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ECONOMICS OF THE CATTLE INDUSTRY IN A TURBULENT DECADE[1]

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Introduction

The purpose of this paper is to present a historical view of the beef cattle industry during the past 10 to 15 years. In some instances, we will extend our examination of industry trends back as far as three decades. It is hoped that by reviewing the past, we can gain some insight into how we might proceed in the future.

Production Costs and Returns

Loss of profitability in agriculture generally, and in the cattle industry specifically, is matter of real concern to everyone. We are all diligently searching for ways to return profitability to our industry, which represents the largest single piece of American agriculture. Profit is difficult to measure for the following reasons, to mention a few: (1) many producers do not have a record system which permits them to accurately account for costs of production; (2) there is a great amount of variation in the way that costs are charged to the cattle enterprise; (3) there are regional and area differences in market opportunities; (4) volatile changes in cattle prices make timeliness and marketing strategy an important factor in profitability. The sections that follow represent an attempt to show how costs, prices, gross returns, and profits have varied in recent years.

Cow Herd Costs and Returns

The University of Missouri has maintained an excellent mail-in record system with beef producers for many years. Table 1 shows average annual costs and returns for cow-calf producers from 1976 to 1985 (Jacobs, 1986). Returns over variable costs were positive for 3 out of the 10 years, while returns over total costs were positive for only 1 year. Costs increased steadily from 1976 to 1981 and have leveled out since then to approximately $280 variable costs and $340 total costs per cow.

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[1]Prepared for South Dakota Cow-Calf Day, Huron, SD, December 10, 1986.

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TABLE 1. ANNUAL COSTS AND RETURNS PER COW IN MISSOURI COW-CALF HERDS[a]

Year	Variable costs	Total costs (variable + fixed)	Gross returns	Gross returns minus variable costs	Gross returns minus total costs
	Dollars per cow				
1976	246	284	175	-71	-109
1977	214	249	178	-36	-71
1978	242	284	254	12	-30
1979	262	315	345	83	30
1980	281	341	297	16	-44
1981	289	354	221	-68	-133
1982	279	337	245	-34	-92
1983	307	369	254	-53	-115
1984	292	354	239	-53	-115
1985	280	337	253	-27	-84
Avg.	269	322	246	-23	-76

[a]Jacobs (1986).

A 1985 beef cow business record summary of 78 herds in Iowa yielded the averages shown in table 2 for all herds and for the low 1/3 and high 1/3 (based on margin over all costs).

TABLE 2. IOWA BEEF COW BUSINESS RECORD SUMMARY (1985)[a]

Item	All herds	Low 1/3	High 1/3
Variable cost/cow, $	268.09	319.65	232.76
Fixed cost/cow, $	104.94	128.72	83.23
Total cost/cow, $	373.03	448.38	315.99
Total cost/cwt beef produced, $	70.94	99.24	48.15
Margin over all costs/cwt beef produced, $	-15.27	-45.55	9.62
Avg. calf wt., lb	504	468	561
Percent calf crop weaned	89.9	85.8	93.6

[a] Strohbehn (1986).

As can be seen in the Iowa summary, keeping cow maintenance cost to a minimum without jeopardizing production was a major factor in determining net return.

Table 3 is a survey of 1985 beef cow herd costs and returns broken down by region (USDA, 1986). Except for the South, there is not as much variation between regions as one might expect.

TABLE 3. COSTS AND RETURNS IN BEEF COW HERDS BY REGION (1985)[a]

Region	Total costs $	Gross returns $	Net returns $
Great Plains	330	264	-66
West	309	263	-46
North Central	324	270	-54
South	354	223	-131
All regions	331	259	-72

[a]USDA (1986). Costs include variable plus fixed cash expenses and do not include full ownership costs.

Estimates of 1985 average production costs for U.S. cow herds by the National Cattleman's Association (Beall, 1986) are somewhat higher than those listed above. Estimated cash costs were $302 and total costs were $421. Assuming anational average calf weaning weight of 450 lb and a weaning percentage of 86% (387 lb calf weaned per cow), the necessary break-even prices would be $78 and $109 per cwt to cover cash and total costs, respectively.

Feedlot Costs and Returns

Table 4 is an 11-year summary of simulated costs and returns for yearling steers fed in the Corn Belt. The data were taken from two different sources: USDA and Iowa State University (Futrell, 1986). In both data sets, the steers are fed for 450 lb of gain. Total cost includes cost of the feeder plus all feed and non-feed costs; therefore, it represents a break-even sale price. Profit is presented as net return per head. Estimates for 1986 do not include the last 2 months of the year. The USDA cost and return figures portray a relatively negative view of the past 11 years, as only 2 years showed a positive net return. The ISU analysis estimates that 5 of the 11 years were profitable for Iowa feedlots; however, 4 of the last 7 years were negative.

HEAD FOR YEARLING STEERS FED IN THE CORN BELT (USDA and ISU)

Year	USDA data[a] Total cost/ cwt sold[c] $	USDA data[a] Net return/ head $	ISU data[b] Total cost/ cwt sold[c] $	ISU data[b] Net return/ head $
1976	45.95	-71.82	47.27	-65.45
1977	45.35	-52.18	45.45	-40.41
1978	48.01	45.46	44.77	82.90
1979	65.98	18.58	62.88	58.47
1980	71.52	-47.88	70.60	-35.53
1981	72.89	-95.02	68.45	-46.89
1982	66.26	-21.42	60.52	49.64
1983	65.89	-36.96	64.09	-7.41
1984	69.34	-42.00	63.99	27.79
1985	67.72	45.69	62.56	-38.40
1986(Jan-Oct)	61.78	-47.14	56.76	16.60
Avg.	61.88	-40.55	58.85	-0.11

[a]From "Livestock, Meat and Poultry Situation" reports, 1972-86.
[b]From Iowa State University (Skadberg, 1985; Futrell, 1986).
[c]Includes cost of the feeder plus total cost of gain; therefore, it represents a break-even sale price.

Table 5 is a summary of average monthly net margins over a 10-year period taken from the ISU data. Steers sold in April, May and June had significantly more potential for returning a profit. This is in close agreement with a similar monthly analysis of net returns conducted by the USDA.

TABLE 5. ESTIMATED NET RETURN PER HEAD FOR YEARLING STEERS FED IN IOWA, 10-YR. SUMMARY, BY MONTH (1976-85)[a]

Month marketed	No. yrs. profit	No. yrs. loss	Net return/ head $
January	5	5	-$8.99
February	5	5	9.65
March	5	5	14.14
April	5	5	34.82
May	5	5	38.08
June	5	5	23.12
July	5	5	9.24
August	3	7	-21.90
September	2	8	-33.13
October	1	9	-31.46
November	3	7	-29.49
December	3	7	-17.32
Avg.	-	-	- 1.53

[a]Iowa State Univ. (Skadberg, 1985; Futrell, 1986).

Table 6 is a 10-year summary (1976-85) of actual feedlot data from two sources: (1) Iowa State University's northwest Iowa beef feedlot record analysis program (Mobley, 1986); and (2) DeKalb Feeds, Inc. analysis of records from farmer-feeder clients in northeast Illinois (Nelson and Watson, 1986). Approximately 120,000 and 470,000 cattle, respectively are represented in these two studies over the 10-year period. Both studies include cattle of all types (yearlings, calves, steers, heifers). Total cost per cwt gain covers all costs (feed + non-feed) incurred during the feeding period but does not include the cost of the feeder. Profit is expressed as net return per head.

Cost of gain and net returns tended to be more favorable in the Illinois analysis, which showed 6 of the 10 years to be profitable. In the Iowa study, 5 of 10 were profitable years. As Nelson and Watson (1986) have stated, their study is comprised of a relatively astute clientele who are adept at "buying feeders right and applying the right technology." In all probability, the northeast Illinois cattle feeders more closely approximate the high 1/3 of the feedlots (based on net return) in the northwest Iowa study, as shown in table 4. It is interesting to note that the high 1/3 of the operators showed a positive net margin for 7 of the 10 years, whereas the low 1/3 had only 1 profitable year out of 10. In referring back to the simulated records in table 2 and comparing the same 10-year period (1976-85), the ISU analysis showed 4 profitable years and the USDA analysis 2 years of positive returns.

TABLE 6. TOTAL COST PER CWT GAIN AND NET RETURN PER HEAD FOR NORTHWEST IOWA AND NORTHEAST ILLINOIS CATTLE FEEDERS (ISU AND DEKALB FEEDS)

	Northwest Iowa[a]		Northeast Illinois[b]	
Year	Total cost/ cwt gain $	Net return/ head $	Total cost/ cwt gain $	Net return/ head $
1976	45.69	-42.20	42.60	-7.37
1977	41.04	10.10	40.74	11.28
1978	46.45	75.80	38.76	80.21
1979	55.79	39.45	46.56	38.94
1980	59.18	-48.02	52.75	-1.43
1981	64.91	-61.93	60.57	-24.66
1982	58.27	11.95	55.19	44.03
1983	65.39	-32.89	56.92	23.56
1984	68.47	1.93	63.18	43.72
1985	52.21	-25.27	54.82	-2.50
Avg.	55.74	- 7.11	51.21	20.58

[a]From Iowa State University (Mobley, 1986).
[b]From DeKalb Feeds, Inc., DeKalb, IL (Nelson and Watson, 1986).

TABLE 7. TOTAL COST PER CWT GAIN AND NET RETURN PER HEAD FOR HIGH 1/3 AND LOW 1/3 OF OPERATIONS IN NORTHWEST IOWA FEEDLOT RECORD PROGRAM[a]

Year	Low 1/3 of operators		High 1/3 of operators	
	Total cost/ cwt gain $	Net return/ head $	Total cost/ cwt gain $	Net return/ head $
1976(Hi 1/2, Lo 1/2)	49.21	-49.00	42.17	-35.41
1977	42.81	-11.68	39.18	32.31
1978	52.73	42.77	43.26	119.26
1979	61.90	-3.31	49.54	93.91
1980	64.12	-105.40	57.94	-36.74
1981	71.53	-105.56	58.95	-22.67
1982	66.94	-59.95	51.19	49.79
1983	76.55	-81.95	58.94	6.44
1984	75.74	-63.13	61.42	64.12
1985	55.89	-69.39	49.63	17.91
Avg.	61.74	-49.76	51.22	28.89

[a]From Iowa State University (Mobley, 1986).

Differences in net return per head between the high 1/3 and low 1/3 of northwest Iowa feedlots over a 9-year period (1977-85) are presented in table 8. Furthermore, the portion of the difference contributed by price spread (sale price minus purchase price times purchase wt.) is partitioned out to show where profit is coming from. Data for 1976 are not included because purchase prices were not reported that year. Over the 9-year period, the spread between sale and purchase price applied to original purchase weight accounted for about 40% of the average difference in net return. Feeding margin (sale price minus cost of gain times gain) would account for the remaining 60%. On an average, the high 1/3 paid $3.37/cwt less at purchase time and received $1.98/cwt more at sale time than the low 1/3.

TABLE 8. DIFFERENCE IN NET RETURN PER HEAD BETWEEN HIGH 1/3 AND LOW 1/3 OF OPERATORS IN NORTHWEST IOWA FEEDLOT RECORD PROGRAM[a]

Year	Net return per head		Diff.	Portion of diff. in net return due to price spread[b]	
	Hi 1/3 of operators	Lo 1/3 of operators			
	$			$	%
1977	32.31	-11.68	43.99	21.90	49.7
1978	119.22	42.77	76.45	38.09	49.8
1979	93.91	-3.31	97.22	61.17	62.9
1980	-36.74	-105.40	68.66	52.09	75.9
1981	-22.67	-105.56	82.89	36.41	43.9
1982	49.79	-50.95	100.74	24.24	24.1
1983	6.44	-81.95	88.39	4.16	4.7
1984	64.12	63.13	127.25	51.67	40.6
1985	17.91	-69.39	87.30	26.42	30.3
Avg.	36.03	-49.84	85.87	35.13	40.9

[a]From Iowa State University (Mobley, 1986).
[b]Price spread = (Sale price/cwt - purchase price/cwt) x purchase wt.

Backgrounding Costs and Returns

As shown in table 9, the past decade appears to have been more favorable for the winter backgrounding operator. These data are adapted from an analysis of estimated costs and returns conducted by Kansas workers (Kuhl and Sands, 1986). Purchase costs and sale returns are based on Kansas City average prices for November and April, respectively. Net returns were positive 8 years out of 10.

TABLE 9. ESTIMATED COSTS AND RETURNS PER HEAD IN A WINTER BACKGROUNDING PROGRAM[a]

Year	450-lb calf cost (Nov.)	Winter cost	700-lb feeder return (Apr.)	Net return
	Dollars/head			
1975-76	163	92	306	51
1976-77	173	99	286	14
1977-78	194	84	378	100
1978-79	328	107	617	182
1979-80	418	120	479	-59
1980-81	362	147	473	-36
1981-82	302	126	459	31
1982-83	300	129	491	62
1983-84	298	154	463	11
1984-85	308	140	480	32
Avg.	285	120	443	+38

[a]Adapted from Kuhl and Sands (1986).

Live Cattle and Beef Prices

Figure 1 graphs feeder steer calf prices (Kansas City) from 1955 to 1986 in both nominal and real (1986) dollars. In 1986 dollars, the lowest average annual price occurred in 1975 ($60.53) and the highest in years 1973 and 1979 ($148.50). Since 1981, nominal prices have plateaued at their current level of $68 to $72. Assuming that annual total cow cost ranges from about $300 to $420, as discussed previously, the breakeven for 400 lb of calf weaned per cow would be $75 to $1.05/cwt, which is well above recent prices.

Figure 2 charts nominal and real (1986) Choice steer prices (Omaha) for the period from 1955 to 1986. In real dollars, the highest peak was reached in 1973 ($110.75) and the lowest in 1986 ($59.00, est.). In nominal dollars, the peak was reached in 1979 ($67.75) and then average price held around $64 until 1985, when it dropped under $60.

Figure 3 presents average retail prices for beek, pork and poultry since 1970. Beef rose dramatically beginning in 1977 and then leveled off and has stayed in the $2.30 to $2.40/lb range since 1980. Pork reached a peak of $1.76 (est.) in 1986. Chicken gradually rose from $0.40 in 1970 to $0.82 (est.) in 1986.

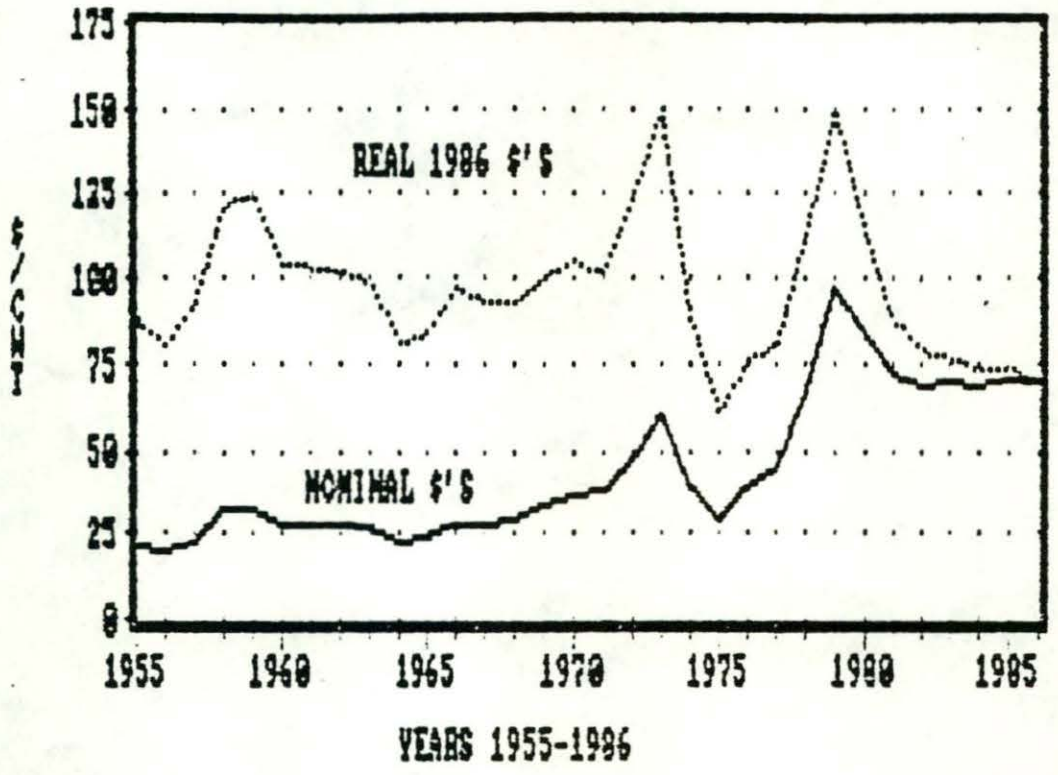

Figure 1

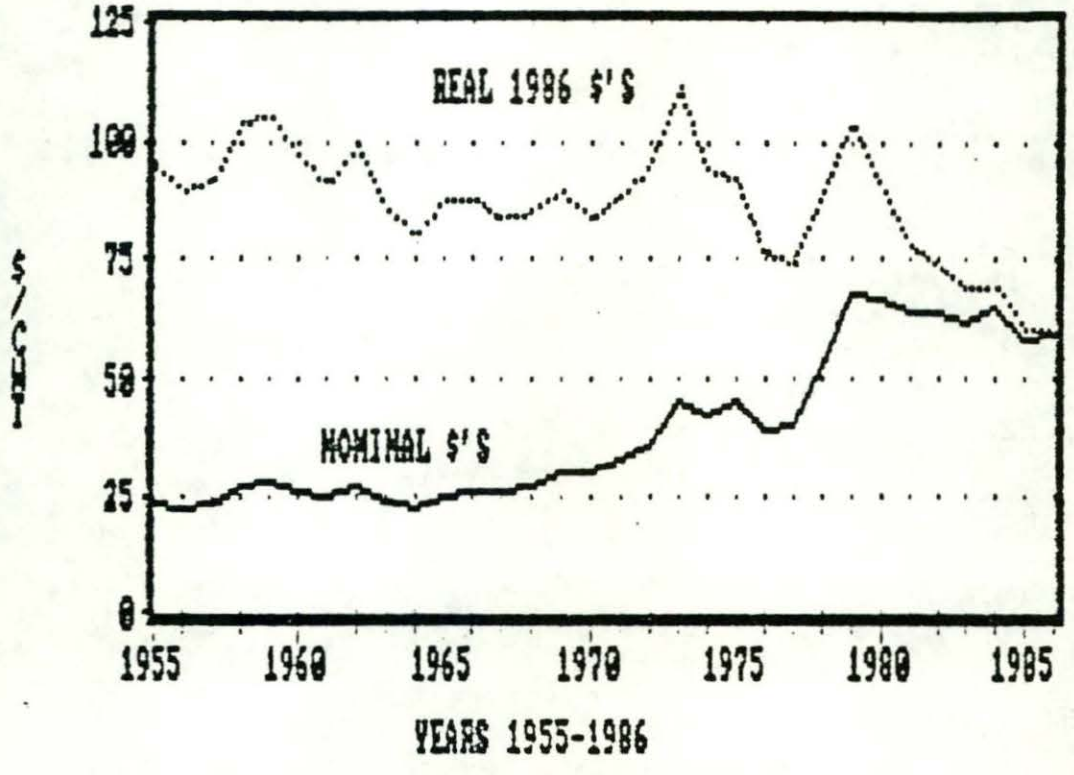

Figure 2

RETAIL MEAT PRICES

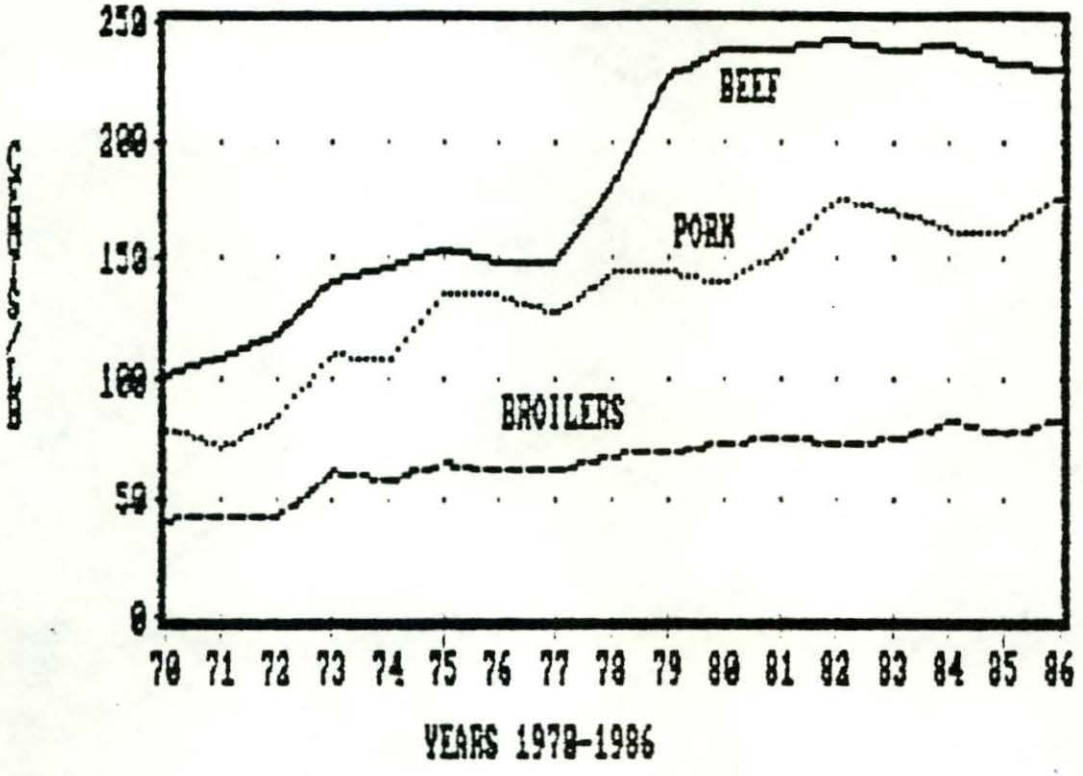

Figure 3

RETAIL BEEF PRICES

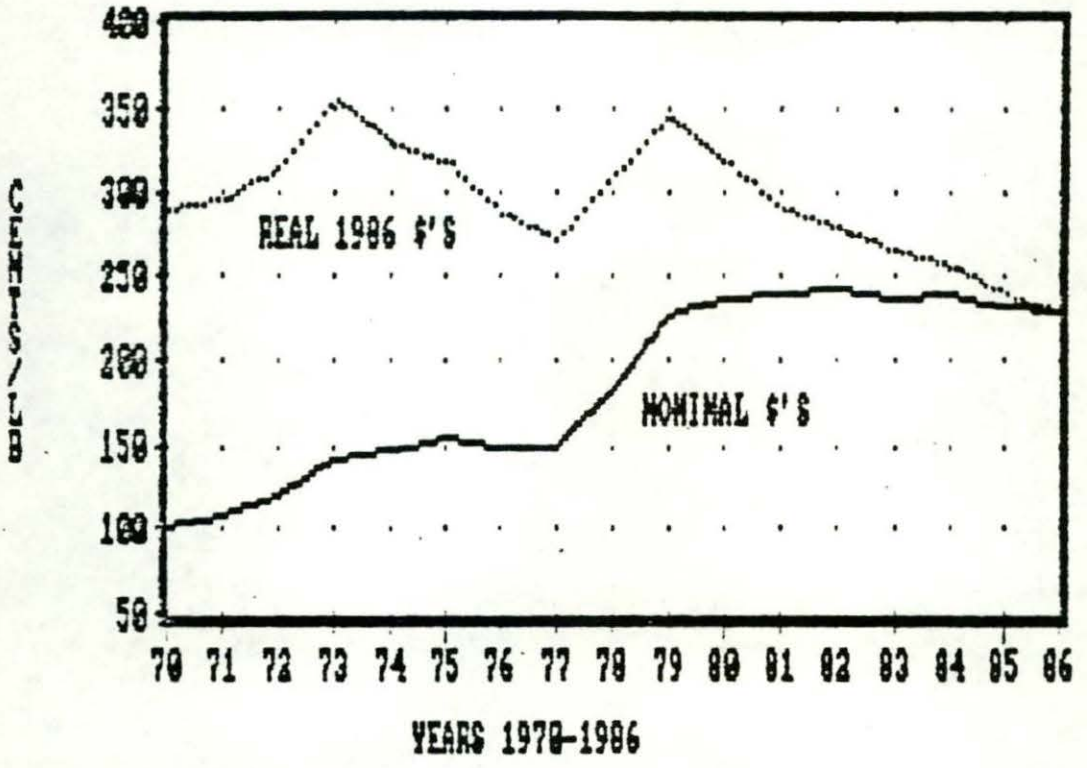

Figure 4

Figure 4 compares the retail price of beef in nominal versus real (1986) dollars. In terms of 1986 dollars, beef peaked at $3.45/lb in 1979 and then declined to $2.30/lb (est.) in 1986. This has occurred in spite of the fact that beef supplies have remained constant since 1979, while disposable personal income has continued to rise. The implication is that the demand for beef, as well as other red meats, has declined in recent years. Evidence of this is presented in table 10, which shows that the percent of disposable income spent on beef fell significantly from 2.71% in 1975 to 1.51% in 1986. Furthermore, per capita expenditures ($) for beef have been falling since the peak year of 1984. Average per capita expenditures ($) for pork peaked in 1983 and then declined. Per capita expenditures ($) for poultry have steadily increased throughout the decade primarily because of a dramatic increase in per capita consumption from 48.6 in 1975 to 73.4 lb (est.) in 1986, as illustrated in figure 5. Within the past decade, per capita consumption of beef reached an all-time high of 94.4 lb in 1976 and then fell to 78 lb in 1979, where it has remained ever since. Per capita consumption of pork has remained relatively constant since 1955, holding between 55 and 65 lb most of the time.

TABLE 10. PER CAPITA EXPENDITURES FOR BEEF, PORK AND POULTRY AS RELATED TO DISPOSABLE PERSONAL INCOME[a]

Year	Disposable personal income (D.P.I.)	As % of D.P.I.			$ per capita		
		Beef	Pork	Poultry	Beef	Pork	Poultry
	$	%			$		
1975	5075	2.71	1.34	0.58	138	68	29
1976	5477	2.58	1.32	0.56	141	72	31
1977	5954	2.28	1.19	0.55	136	71	33
1978	6571	2.41	1.22	0.56	158	80	38
1979	7293	2.41	1.26	0.56	176	92	41
1980	8032	2.26	1.18	0.56	182	95	45
1981	8908	2.07	1.11	0.50	184	99	45
1982	9379	2.00	1.11	0.47	187	104	44
1983	9977	1.88	1.06	0.47	187	106	47
1984	10,877	1.73	0.92	0.50	188	100	54
1985	11,718	1.59	0.86	0.46	184	101	54
1986(pro.)	12,010	1.51	0.85	0.52	182	103	63

[a]USDA and U.S. Dept. of Commerce data.

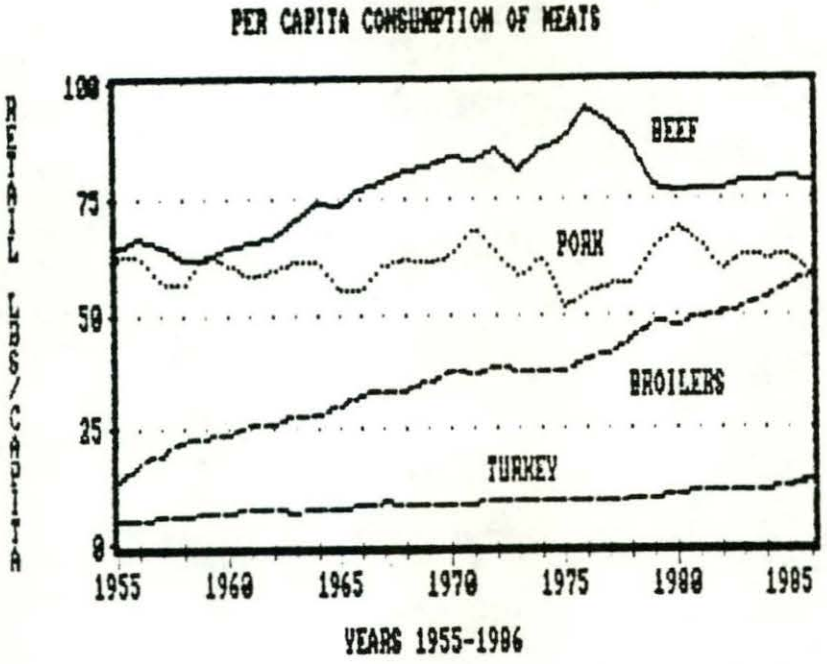

Figure 5

In a recent paper, Hilker et al. (1986) presented evidence to show that beef demand increased from 1955 up to 1972, when a negative shift occurred which increased in intensity around 1980. For example, if the economic relationships that held for the 1955-72 period were used, the 1985 average price for Omaha Choice steers would have been $143/cwt instead of $59/cwt. If the data set were extended to 1979, the average price in 1985 would have been $102/cwt. The authors point out that, while disposable income is still a factor in beef demand, other factors such as poultry supplies (since 1979), diet/health concerns, changes in tastes and preferences, and age of the population seem to be over-riding its historical impact. The magnitude of the problem is illustrated by the fact that if all of the currently recognized demand factors (disposable income, beef and competing meat supplies, etc.) were held constant, Choice steer prices would decline about $5/cwt per year due to the shift away from beef. If this estimated demand shift is in fact real, it presents a challenge of considerable proportions to the beef cattle industry.

Total Cost of Producing Beef

Table 11 represents an attempt to account for all costs involved in the production of a typical 1100-lb Choice steer during the past 10 years. The net return column represents profit or loss to the industry from the time the calf was conceived until he left the feedlot. Out of 10 years, 3 years were clearly profitable, 1 year was about breakeven and 6 years were unprofitable. NCA (Beall, 1986) recently made a similar accounting of 1985-86 costs in the production of a 1080-lb Choice steer:

Calf cost (475-lb steer calf)	$375
Backgrounding cost (200 lb grazing gain)	87
Feedlot cost (405 lb gain @ $55.31/cwt)	224
Total costs	686

The cost of producing beef does not stop at the feedlot gate. Following are the estimated additional costs that may be incurred in getting the product through a retail outlet to the consumer:

Killing costs	$ 22
Fabrication costs	52
Distribution costs	35
Additional processing and merchandising costs	179
Total costs	$288

If one adds the above costs to Beall's (1986) estimated total cost of producing the live animal, the overall cost from conception to consumer amounts to $974.

A typical Choice 1080-lb steer will yield 466 lb of retail cwts. At the current average price for all cuts of $1.93, his retail sale value would be $899. His hide and offal are currently worth $70 ($6.50/cwt), bringing the gross return to $969. At these costs and returns, the total industry is right at a breakeven position.

TABLE 11. TOTAL BEEF INDUSTRY ESTIMATED COSTS AND RETURNS IN PRODUCTION OF 1100-LB CHOICE STEER (1976-85)[a]

Year	Costs				Gross return	Net return
	Cow herd	Back-ground	Feed-lot	Total cost		
	Dollars/head					
1975-76	248	92	183	523	430	-93
1976-77	284	99	164	547	444	-103
1977-78	249	84	186	519	577	58
1978-79	284	107	202	593	745	152
1979-80	315	120	240	675	737	62
1980-81	341	147	259	747	702	-45
1981-82	354	126	229	709	706	-3
1982-83	337	129	263	729	688	-41
1983-84	369	154	267	790	719	-71
1984-85	354	140	222	716	642	-74
Avg.	314	120	222	655	639	-16

[a]Adapted from Jacobs (1986), Kuhl & Sands (1986), and Mobley (1986).

Shifts in Cattle Numbers

Several significant shifts in state and regional cattle numbers have taken place during the past 15 years.

Table 12 shows how the top 10 states in beef cow numbers in 1986 have varied over time in their percentage contribution to the nation's cow herd. Texas has always been dominant and Missouri and Oklahoma have traditionally traded back and forth for 2nd and 3rd. Nebraska has generally ranked a close 4th. South Dakota declined sharply in the late '70's to 8th, and then recovered to rank 5th in 1986. Montana also declined in the late '70's but increased to 7th by 1986. At one time, Kansas ranked 4th but has fallen to 6th, while markedly increasing its fed cattle numbers. Iowa ranked as high as 5th in 1980, but has dropped sharply since then. Florida and Tennessee have increased their percentage contributions to help the 10 states of the Southeast region lead the nation in beef cow numbers (21% of U.S. total).

TABLE 12. PERCENT OF TOTAL U.S. BEEF COW NUMBERS IN 10 LEADING STATES[a]

State	Year			
	1970	1975	1980	1986
	Percentage of U.S. total			
Texas	15.3	15.2	15.1	15.4
Mo.	5.2	6.1	6.1	5.8
Okla.	5.8	6.0	5.8	5.5
Nebr.	5.0	5.2	5.3	5.2
S.D.	4.6	4.7	4.1	4.4
Kan.	5.0	4.4	4.6	4.3
Mont.	4.2	3.7	3.9	4.1
Iowa	3.9	4.0	4.7	3.5
Fla.	2.4	3.2	3.2	3.4
Tenn.	2.5	2.8	2.6	3.1

[a]January 1 inventory

Table 13 lists the fed cattle marketed over time by each of the 13 leading states, expressed as a percentage of the 13-state total. Texas was overtaken by Nebraska from 1981 to 1983, but regained its lead in 1984. Kansas has achieved the most significant increase of any state, from 8.6% up to 16.9% of the 13-state total. Conversely, Iowa has declined from 20.9% to 7.9% of the 13-state total and from 1st to 5th position. California, Illinois, Minnesota and Arizona have also experienced significant declines in their contributions to total fed cattle numbers. Oklahoma, South Dakota, and Washington have increased their percentages somewhat. From a regional standpoint, some very important shifts have occurred over this period of time. In 1970, the regions ranked as follows: (1) Corn Belt; (2) Southern Plains; (3) Northern Plains; (4) Southwest; (5) Mountain states; (6) Northwest. Today, the numbers have shifted to: (1) Southern Plains; (2) Northern Plains; (3) Corn Belt; (4) Mountain states; (5) Southwest; (6) Northwest.

TABLE 13. PERCENT OF FED CATTLE MARKETED BY 13 LEADING STATES

State	Year			
	1970	1975	1980	1985
	Percentage of 13-state total			
Texas	14.3	16.7	19.5	22.0
Nebr.	16.5	15.3	18.0	20.1
Kan.	8.6	12.4	14.2	16.9
Colo.	8.7	10.1	9.1	9.2
Iowa	20.9	14.5	12.6	7.9
Calif.	9.0	9.0	5.9	4.6
Ill.	5.3	4.4	4.1	4.0
Okla.	2.5	2.8	3.0	3.3
S.D.	2.5	3.1	2.8	3.0
Minn.	4.0	4.2	3.6	2.5
Ariz.	3.9	4.0	2.6	2.2
Wash.	1.6	1.7	1.9	2.2
Idaho	2.0	1.8	2.7	2.1

Other Events and Trends of the Past Decade

Structural Changes in the Industry

Number of firms slaughtering cattle declined from 755 in 1975 to 533 in 1984. The four largest firms increased their share of fed cattle slaughter from 28.0 to 52.9%. Today, out of 100,000 feedlots in the U.S., 1607 of them have capacities of over 1000 head and they account for 72% of the fed cattle sold. The 202 lots with capacities over 16,000 sell 43% of the fed cattle. There has been a recent trend for large cow herd operators (over 500 head) to either expand or liquidate; medium size operators (50-500 head) to either liquidate or else reduce herd size and expand other enterprises; and new small operators (under 50 head) to enter the business. Of the 1.0 million beef cow operators, 93% of them have less than 100 cows and account for 54% of the nation's herd.

Current Beef Cycle Shortest in History

Cattle numbers reached an all-time high in 1975 and then declined until 1979-80. The latest build-up in cow numbers lasted only 2 years (1981-82) before deceleration started in 1983. Total cow numbers (beef & dairy) in 1986 were the lowest since 1961. Traditional 10- to 12-year U.S. beef cycles may be a thing of the past.

Government Programs

The PIK program in 1983 reduced corn supplies, increased corn prices and raised 1984 feed costs for cattlemen. Later, the dairy diversion program was instrumental in pushing 1984 cow slaughter to the highest level since 1977. About the time the industry was in for some relief, the 1986 dairy herd buy-out program pushed cow slaughter back up and acted to depress beef prices in mid-1986.

Beef Check-Off Program

On three occasions in the past decade, the U.S. beef industry debated a national check-off for promotion and research. The Beef Promotion and Research Act of 1985 has put one in place for the time being.

Interest Rates Sky Rocketed and Then Declined

Bank interest rates for feeder livestock loans in the U.S. averaged 8.5% in 1975, 18.5% in 1981 and 12.9% in 1985. A peak of 19.6% was reached in the 3rd quarter of 1981. Some large banks were averaging 20.6% at that time, and some individual loans were over 22%.

Land Values Inflated and Then Deflated

From 1974 to 1981, the price of Corn Belt farm land increased over 3-fold. Since 1981, land values have fallen over 50%. For example, Iowa land was valued at an average of $597/A. in 1974; $1955/A. in 1981, and $841/A. in 1986.

Shift From Carcass to Boxed Beef

Boxed beef was first adopted in the late 1960's. By 1972, market penetration was estimated to be 31%. Boxing operations increased rapidly during the mid to late '70's. By 1982, estimated market penetration had risen to 79%. In 1986, it is estimated at 83%. Net gain of the boxed system over the on-the-rail system of processing has been estimated to be 5 to 6 cents per lb (Williams, 1980).

Shift in Type of Beef Consumed

Type of beef served in-home has changed since 1975 as follows (percent of servings):

	1975	1984
Ground beef	45	54
Steaks	25	22
Roasts	20	15
All other	10	9

Overall per capita consumption of ground beef is now estimated at 40% of total beef consumption.

Today's Beef Is Leaner

Since 1976, the distribution of yield grades has changed as follows (% of total graded):

	1976	1984
Y.G. 1	1.9	3.6
Y.G. 2	28.3	40.7
Y.G. 3	58.3	50.0
Y.G. 4	9.7	5.2
Y.G. 5	1.6	0.4

In the meantime, quality has not declined; percent of total U.S. beef production grading Choice or Prime in 1985 was even slightly higher than in 1976 (52% vs. 48%).

Fed Cattle and Carcasses Are Heavier

Carcass weights have gradually increased over time. For example, steer carcasses averaged 646 lb in 1965, 673 lb in 1975, 708 lb in 1980, and are expected to average 722 lb in 1986.

Calves Are Heavier and Large-Framed

Nearly all state record programs report increased calf weaning weights. As an example, calves on Michigan's performance testing program increased from 470 lb in 1975 to 576 lb in 1984; average frame score increased from 4.1 to 5.0.

Genetic Composition Has Changed

Since the early '70's, there has been a significant infusion of larger Continental ("exotic") blood into the U.S. cattle population. This, together

with selection for growth and frame size within breeds, probably accounts for a portion of the increase in calf weights, carcass size and carcass leanness noted above. There is general concern in the industry that this trend may go too far, resulting in later maturity, longer feeding periods, over-size carcasses and cuts of beef, too much beef tonnage, and increased cow maintenance costs.

New Technology

During the past decade, industry and university research together have fostered a number of technological advances, including the following:

1. Sophisticated statistical methods have helped make sire evaluation programs a powerful selection tool.
2. Embryo transfer moved from the lab to the farm; freezing embryos is now commonplace.
3. New vaccines have given protection against scours and other costly diseases.
4. Insecticide tags made effective fly control much easier for beef producers; fly resistance can be a problem, however.
5. New broad-spectrum internal and external parasite control products were developed.
6. The ionophores (monensin and lasalocid) have significantly improved efficiency of feedlot and pasture gains.
7. New growth stimulant implants came on the market.
8. Nutritional programs for optimum use of NPN and by-pass protein were developed.
9. Treatment systems to increase intake and digestibility of low-quality crop residues were developed.
10. Improved forage varieties were developed.
11. Forage harvesting shifted to greater use of large-package systems.
12. Computer systems have been adapted to on-farm use.
13. Electronic marketing systems have been developed but not widely adopted.
14. Electrical stimulation of carcasses has enhanced beef quality.
15. Improved restructured beef products were researched and are near market development.

Some are questioning whether continued advances in technology are truly beneficial to the industry. It is argued that new technology increases beef tonnage, drives prices down, forces smaller producers out of business, and allows the large production units to get bigger. On the other hand, it can be argued that without new technology, producers of competing commodities (poultry, pork, etc.) will become more efficient, thereby applying downward pressure on beef demand. Furthermore, the U.S. beef industry could become even less competitive in the world market for agricultural commodities. It appears that research and technology will continue unless Congress decides that agriculture should be maintained as a social institution and develops public policy that discourages innovation. The emerging age of "biotechnolgoy" will likely result in more rapid change than ever before.

Market Research Unveiled Consumer Attitudes

Three market research studies (Yankelovich et al., 1983, 1985; NCRBS, 1985) provided desperately-needed information on consumer attitudes toward beef. These studies revealed that "active lifestyle" and "health-oriented" consumers increased from 33 to 50% of the population in 2 years (1983-85). Also, that beef demand has suffered as a result of: diet/health concerns about fat, calories and cholesterol; age shifts in the population; lack of brand-name products; and lack of quick, easy-to-serve beef items. Finally, the National Consumer Retail Beef Study (NCRBS) left no doubt that consumers are serious about wanting a leaner product.

Beef Industry Began Reacting to Market Research

During 1984-86, the beef industry began responding to the results of market research on several fronts: (1) Research on new product development intensified; (2) Branded beef products began to appear; (3) "Nutri-Facts" program put nutritional data in full view of the shopping public; (4) Increased interest developed in the integration of various segments of the beef production chain; (5) Several retail chains and packers announced adoption of close-trim programs for beef. More change has occurred in market development during the past 24 months than in the previous 30 years.

Future Trends in Beef Production

Beef Supplies and Prices

Using a version of the Michigan State University Agricultural Demand Model, forecasts out to 1996 were made for per capita supplies of beef, pork, broilers and turkey; beef cow numbers; feeder calf prices; and Choice steer prices. The absolute numbers generated are not as useful as the trends forecast by the model. They are as follows:

1. Per capita beef supply will decline to 67 lb by 1989 before increasing to the next peak of 73 lb in about 1994.
2. Pork production will increase to a peak of about 67 lb per capita by 1989 and then decline throughout the rest of the decade.
3. Poultry and turkey supplies will exhibit a gradual increase until total supplies plateau and remain level at about 84 lb per capita by 1993.
4. Beef cow numbers are predicted to bottom out at about 32 million in 1987. However, other industry analysts predict liquidation to continue into 1988, with beef cow numbers dropping to 31 million.
5. With supplies tight, feeder prices are expected to rise rapidly and hit a peak in 1989-90 before starting to decline. Lightweight steer calves could go over $100/cwt (1986 $) for the first time since 1978, when they were $111/cwt (1986 $).
6. Choice steer prices will increase through 1989 before starting to decline. Prices could go over $80/cwt (1986 $) for the first time since 1980, when they were $89/cwt (1986 $).

Trends In the Seedstock Industry

1. There will be fewer purebred herds; up to 50% of the present registered herds will go out; some breed associations will pool resources and operate together.
2. A.I. will expand from 25% to 50% of the registered cows.
3. Future of embryo transer will lie in the sale of frozen embryos from the top 0.1% of registered cows.
4. Sex control will eventually become a reality.
5. To be merchandised effectively, seedstock will have to be sold on the basis of deliverable specifications.

Trends In the Commercial Cow-Calf Industry

1. Number of large herds and small herds will continue to increase. Number of middle size herds will decrease.
2. Some producers will switch to yearling grazing operations, but competing with feedlots for cattle will be difficult.
3. Use of A.I. will increase from 1.5 to 5.0% of the national cow herd.
4. Larger production units will not have time for problem cattle. The cattle will have to be relatively trouble-free (calving ease, disposition, functional soundness, etc.).
5. Within a region or environment, herds will become more uniform so as to meet the tighter specifications of the packing, retailing and foodservice industries.
6. Creative financial arrangements will permit an increase in retained ownership and/or other joint ventures with cattle feeders.

Trends in the Feedlot Industry

1. Feedlots will continue to become larger.
2. Commercial lots will continue to solicit outside capital, but it will be profit-motivated rather than tax-motivated.
3. Gradual shift in feedlot numbers from Texas-Oklahoma to the Nebraska-Kansas-Colorado area.
4. Corn Belt cattle feeding will change:
   a. More custom feeding.
   b. Less ownership of fixed assets (land & facilities); more leasing.
   c. "Hotter" diets (less roughage; more grain).
   d. More feed will be purchased instead of grown.
   e. Bottom line: farmer feeders will become more like commercial lots.

Trends In The Product

1. In general, there will be pressure on the cattle industry to come up with a more uniform, more consistent product.
2. Nevertheless, it appears the marketplace can accommodate as many as three kinds of beef:
   a. Lean and low-priced; palatability not a high priority.
   b. Lean and relatively palatable (Avg. Good or better).
   c. Consistently palatable (Avg. Choice or better); external fat will be trimmed when necessary.

3. Genetics will play a larger role in improving the product. Selection will be for lines of cattle with superior cutability and adequate levels of marbling.
4. Repartitioning agents may play a role in increasing leanness. But there may be some question about marbling and palatability.
5. There will eventually be greater price differentiation at the producer level between the various qualities of beef; less trading on "averages".

Other Trends and Issues

1. Animal rightists will become more sophisticated and active. Cattlemen must be prepared to tell their side of the story to the public.
2. Steps will need to be taken to further assure American consumers of beef's "safety" as a food.

References

Allen, Kris and H.M. Riley. 1984. The beef industry in Michigan and the Eastern Corn Belt: changing competitive positions. Mich. State Univ. Ext. Bull. E-1797.

Beall, Tommy. 1986. Personal communication.

Breidenstein, B.C. 1984. Contribution of red meat to the U.S. diet. National Livestock and Meat Board, Chicago, IL.

Francis, John. 1986. Personal communication.

Futrell, G.A. 1986. Estimated Returns for Finishing Medium No. 1 Yearling Steers. Iowa State Univ. Ext. Bull. H-1229.

Hilker, J.H., J.R. Black and M.D. Ines. 1986. Beef demand outlook: 1985 go 1995: Mich. Agr. Exp. Sta. Res. Rep. 473, pp 1-10.

Hilker, J.H. and J.R. Black. 1986. The decline in beef demand: how far will it go? National Cattlemen, May, 1986.

Hughes, Harlan. 1986. Personal communication.

Jacobs, V.E. 1986. MIR Cow Calf Returns, 1971-85. Univ. of Missouri Coop. Ext. Serv. Farm Management Newsletters, Colombia, MO.

Knutson, J. 1986. Meat Facts. American Meat Institute, Washington, D.C.

Kuhl, G. and M. Sands. 1986. Retained ownership of beef cattle. Proc. Cornbelt Cow-Calf Conference, Ottumwa, IA.

Mobley, E.E. 1986. Beef Feedlot Record Analysis Summaries, 1976-85. Iowa State University Coop. Ext. Serv., Sioux City, IA.

National Livestock and Meat Board. 1986. Meat Board Consumer Marketing Plan for 1986, Chicago, IL.

Nelson, C.R. and L.T. Watson. 1986. Personal communication.

Riley, H.M. and S.W. Hiemstra. 1982. Michigan's competitive position in cattle slaughtering and beef processing. Mich. State Univ. Ext. Bull. E-1557.

Skadberg, J.M. 1985. Analysis of Cattle Feeding Returns. Iowa State Univ. Coop. Ext. Serv., Ames, IA.

Strohbehn, D.R. 1986. Beef Cow Business Record Summary, 1986. Iowa State Univ. Coop. Ext. Serv., Ames, IA.

Thorpe, Topper and Tommy Beall. 1984. Outlook, costs and profits for beef industry. Proc. 1984 National Beef Profit Conference.

Thorpe, Topper and Tommy Beall. 1985. Proc. 1985 NCA Beef Profit Conference.

USDA. Livestock, Meat and Poultry Situation Reports, 1970-86. USDA-ERS, Washington, D.C.

USDA. 1984. Livestock and Meat Statisitics, 1983. Statistical Bull. 715. USDA-ERS, Washington, D.C.

USDA. 1986. Economic Indicators of the Farm Sector: Costs of Production, 1985. ECIFS 5-1. USDA-ERS, Washington, D.C.

Williams, Willard. 1980. The Changing Structure of the Beef Packing Industry, TARA, Inc., Lubbock, TX.