.13

This table and the succeeding table contain preliminary 1989 information. Final tables on seed, fertilizer, pesticide and tillage use during 1989 and additional data will be published in " Agricultural Resources--Inputs Situation and Outlook Report" to be issued in February, 1990.

Table 2--Fertilizer use on selected crops in the major producing States, 1989 (preliminary)

State	Acres 1/	Acres receiving			Application rate			State	Acres 1/	Acres receiving			Application rate		
		N	P205	K20	N	P205	K20			N	P205	K20	N	P205	K20
	Thousand	Percent			Pounds per acre				Thousand	Percent			Pounds per acre		
				Corn for grain								Cotton			
IL	10,900	99	83	85	160	74	101	AZ	460	95	51	3	178	64	*
IN	5,500	99	94	87	133	78	110	AR	590	94	70	71	80	35	62
IA	12,700	99	85	83	128	57	69	CA	1,069	97	42	13	123	56	14
MI	2,300	99	94	90	111	52	105	LA	650	100	70	72	86	45	55
MN	6,200	97	89	85	115	49	63	MS	1,100	100	54	61	103	49	65
MO	2,400	97	79	82	140	58	72	TX	4,575	63	53	22	48	37	12
NE	7,500	96	68	28	145	36	23	6 State							
OH	3,300	99	97	92	143	72	101	Total	8,444	79	54	32	83	43	40
SD	3,400	69	58	30	69	33	23								
WI	3,600	99	95	95	88	55	73					All wheat 2/			
10 State															
Total	57,800	97	84	75	131	59	81	AR	1,350	97	38	38	99	45	54
								CA	570	92	36	6	105	43	*
				Soybeans				CO	2,100	64	13	nr	45	32	nr
								ID	1,390	90	47	7	95	41	32
AR	3,500	11	27	29	16	37	57	IL	1,800	98	78	66	90	72	79
GA	1,200	67	77	78	20	40	76	IN	880	95	89	88	76	63	65
IL	8,800	10	23	33	17	54	85	KS	9,600	87	52	6	53	32	29
IN	4,600	20	31	41	12	48	81	MN	2,600	99	89	65	72	37	28
IA	8,300	9	16	18	16	50	68	MO	1,850	96	76	70	86	54	67
KY	1,200	35	54	55	24	63	76	MT	5,200	59	52	10	34	26	12
LA	1,950	7	36	37	24	41	60	NE	2,050	76	13	nr	41	30	nr
MN	5,050	16	17	16	16	34	51	ND	10,700	73	61	9	41	28	19
MS	2,500	10	34	34	16	42	63	OH	1,200	95	92	90	79	60	67
MO	4,400	11	20	23	25	41	69	OK	5,700	95	59	12	75	36	22
NE	2,600	24	28	13	16	36	23	OR	800	97	12	6	75	44	38
NC	1,550	54	55	63	24	40	80	SD	2,200	44	35	6	54	28	*
OH	4,000	21	37	50	14	55	93	TX	3,000	72	32	8	89	41	26
TN	1,480	22	45	51	21	43	61	WA	1,300	98	41	2	66	30	*
14 State								18 State							
Total	51,130	17	28	32	18	46	74	Total	54,290	81	53	18	62	37	46

* -- insufficient data nr = none reported

1/ Acres are harvested for winter wheat and planted for all other crops.

2/ Does not include winter wheat in MN, ND, and SD; spring wheat in CA, CO, and WA; and durum wheat in MN, MT, and SD.

Figure 1

Distribution of Production Expenses, 1988

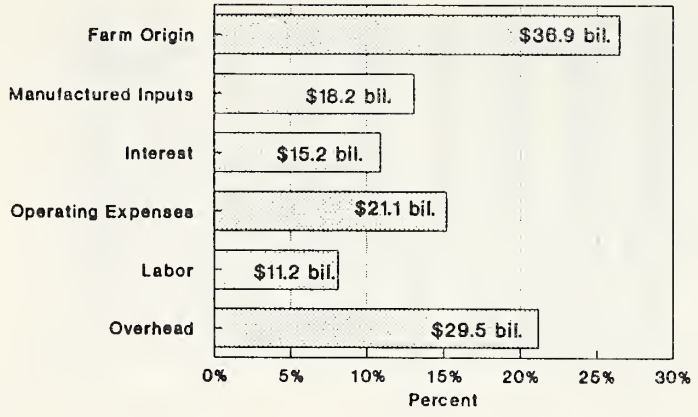

Figure 2

Area Planted to Principal Crops

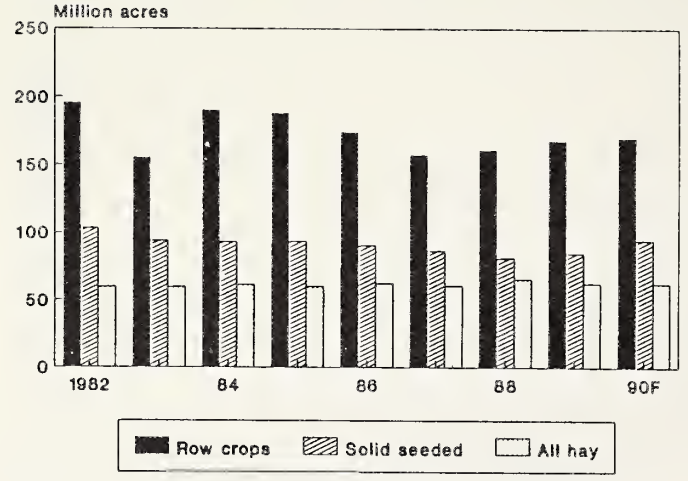

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Figure 3

Seed Use for Major Crops

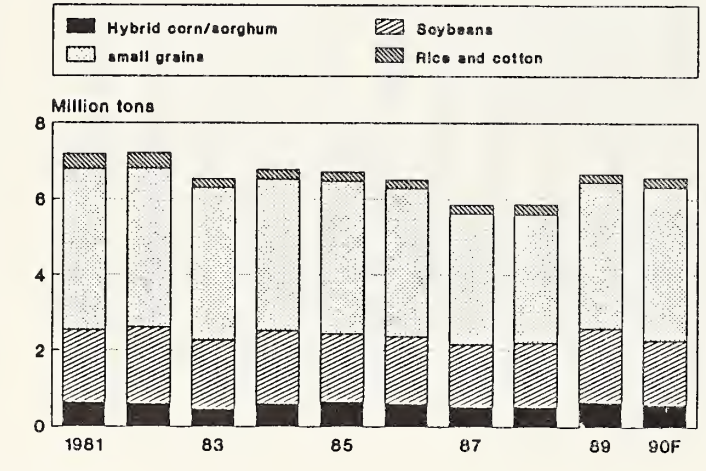

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Figure 4

Seed Price Index

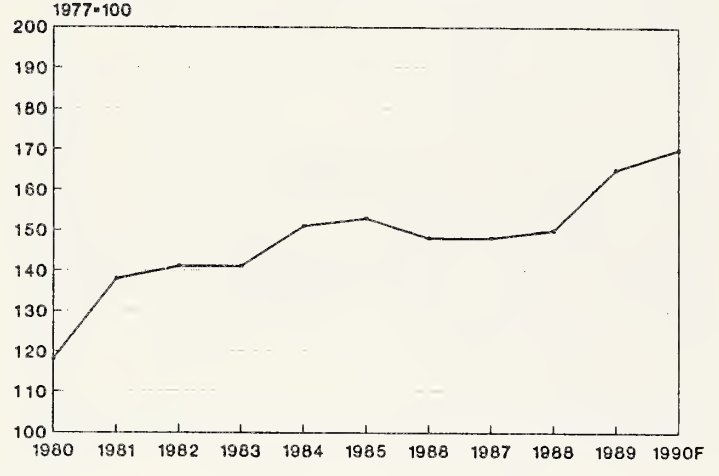

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Figure 5

Fertilizer Nutrient Consumption

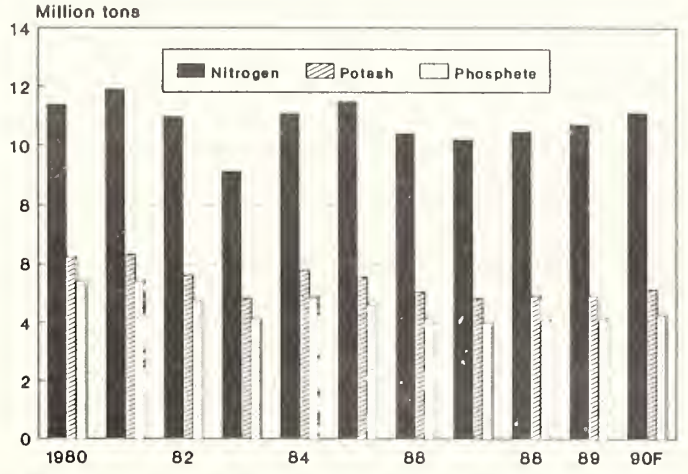

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Figure 6

Fertilizer Price Index

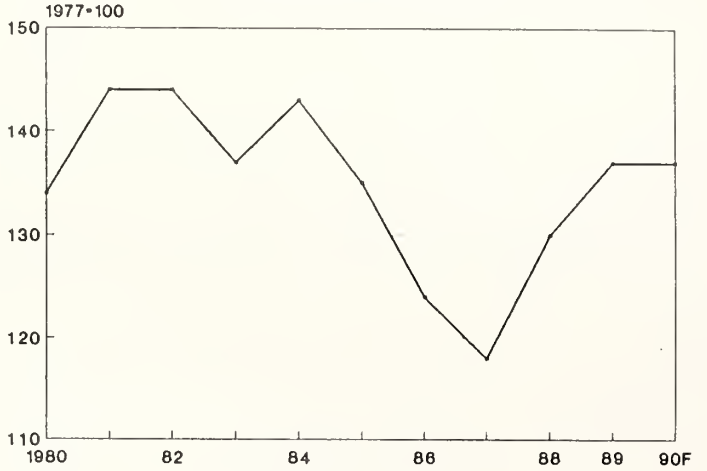

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Figure 7

Pesticide Use on Major Field Crops

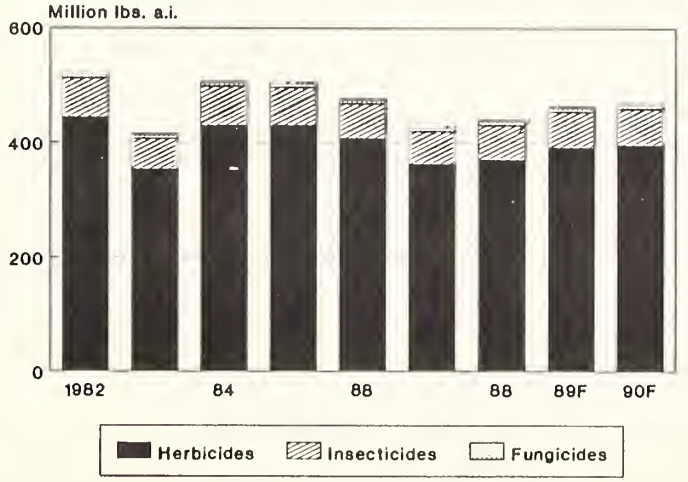

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Figure 8

Agricultural Chemical Price Index

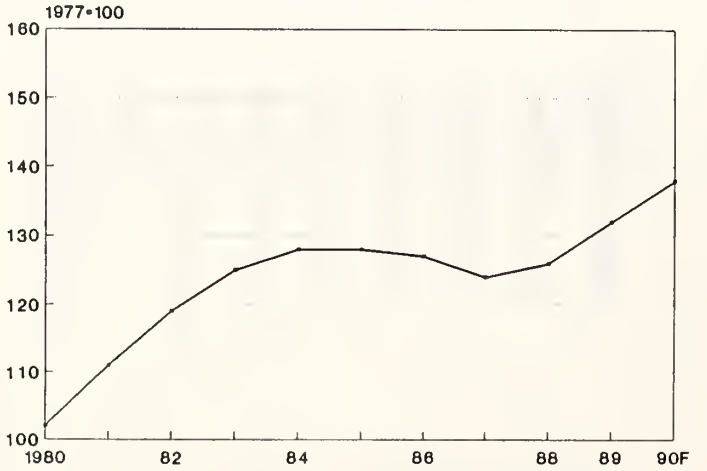

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Figure 9

Tractor Unit Sales

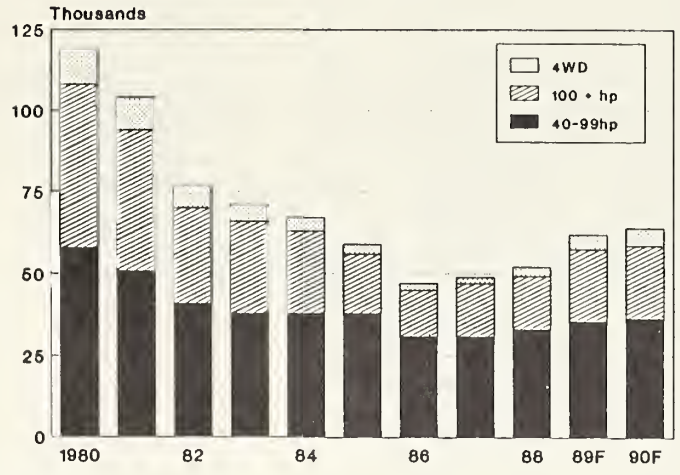

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Figure 10

Sales of Self-Propelled Combines

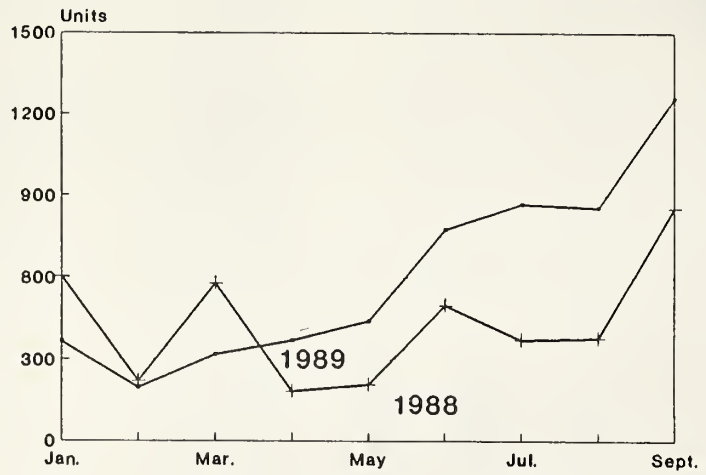

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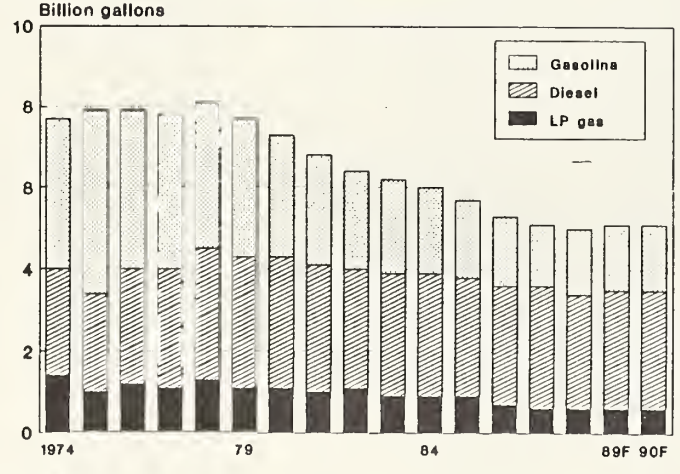
Figure 11

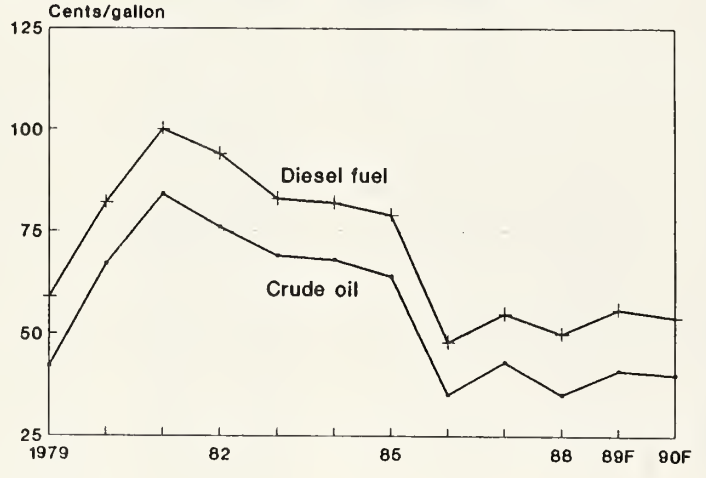
Farm Fuel Use



F = forecast

Figure 12

Crude Oil and Diesel Fuel Prices



F = DOE forecasts.