

THE BATTLE AMONG BEEF, PORK AND POULTRY
FOR THE CONSUMER'S MEAT DOLLAR

John E. Ikerd

Extension Economist
Oklahoma State University

During the first half of this century, pork held the position as the most popular meat in the United States. Percapita consumption levels of pork were consistently above those of beef and poultry until the early fifties. Beef prices were typically somewhat higher than pork prices but pork held first place in terms of percapita consumption levels. Chicken was considered something for special occasions and came in a distant third in terms of popularity. Lamb, veal and turkey came still further down the popularity listing.

During the decade of the fifties beef took from pork the unofficial title of "king of the meats". Percapita consumption levels for beef moved above percapita consumption of pork on a carcass weight basis early in the decade of the fifties. By the end of the decade beef consumption had topped pork even on a retail weight basis. And beef was still bringing a premium price relative to pork in the retail meat market. Beef was not only the most popular meat but it was the most prestigious meat as well. Beef was king.

There is statistical evidence of a shift in basic consumer preferences between beef and pork during the late fifties. Consumers were willing to pay higher prices for beef relative to pork in the early sixties than during the early fifties. And, they paid higher relative beef prices for larger relative quantities of beef. A higher relative price for a larger relative quantity indicated a shift in consumer preferences in favor of beef relative to pork. The rapid growth in the cattle feeding industry during the decade of the sixties may have accounted for this shift in preferences in favor of beef. The grain fed beef of the sixties might well have met with greater consumer acceptance than did the beef of earlier times. The growth in cattle feeding might have improved the competitive position of beef relative to pork on the supply side of the market as well. These are propositions that are difficult to prove but none the less seem reasonable. Chicken made major strides in gaining a share of the meat market during the sixties also. The coming of the large commercial broiler operations revolutionized the chicken industry. Percapita chicken consumption more than doubled between 1950 and 1970 with nearly all the gains coming after the mid fifties. But, there is no statistically based evidence of a shift in consumer preferences in favor of chicken compared with the other meats. Chicken has gained its share of the market through a persistent decline in prices of broilers relative to the two other major meats. Continued gains in production efficiency have allowed broiler producers to "buy" a larger share to the total meat market.

The supremacy of beef in the meat market has been seriously challenged since the mid seventies. Pork has made a comeback at least in terms of popularity with consumers. Per capita consumption of pork in the past two years has averaged between eighty and ninety percent of beef consumption levels having regained nearly all the relative consumption losses of the sixties. Broilers have increased the rate at which they regaining a share of the meat market. By 1981, broiler consumption was more than three-fourths as large as pork and two-thirds as large as beef on a retail weight basis. And, there are indications now that turkeys may be making a move toward gaining a larger share of the consumers meat dollar. In 1976, beef held about 47 percent of a total meat market made up of beef, pork, broilers and turkeys. By 1980 beef's share of that same market amounted to less than 37 percent. The supremacy of beef is being challenged. Some have concluded that beef is no longer king of the meats. Others think that it is just a matter of time until beef is in second or even third place in consumer popularity.

No one knows what lies ahead in the battle among beef, pork and poultry for the consumers meat dollar. There could be dramatic changes in the future that would overshadow even the advent of commercial cattle feed lots and integrated broiler operations in the past. But, the demand for beef, demand for meats in general, and preferences among the meats have been popular topics of discussion in industry circles for some time. And many of the conclusions are being drawn from past shifts in consumption trends and prices of the various meats. More than a few of these conclusions are not consistent with a logical interpretation of the data. If past developments are to be used as guides to the future, there must be a logically sound, unbiased interpretation of those past occurrences.

Is beef still king with the consumer? If so, can it remain No. 1 in the retail market? The past does give some insights into the answers to those questions. But, meaningful lessons from the past can be learned only from a search for facts through sound economic logic. All too often the search has been for sensationalism through half truths of statistics.

The objectives of the analysis reported here were as follows:

1. To examine the trends in market shares of beef, pork and poultry over the past 20 years.
2. To analyze recent shifts in the consumer demand for beef.
3. To estimate the total demand for meat including beef, pork, chicken and turkey based on data since 1960.
4. To explore the relationship between total meat demand and the share of consumers' incomes spent for meat.

5. And finally, to determine whether or not there have been shifts in consumer "preferences" among the three major meats, beef, pork, and chicken.

Changing Market Shares of Beef, Pork, Chicken and Turkey

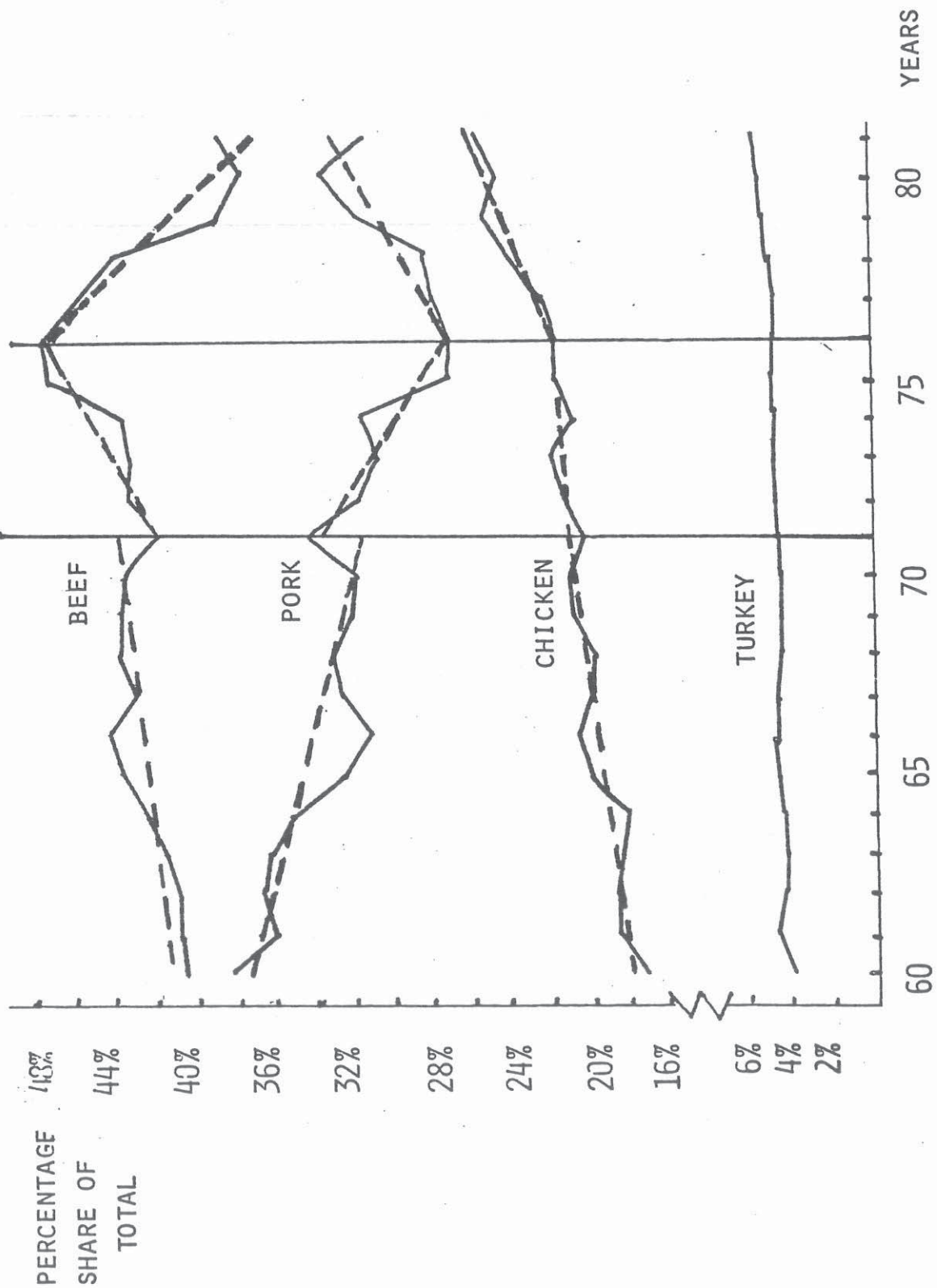
The basic trends in market shares among the major meats were outlined in the introductory statements of this report. However, figure 1 shows these trends for the 1960-81 period in detail. The shares are calculated on a retail weight basis and this differs substantially from carcass weight comparisons. For example for 1980 USDA estimates indicated that 1.35 pounds of carcass weight for beef was equivalent to 1.00 pound of beef at the retail level. But for pork, only 1.08 pounds of carcass weight was equivalent to 1.00 pound at the retail level. For chickens and turkeys, the retail and carcass weights are the same. Poultry is generally sold as whole birds or the total carcass on a cut up basis. But, retail rather than carcass weight comparisons seem more appropriate when evaluating retail or consumer demand and preferences for meats.

The trends in figure 1 are broken into three periods: 1960 to 1971, 1971 to 1976 and 1976 to 1981. These breaks are somewhat arbitrary but none the less seem to illustrate basic changes in trends concerning relative shares of meats. During the early period, beef and chicken gained shares of the market at the expense of pork. Turkey just held its own at between 4 to 5 percent of a total market represented by total percapita retail weights of the four meats. The total percapita meat supply of the four meats grew from less than 160 pounds per person in 1960 to 200 pounds per person in 1971. So, beef and chicken were gaining a larger share of a larger market. Turkey was able to hold its share as the total market grew. But, pork lost its market share by ending the decade of the sixties with percapita supplies roughly equivalent to the levels at which it began the decade. The total meat market grew but pork consumption did not.

The next period, 1971-76 shows an acceleration of the trend toward a larger share of the market for beef. Again most of the gain for beef came at the expense of pork although the gains of chicken slowed a bit in this period as well. At this point it should be noted that trends in consumption levels reflect practically identical trends in production levels. There is generally only about 10 days supply of meat in storage at any given time. So over the period of a year, relative consumption levels of beef, pork and poultry reflect relative production levels of beef, pork and poultry. And in the case of beef and pork in particular, the supply levels in any given year may have been largely determined by production decisions made in previous years.

The changes in market shares of beef and pork in the early seventies reflect cyclical trends in production during this period. Beef production was in the expansion phase of its cycle brought on by relatively profitable price levels of the late sixties and early seventies. Pork producers had suffered large losses in the early

FIGURE 1. SHARES OF TOTAL MEAT MARKET



seventies and were in the liquidation phase of their cycle. Sharp rises in grain prices in the early seventies exaggerated the hog liquidation phase. And, shrinking pork supplies allowed beef prices to hold at higher levels and allowed the beef expansion phase to continue longer than might have been the case otherwise. Total meat consumption in 1976 was almost identical to 1971 on a percapita basis. The gains of market share for chicken during this period were very small and again turkey just held its own in the 4 to 5 percent area.

The last period, 1976-1981, shows an abrupt change in the market shares of beef and pork. The total meat market continued to grow during this period but beef production was now in its liquidation phase. Pork producers had completed their liquidation phase by the mid seventies and were poised for expansion. Poultry producers likely were looking for an opportunity to expand their markets after the stagnant period of the early seventies. So, as beef production fell, increases in pork and poultry were more than enough to offset the decline in beef supplies. Beef's share of the market dropped from 47 percent in 1976 to 37 percent in 1980, and pork increased its share from 27 percent in 1976 to 33 percent in 1980 before reversing 1-2 percent in 1981. Broilers increased from a 21 percent share of the market in 1976 to a 25 percent share in 1981. And, turkey gained almost a full percentage point in the meat market between 1976 and 1981 after holding nearly a constant share during the previous 15 years.

So there have been identifiable shifts in market share trends over the past twenty years among beef, pork, chicken and turkey. After sixteen years of an increasing share for beef, the trend was reversed in the late seventies. Pork has shown an opposite pattern of gaining market share in the late seventies after sixteen years of losing its share of the market. Chicken has consistently gained an ever larger share of the market during the entire period. And turkey has shown indications of an increasing share in the late seventies after sixteen years of just holding on to a constant share of a growing total meat market.

Market Share and the Demand for Beef

The impact of changing shares of the market is discernable in consumer demand for the various meats. First it should be pointed out that demand is not the same thing as consumption or quantity demanded. The economic concept of demand relates to prices as well as quantities or consumption levels. Thus, it may be concluded that demand has increased if consumers are willing to pay a higher price for a larger quantity. But, an increase in price that results from a smaller supply or an increase in consumption resulting from a lower price need not represent an increase in overall demand. Likewise, a drop in consumption in response to higher prices or a drop in price resulting from larger supplies does not necessarily imply weaker demand.

The overall demand for beef is related to population, consumer incomes, supplies of competing meats and consumer tastes and

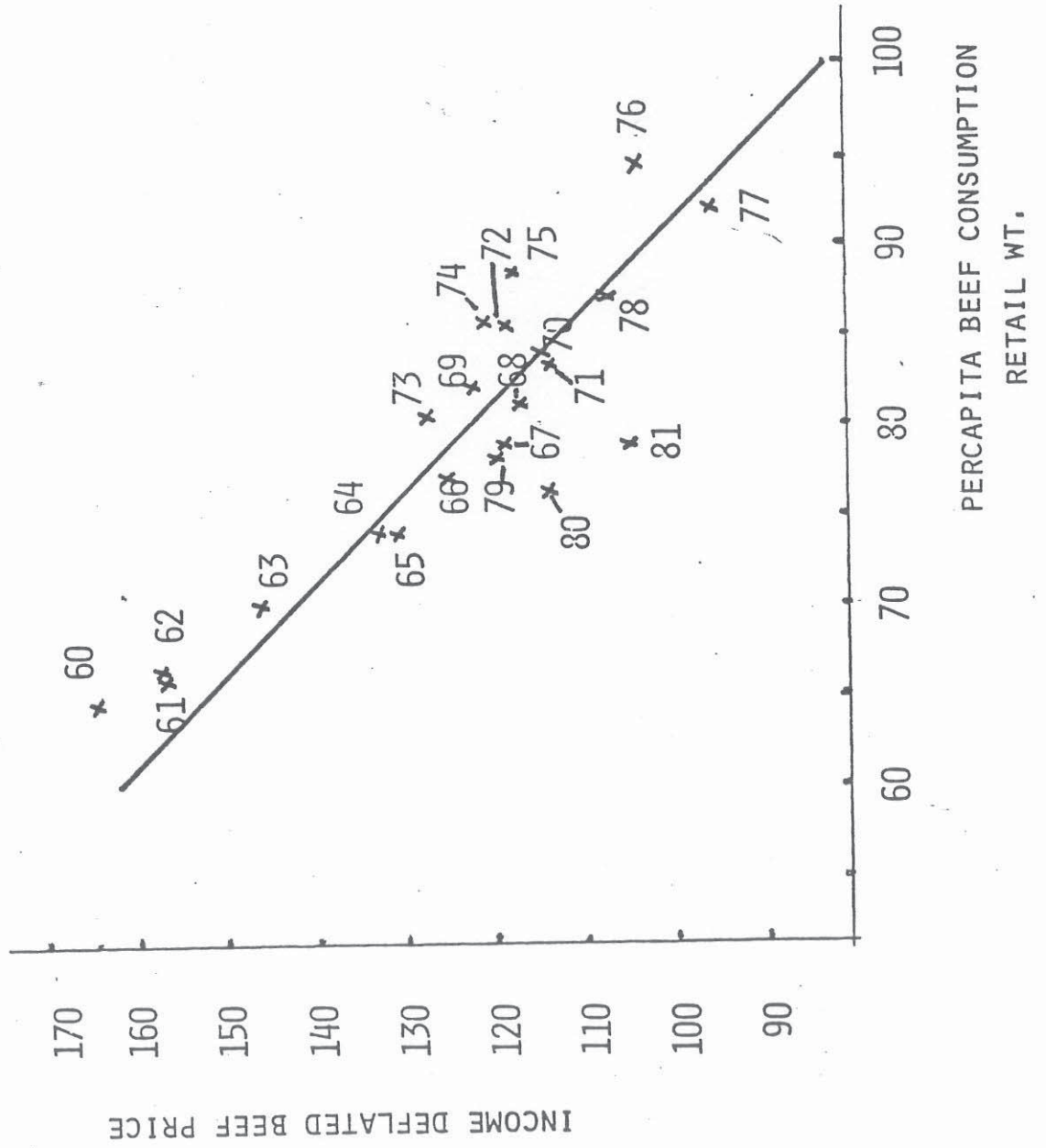
preferences. Changes in population may be accounted for by using percapita consumption figures. This assumes that each percentage increase in population will add one percent to the total demand for beef. Changes in consumer incomes may be accounted for by deflating beef prices by an index of percapita disposable incomes of consumers. This implies that each percentage increases in disposable income will increase demand for beef by one percent. The resulting prices may be thought of as prices relative to incomes. Past studies of beef demand indicate that this assumption, which economist would call an income elasticity of beef equal to one, is a reasonable assumption. So, if population increases from one year to the next by one percent and consumer disposable incomes go up by 7 percent there would be an expected increase in beef demand of 8 percent on the basis of those two factors. This would mean that 8 percent more beef could be sold in the second year than in the first without any change in the price of beef. This would be an 8 percent increases in beef demand.

Other meats such as pork and broilers compete with beef for the consumers meat dollar. So, if there are relatively large supplies of competing meats in the market place it will tend to reduce consumer demand for beef. Smaller supplies of competing meats will tend to strengthen demand for beef. Other things being equal, demand for beef would be expected to be stronger during periods when beef holds a larger share of the total meat market and would be weaker during periods when beef holds a smaller market share.

Figure 2 shows the overall demand relationship for beef over the past twenty two years. Retail beef prices, on the vertical axis of the chart, have been deflated by a 1972 based index of percapita consumer disposable incomes. Higher price levels represent higher beef prices relative to consumer incomes. Lower prices in figure 2 indicate beef prices that were lower relative to consumer incomes. The horizontal axis represents percapita consumption of beef in retail weights. Note that in years of relatively small production levels, such as the early sixties, that beef prices were high relative to consumer incomes. And in large percapita production years, such as 1976 and 1977, beef prices were at their lowest levels relative to consumer incomes. This implies the basic demand relationship: smaller supplies will command higher price levels and larger supplies will require lower price levels to clear the market.

A single average demand relationship may be estimated for the entire period, such as that represented by the downward sloping line in figure 2. And, nearly 80 percent of the variation in beef prices in figure 2 can be explained by or related to changes in the quantity of beef supplied from year to year. But, this single demand line cannot represent the demand for all year within the period. Even if all other factors were unchanged, changes in relative supplies of pork and poultry would be expected to shift the overall demand for beef from year to year during the period.

FIGURE 2. BEEF DEMAND



Note the position of the price-quantity plots in figure 2 relative to changing market shares in figure 1. The plots for the years of 1960 through 1971 line up very well on an imaginary line slightly steeper than the average line with the early years slightly above and the later years slightly below. This matches the period of a generally increasing share of beef in the total market place. But, the years of 1972 through 1976 lie well above the average demand line indicating a stronger beef demand for those years than had been evident during the 1960s. Recall that this was a period of rapid growth in beef's share of the total meat market. There was a sharp decline in competition from pork during this period.

The demand for beef dropped back to lower levels in the 1977-79 period but held only slightly below average levels for those three years. This was a period when beef was showing sharp losses in market share as both pork and poultry gained. Further losses in beef demand are apparent in 1980 and 1981 as the dominance of beef in the market place continued to slip.

A clear interpretation of the impact of this loss in beef demand may be seen in a comparison of the years of 1973 and 1981. Per capita beef supplies were slightly smaller in 1981 than in 1973. But, the income deflated price of beef was 105 in 1981 compared with over 127 in deflated 1973. This means that prices relative to incomes were more than 17 percent less in 1981 than in 1973 even for a smaller supply of beef. This implies that retail beef prices could have been 17 percent higher in 1981 if beef demand levels had just held as strong as demand levels of the early seventies. Reported retail beef prices in 1981 averaged about \$2.38 per pound for choice beef. An early seventies demand level would have resulted in a price of about \$2.78 per pound. This could have resulted in average prices of choice steers at the \$81 per hundred level in 1981 rather than the \$65 actually reported, assuming actual 1981 price spreads between retail beef and live cattle prices.

In summary, there have been some apparent shifts in overall beef demand over the past two decades. Those shifts seem to be related in general to the changing share of the total meat market held by beef. Alternatively stated, beef demand has been affected by changing supplies of competing meats. And over the past five or six years, the demand for beef has declined to an extent that it may have changed potential profits into actual losses for most beef producers. Changes in population and incomes have been accounted for in calculations of prices and quantities. So, the declining demand for beef likely was caused by larger supplies of pork and poultry in the market place, or by changing tastes and preferences.

Consumer Demand for Meat in Total

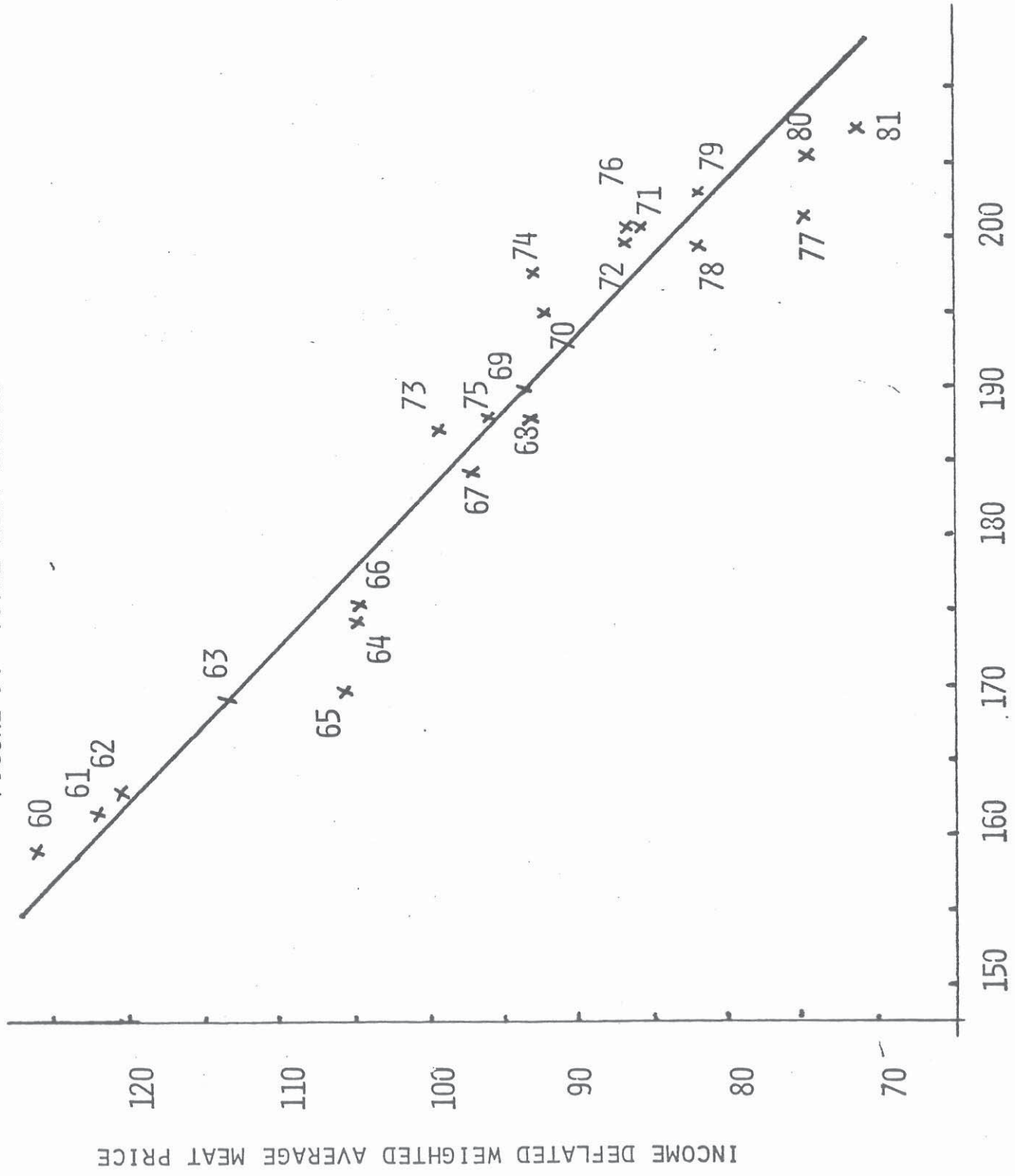
The decline in beef demand might have been caused by decline in demand for meat in general. Or if such a decline in meat demand had occurred, it would have magnified the impact of simultaneous increases

in other meats on beef demand. However, there is no evidence of such a shift in total meat demand, at least not over the past two decades. There has been a great deal of publicity about changing consumption habits with respect to meats. Health concerns are often mentioned as a cause for concern for the future role of meats in consumers' diets. Heart attacks, cancer, obesity and a number of lesser ailments have all been linked by one study or another to the high level of meat in diets of American consumers. There have been numerous campaigns by various "public service" groups to convince consumers that they should eat less meat. And, there have been consumer surveys indicating that consumers will answer questions in a way that they think they ought to be answered. So, consumers say they are eating less meat or at least are concerned about meat in their diets. But, the data do not support such surveys. Consumers are eating more meat in the late seventies and early eighties than at any time in history. And there is no evidence that current meat prices are any lower than might have been expected twenty years ago had current levels of meat consumption and consumer incomes existed at that time. In other words, recent prices of meats in relation to the quantities consumed are well in line with overall meat demand levels of the sixties.

Figure 3 provides graphic evidence to the consistency of total meat demand over the past two decades. The deflated weighted average meat price represents retail prices of beef, pork, young chicken and turkey. Each price was weighted by the proportion of the total of the four meats represented by the individual meat. If there was twice as much beef as pork in any given year, then the retail choice beef price was given twice as much weight as the retail pork price, and so on. The weighted average meat price was then deflated by dividing by an index of consumer disposable incomes. All data were on a percapita basis. The total meat consumption figures differ from some other series because four meats only are included. Most published total meat figures include veal, lamb and mutton, and other fowl. But, the other meats are a minor fraction of the total and little is lost by their exclusion. A great deal of simplicity and clarity, particularly from the price side, is gained by restricting the analysis to the four meats.

Over 95 percent of the total variation in income deflated meat prices over the past two decades has been related to changes in total meat supplies. The aggregate prices of meats relative to consumers' incomes have dropped by an estimated 43 percent between 1960 and 1981. But, this price decline has resulted in an estimated 30 percent increase in percapita meat consumption. Alternatively stated, consumers have been willing to buy 30 percent more meat but only at 43 percent lower prices. Supplies and prices of meats have changed dramatically over the past two decades. But, there is no indication that consumers are willing to buy any less meat today than they would have bought at any earlier time had price relative to incomes been at today's levels. In other words there is no indication of a negative change in consumer demand for meat.

FIGURE 3. TOTAL MEAT DEMAND



PERCAPITA CONSUMPTION: BEEF, PORK, BROILERS AND TURKEYS

There have been year to year deviations from the average demand level as indicated in figure 3. The years of 1965 and 1977 were the weakest total meat demand years. Meat prices averaged 5 to 7 percent below the two decade average levels in those two years. The year of 1974 was an exceptionally strong total meat demand year. But, there were good demand years in the early sixties as well. The years of 1980 and 1981 have averaged below longer term total meat demand levels. But those years are little if any weaker than demand levels in 1978, 1968, 1966, and 1964. The years of the early seventies were better than average years in general and four out of five years since 1976 have been below the average. But, there is no solid evidence that this represents a shift in consumer meat demand. Demand in 1979, just three years ago, was better than average. And, 1982 may be as likely to be better than average as it is to be worse than average, based on the data in figure 3.

Share of Consumers' Incomes Spent for Meat

Consumers have been spending a smaller and smaller share of their total incomes for meat in total and beef in particular. Many have interpreted this trend as an indication of a weaker meat and beef demand. But, declining demand and declining percentage of income spent for a commodity are two completely different concepts. The use of percentage of consumer income spent for meat as an indication of consumer meat demand may be totally misleading. The percentage of income spent on an item will change with very change in price and quantity purchased, in all but the most narrowly defined demand situations. And as shown in figures 2 and 3 a wide range of prices and quantities are consistent with a given level of overall demand. A change in demand for meats means that consumers will pay more or less for a given quantity or that they will buy more or less at a given price. Buying less at a higher price and buying more at lower prices does not represent a shift in consumer demand.

A change in percentage of consumer incomes spent on an item is equivalent to a change in consumer demand "only" in the very restrictive situation where any change in price would have been "exactly" offset by an opposite change in quantity bought, had there been no shift in overall demand. In economic jargon, this unique situation where changes in price and quantity are exactly offsetting, is called a demand with an elasticity equal to one. In all other situations, either price or quantity will dominate the relationship. Total expenditures can go up or down even though there has been no changes in the overall demand for the item. If changes in prices result in opposite changes in quantities purchased that more than offset the price change, then the total expenditure will change in a direction opposite to price changes. For example, if meat prices were to drop by 10 percent but consumers bought 20 percent more meat at the new lower prices, they would be spending 10 percent more total money on meat at the lower price. The 20 percent increase in amount bought would more than offset the 10 percent drop in price. Such items are said by economists to have an "elastic" demand.

It is generally agreed among market analysts that meats have an "inelastic" rather than "elastic" demand. This means that the change in price more than offsets opposite changes in the quantity purchased. If meat prices were to drop by 20 percent there might be only a 10 percent increase in total meat purchased. Likewise if there were to be a 20 percent increase in meat price, consumers might cut back on meat consumption by only 10 percent. As a result, total consumption expenditures would move up or down in the same direction as prices. Whenever prices went up, consumers would spend more in total on a smaller quantity of meat, 20 percent higher prices for 10 percent less meat. These changes in consumer expenditures on meat would not imply a change in the overall demand for meat only a change in the quantities consumed. If there was first a 10 percent increase in meat supplies and then a 10 percent decline in supplies, prices would first drop by 20 percent and then rise by 20 percent back to the original level. There would have been no change in overall meat demand. But, total expenditures on meat first would have dropped by 10 percent and then would have increased by 10 percent, even though there would have been no change in meat demand.

Table 1 shows that in fact the percentage of consumers disposable incomes spend on beef, pork, chicken and turkey has dropped more than 25 percent between 1960 and 1981. In 1960, consumers spent more than 5 percent of their income on the four meats but in 1981 they spent less than 4 percent of their income on the major meats. These figures correspond quite closely with publishers figures which include all meats. But, the percentages in table 1 are calculated from the same data used in the total meat demand relationships in figure 3. So, the conclusions that there has been no significant decline in consumer total meat demand is completely consistent with the data showing that there has been a 25 percent drop in the percentage of consumer incomes spent on meats. There is no contradiction. The demand for meat is "inelastic". When total meat supplies increase, a more than offsetting decline in meat prices would be expected to follow. Total expenditures for meat would be expected to decline.

The prices in figure 3 represent prices already divided by consumer disposable incomes. This makes conclusions relative to percentage of consumer income spent on meat totally consistent with conclusions regarding consumer expenditures if prices had been expressed in ordinary terms. The responsiveness of consumption to prices, ie. the elasticity, is different for different levels of consumption. But on the average it has taken a 1 1/2 to 2 percent change in prices to bring about a 1 percent opposite change in consumption levels over the past two decades. Alternatively, each 1 percent increase in meat supplies has required a 1 1/2 to 2 percent drop in prices to clear the market. So, during the past period of expanding total meat supplies, the percentage of consumers incomes spent on meats, as expected, did decline.

The price quantity relationship for meat is even more sensitive at current consumption levels than at earlier, lower levels. At current levels, each 1 percent change in meat supplies would be expected to

TABLE 1
 PERCENTAGE OF CONSUMER DISPOSABLE INCOME SPENT ON
 BEEF, PORK, CHICKEN AND TURKEY*

| | PERCENTAGE |
|------|------------|
| 1960 | 5.18 |
| 1961 | 5.09 |
| 1962 | 5.07 |
| 1963 | 4.96 |
| 1964 | 4.70 |
| 1965 | 4.60 |
| 1966 | 4.75 |
| 1967 | 4.62 |
| 1968 | 4.50 |
| 1969 | 4.70 |
| 1970 | 4.61 |
| 1971 | 4.41 |
| 1972 | 4.55 |
| 1973 | 4.80 |
| 1974 | 4.74 |
| 1975 | 4.65 |
| 1976 | 4.46 |
| 1977 | 4.02 |
| 1978 | 4.22 |
| 1979 | 4.27 |
| 1980 | 4.04 |
| 1981 | 3.80 |

*CALCULATED FROM INDIVIDUAL MEAT SUPPLIES AND PRICES

cause a 2 1/2 percent price change rather than the 1 1/2 to 2 percent changes of earlier times. And if supplies continue to increase, the relationship between price changes and percentage of income spent on meats would be expected to become even more sensitive. But, continued decreases in percentages of consumer incomes spent on meat would not mean that the overall demand for meat had declined.

If there were to be a decline in overall meat demand the percentage of income spent on meat at a given price or given consumption level would in fact fall. A lower price for the same quantity or a smaller quantity at the same price obviously would result in a smaller total expenditure. The percentage of income spent on meat in total in 1980 and 1981 would have been greater had those years represented demand levels at or above the average in figure 3 rather than below. And the percentage of income spent on beef would have been greater in the late seventies if beef could have held to the stronger demand levels of the early seventies. These facts have likely led to the confusion regarding demand and percent of consumer income spent. The problem arises because a decline in demand will cause a decline in percentage spent on meat but a decline in percentage spent on meat does not necessarily imply that there has been a decline in demand. And the past two decades provides a prime example of a situation where there has been misinterpretation. There has been no decline in meat demand only a persistent increase in total meat supplies. And, the difference in those two conclusions have greatly different implications for the future of the meat industry. In short, a decline in meat demand would indicate problems beyond the control of producers that might continue to worsen in spite of anything that meat producers might do. But, the decline in incomes spent on meat as a result of increasing supplies is a situation that is a direct result of past decisions to produce more meat. Those decisions were based on expectations of profits as a possible result of those decisions. And even though the result may have been losses, it is within the power of producers to reverse the situation and return prices to profitable levels. The fact that demand has not declined implies that the fate of the industry is still in the hands of the producers.

Consumer Preferences Among Beef, Pork and Chicken

There has been no change in overall meat demand over the past two decades. But, have there been changes in the relative demands or preferences among the meats that make up the total meat supply? It was indicated in figure 1 that there have been changes in relative market share among the meats. But, changes in relative quantities do not imply changes in consumer preferences any more than do changes in percapita consumption imply changes in demand. Demand includes both price and quantity and cannot be interpreted in terms of either alone. Likewise preference between two meats can be measured only by considering both relative prices and relative quantities consumed. The fact that consumers will buy more of one meat relative to another at a lower relative price does not mean that the preferences between those two meats has changed. The consumer might still prefer the meat for which the consumption has dropped. But, at a lower relative price it is quite

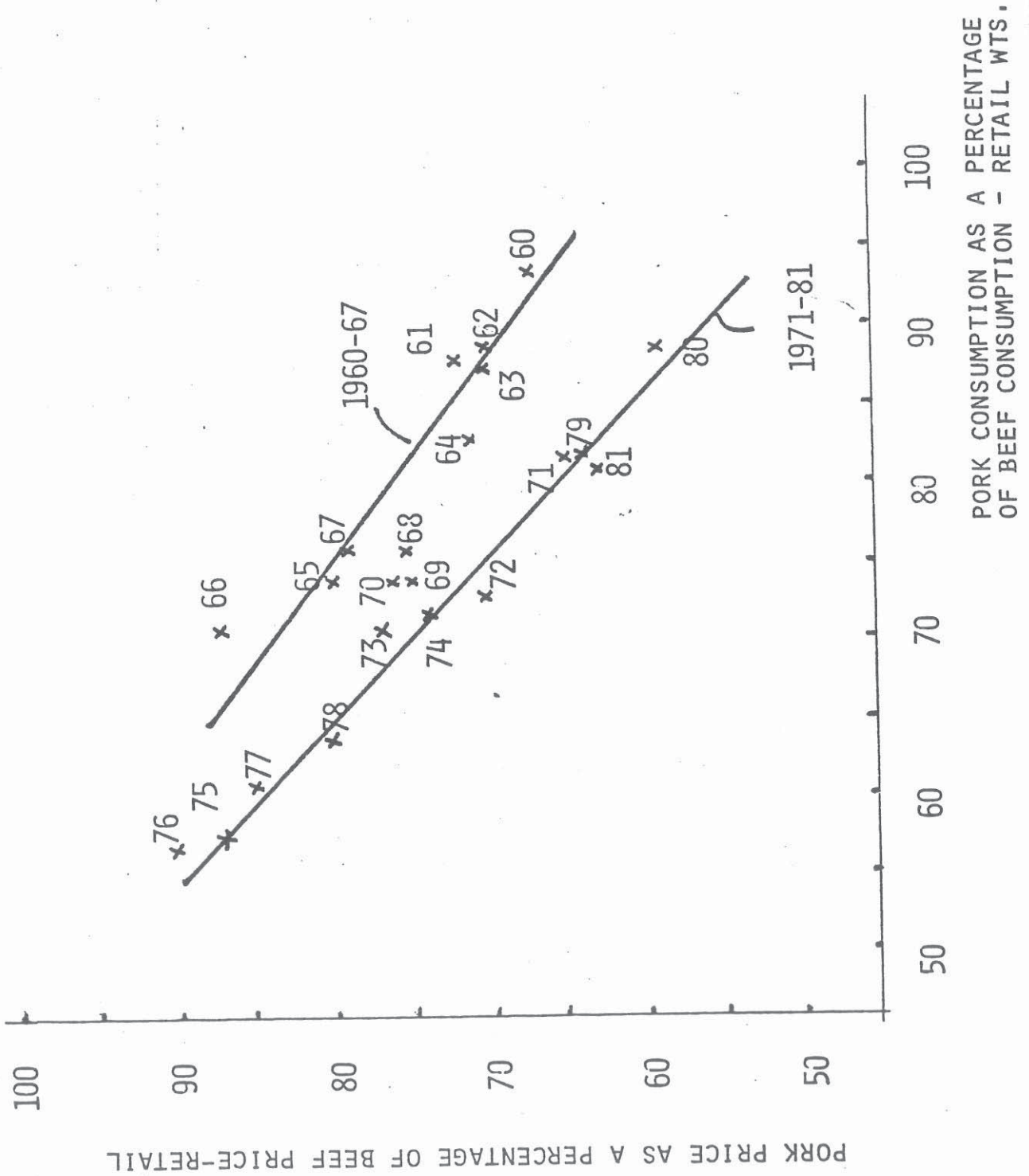
logical to buy more of the lower priced meat even if basic consumer preferences have not changed. A change in consumer preferences would imply that the consumer would be willing to buy more or less of one meat relative of another without any change in relative prices. Or, consumers would be willing to pay a higher or lower price for one meat relative to another without any change in relative supplies. If the relative price that consumers would be willing to pay for the same relative quantity has not changed, there has been no change in preferences regardless of the variation in prices and market shares.

Figure 4 illustrates consumer preferences between beef and pork over the past two decades. The vertical axis of the graph represents retail pork prices as a percentage of retail beef prices. The horizontal axis represents pork consumption as a percentage of retail beef consumption again on a retail weight basis. Notice that back in 1975 and 1976 pork consumption averaged only about 57 to 58 percent as great as beef consumption in retail weights. This was the period when beef held its greatest share of the total meat market. But during those years, retail pork prices averaged 88 to 90 percent as high as beef prices. In 1980, when beef's share of the market was smallest for the two decade period, pork consumption was nearly 90 percent as large as beef consumption. But to sell this larger relative quantity of pork, pork prices had to be dropped to less than 60 percent of beef prices.

However, there is no indication of a basic change in consumer preferences during this period. There is some indication of a shift in preferences between beef and pork between the 1960-67 period and the 1971-81 period. More complete studies have indicated that any such shift was not statistically significant at high levels of confidence. But, when pork supplies were 85 to 90 percent of beef consumption levels in the early sixties, retail pork prices averaged nearly 70 percent as high as retail beef prices. It took a 10 percentage point lower relative price for pork to move similar relative quantities in 1980. So, if there has been a shift in preferences, it has been in favor of beef relative to pork. If beef was the preferred meat in the sixties, there is little doubt that it remains so today. The gains in market share for pork relative to beef since the late seventies have reflected larger supplies of pork that could not be moved except at lower price levels. Any shift in preferences has favored beef not pork.

During the sixties, chicken supplies averaged about 44 percent as great as retail beef consumption. Chicken prices averaged about 47 percent as high as beef prices during this period. During the seventies, broiler supplies increased to 47 percent as large as beef supplies but retail chicken prices dropped to about 44 percent of retail beef prices. Chicken supplies increased as beef supplies dwindled in the late seventies. But, lower relative prices for chicken at retail were again required to move the larger relative supply of chicken. The drop in relative price was not as great as might have been expected based on data from the 1960-77 period. So, there might have been some shift in preferences in favor of chicken. But any shift was not enough

FIGURE 4



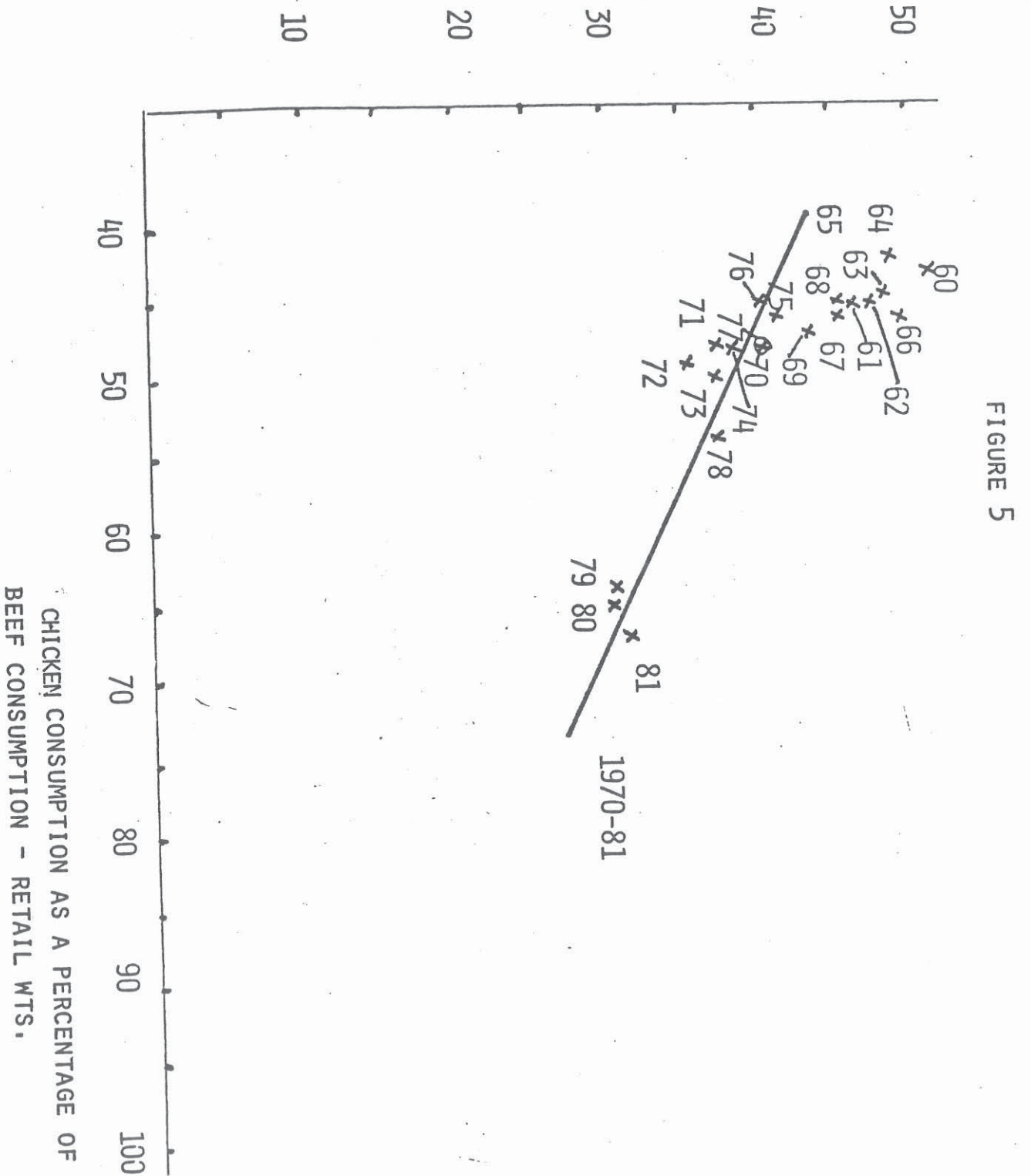
to allow larger relative supplies of chicken to clear the market without significantly lower relative prices.

Figure 5 shows a preference chart between beef and chicken similar to that for beef and pork in figure 4. The pattern of preferences is less evident due to the relative minor variations in relative supplies of beef and chicken during the sixties and early seventies. But again, there is little solid evidence of any shift in overall consumer preferences between beef and chicken. The pork-chicken preference chart in figure 6 sheds some further light on the possibility of beef-chicken preference changes. Recall that there was some indication that preference for pork relative to beef had fallen between the sixties and seventies in figure 4. But, there is no indication that pork preference relative to chicken showed a similar drop in figure 6. By implication, the drop in chicken prices relative to beef between the sixties and early seventies probably reflected a decline in preference for chicken relative to beef as well as a larger relative supply of chicken. There is no indication of a shift in preference between beef and pork or between pork and chicken between the early and late seventies. This would indicate that there was no shift either in preferences between beef and chicken between those two periods. So any shift between beef and chicken was likely one in favor of beef between the sixties and seventies.

In summary, it appears that the preferences between pork and poultry have not changed over the past two decades although there have been dramatic changes in the relative supplies of these two meats during this period. In general increases in broiler supplies relative to pork supplies have been accompanied by lower prices for chicken relative to pork at the retail level. About 60 percent as much chicken as pork has been sold at chicken prices about 60 percent as high as pork prices. But to move 80 percent as much chicken as pork, it has required a drop in broiler prices to about 45 percent as high as pork prices. There seems little doubt that much larger supplies of pork than chicken could be moved at equal prices and that much higher prices for pork than chicken could be commanded in the markets for an equal supply of pork and chicken. So, pork has been preferred to chicken by consumers over the past two decades and there is little to indicate that this preference for pork is changing.

The beef-pork preference picture can be summarized by the statement that any shift in preference over the past two decades has been in favor of beef relative to pork. During the decade of the seventies, roughly 65 percent as much pork as beef could be sold at pork prices 85 percent as high as beef prices. And, about 85 percent as many retail pounds of pork as beef could be sold at pork prices 65 percent as high as beef prices. Pork prices would have had to drop to something less than 50 percent of beef prices to sell as much pork as beef to consumers. Pork supplies would have had to drop to something less than 50 percent of beef supplies to maintain pork prices as high as retail beef prices. So, beef is preferred to pork by consumers, and that preference may be even stronger today than 15-20 years ago.

YOUNG CHICKEN PRICE AS A PERCENTAGE
OF BEEF PRICE



CHICKEN PRICE AS A PERCENTAGE OF PORK PRICE

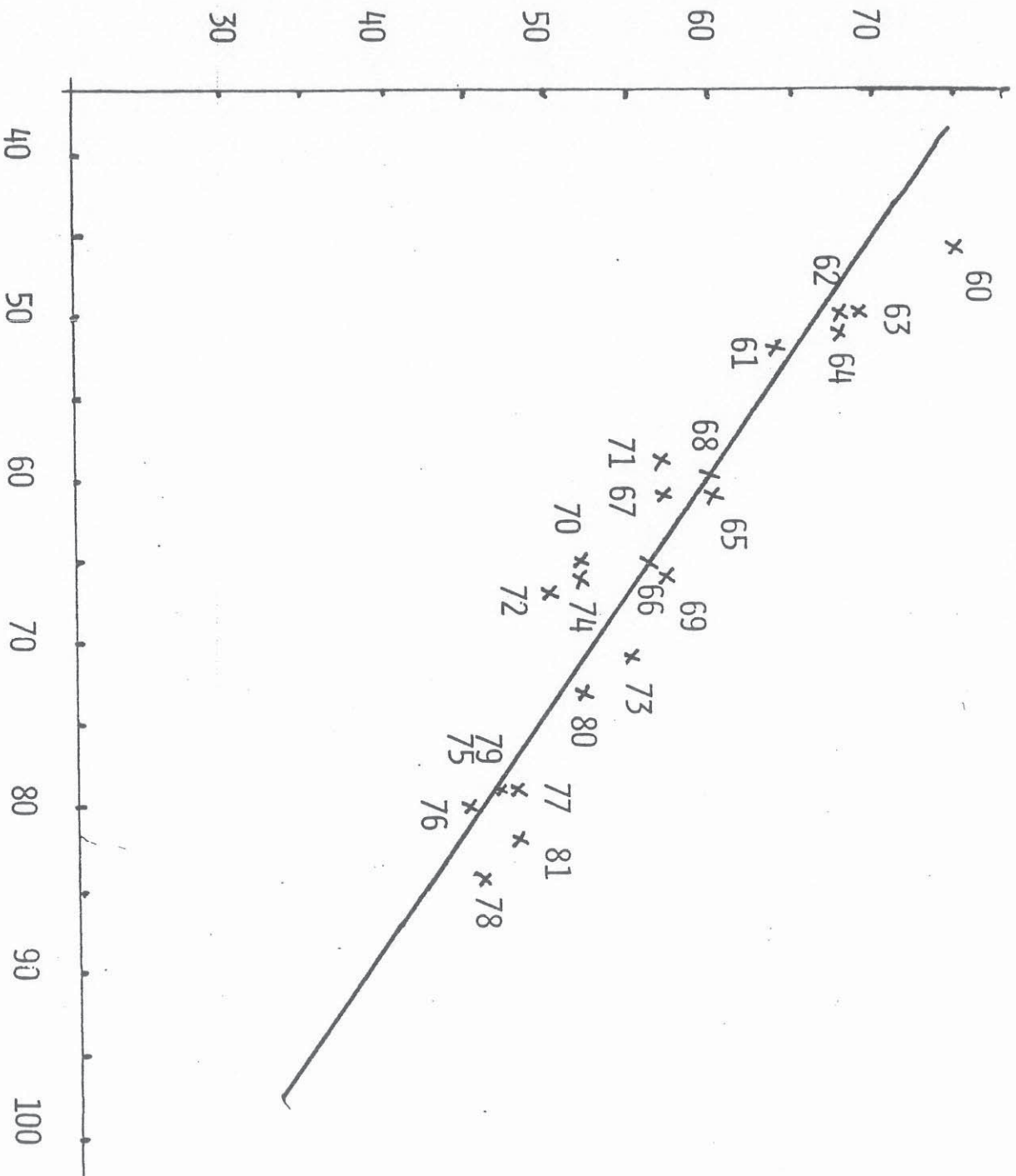


FIGURE 6

BROILER CONSUMPTION AS A PERCENTAGE OF
PORK CONSUMPTION, RETAIL WTS.

Preference for beef relative to chicken is less clear cut. But, it appears that any shift in preference between the two meats again has been in favor of beef rather than chicken. The lack of shift in preference between pork and chicken seems to support the hypothesis that the preference for chicken relative to beef dropped between the sixties and seventies. Per capita consumption increases for chicken relative to beef in recent years have resulted in both price and supply ratios between chicken and beef that have not been seen before. But, those ratios are consistent with those that might have been expected if there had been no change in preferences between the early and late seventies. Preference relationships of the seventies indicate that no more than 50 percent as much chicken as beef could be sold at chicken prices only 40 percent as high as beef prices. To move 65 percent as much chicken as beef has required chicken prices only about 30 percent as high as retail beef prices. An even much lower price of chicken relative to beef seemingly would be required to sell as much chicken as beef. So there is little doubt that beef is still strongly preferred to chicken.

In terms of consumer preference, beef is still king. The inroads of pork and poultry into the total meat market have been made only by lowering the prices of pork and poultry relative to beef prices. At the higher relative prices of pork and poultry of previous years, consumers apparently would be willing to give at least as large a share of the market to beef as before. But, pork and poultry producers have lived with lower relative prices in order to increase their market share. And the challenge to beef as king has come not from the consumer side of the market but from the supply or production side. Current indications are that even larger shares of the market for pork and poultry will come only at even lower prices for these meats relative to beef. Consumers still prefer beef. But they will substitute increasingly cheaper meats for beef, even if their basic preferences remain unchanged.

Is Beef Still King?

Beef is still king among the meats both in terms of popularity or share of the market and in terms of consumer preferences. But, the more important question may be whether or not beef can remain king in light of increased competition from pork and poultry in recent years. The study reported here provides some insights into the question of the future supremacy among the major meats. Although it does not provide the answers, it does provide direction in asking the right questions. And it indicates that many of the questions being asked today, particularly regarding the demand side of the market, are only marginally relevant to the potential problems of beef in the future. The results of the study reported here may be summarized by the following conclusions.

1. Beef has lost a significant share of the total meat market since the mid seventies. That loss was due in major part to a coincidence of cyclically declining beef supplies at a time of cyclically expanding pork supplies. But the market share gains

of chicken have been persistent over the past two decades. And turkey may have become the fifth major meat, although its market share is still small. It seems likely that expansion of poultry production will prevent beef from regaining its former dominance of the total market in the foreseeable future.

2. Shifts in beef demand, prices relative to quantities, are apparent from retail beef price and percapita consumption data covering the past two decades. There was an apparent increase in beef demand between demand levels of the sixties and demand levels of the early seventies. There has been an apparent decline in beef demand since the mid seventies. These shifts in beef demand correspond to the periods of changing market shares for beef. Beef demand was stronger whenever beef had less competition in the market, that is, when beef made up a larger share of total meat supplies. Beef demand was weakest whenever beef had more competition and a smaller market share. The decline in beef demand since the mid seventies appears to have kept 1981 cattle prices \$15 per hundred or more lower than would have been possible at earlier demand levels.
3. There has been no identifiable shift in demand for beef, pork, chicken and turkey in total over the past two decades. Percapita supplies of these four meats have increased by about 30 percent over this period. But, aggregate meat prices relative to consumer incomes have dropped by about 43 percent as supplies increased. These changes in price and quantities consumed do not represent a shift in the basic consumer demand for meat. A shift in demand would imply that more or less meat could be sold at a given price or that a higher or lower price would be needed to clear the market of given supply of meat. Lower prices for larger quantities or higher prices for smaller quantities need not represent shifts in demand. Meat demand levels in 1981 were lower than average for past decades. But, there is no indication that 1981 meat prices relative to consumer incomes were outside the range of realistic expectations based on average demand levels of the past twenty years.
4. The share of consumers' incomes spent on meat in total has dropped from over 5 percent in 1960 to less than 4 percent in 1981. But, this does not represent a decline in consumer meat demand. The demand for meat historically has been "inelastic". This means that any change in quantity supplies will result in a more than offsetting change in the price of meat in the opposite direction. So, as total meat supplies increased between the early sixties and late seventies, there was an even greater drop in prices of meats relative to incomes. Consequently, there was a drop in the percentage of consumers' incomes spent on meats. The drop in this percentage did not represent a drop in price for any given quantity. Nor did it represent a smaller quantity demanded at any given price. Thus, it did not represent a drop in overall meat demand. The decline in percentage spent on meat was the normal and expected consequence of increasing total meat supplies.

5. Finally, there is no solid statistical evidence of any change in consumer preferences among the three major meats over the past two decades. There have been dramatic shifts in relative consumption levels among the three meats. But, there have been equally dramatic shifts in relative price among the three meats. And, the fact that chicken consumption levels have gone up relative to beef as chicken prices have fallen relative to beef prices does not imply a change in consumer preferences between the two meats. At previous relative supply levels, consumers would still be willing to pay as great a premium for beef now as they have paid in the past. This would indicate that there has been no change in preferences, only changes in relative supplies. If there has been any shift in preferences among the three meats, the evidence seems to indicate that it has been in favor of beef relative to the two other meats.

In summary, this study indicated that the problems of beef in the market place since the mid seventies have come from the supply side of the meat market and not from the demand side. The declining demand for beef has resulted from increasing supplies of competing meats and not from a change in consumer demand for meat in total nor from a change in consumer preferences for beef relative to the other meats. In fact the consumer preference for beef may be stronger today than at any time in the past. This study does not mean that the demand for meat or preference for beef cannot, at some future time, be affected by health concerns, negative consumer attitudes, etc. Such future developments are certainly possible. But at least up through 1981, there was no indication that such negative consumer demand developments have occurred.

Thus the basic questions for the future of the beef industry seem to be more questions of whether beef can continue to compete with pork and poultry from the supply side of the market. Pork and poultry supplies continued to increase during the late seventies, even though prices of pork and poultry relative to beef continued to decline. Market shares of the three meats in the future will depend on whether pork and poultry producers can continue to produce at lower and lower relative prices or whether they will be forced to give up some of their gains in order to return their prices to profitable levels. The outcome of this battle among beef, pork and poultry for the consumers' meat dollar apparently will be determined by relative supplies and production costs rather than changing consumer demand and preferences.