

The relationship among market-hog, carcass, and wholesale-cut prices

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Summary: We used weekly data collected from January 1987 to December 1992 to examine the relationship among market hog, carcass, and wholesale-cut prices and their seasonality. Market hog and carcass prices followed a similar seasonal pattern over the study period. The seasonal pattern of prices for the individual wholesale cuts differed somewhat from the seasonal pattern of market hog and carcass prices. Loin prices declined to a greater degree in November and December. Ham prices reached seasonal peaks during the Thanksgiving and Christmas seasons. The price of bellies was relatively higher than average during the first 3 months of the year. Sparerib prices reached seasonal peaks during the outdoor cooking season and were relatively lower than average compared to the other wholesale cuts during the last 3 months of the year. Market hog and carcass prices were highly correlated with wholesale-cut prices. Loins, Boston butts, and bellies were more highly correlated with market hog and carcass prices than the other two wholesale cuts.

As producers adopt lean value marketing strategies, their interest in the relationships among market-hog prices, carcass prices, and wholesale-cut prices is increasing. When producers use lean marketing techniques, the price they receive for market hogs depends more on carcass and wholesale-cut prices than on liveweight. Different individual wholesale-cut prices vary in the degree to which they correlate with market-hog prices. For example, wholesale-cut prices for loins are probably more highly correlated with market-hog prices than prices for some of the other cuts.

This correlation is also likely to vary by season. Seasonality of market-hog prices is well documented.¹ Producers are aware that live prices generally peak during the summer and are lowest in the fall. However, seasonal patterns of carcass and wholesale-cut prices have not been well documented. Producers who sell on a lean-value basis must understand seasonal patterns of market hog, carcass, and wholesale-cut prices, because gross returns are directly dependent on fluctuations in these prices.

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Previous research also indicates that market-hog prices cause wholesale-cut prices, leading them by 4 weeks.² Thus, the market-hog prices of 4 weeks ago will be significantly correlated with current carcass and wholesale-cut prices.

This study does not attempt to reconfirm the causation from market-hog prices to wholesale-cut prices. Rather, we used contemporaneous prices to investigate the relationships among current market hog, carcass, and wholesale-cut prices.

The objectives of this report are:

- to examine the correlations among market hog, carcass, and wholesale-cut prices;
- to examine correlations among lagged and contemporaneous prices; and
- to examine the seasonality of these prices.

Methods

We used weekly market hog, carcass, and wholesale-cut prices from January 1987 to December 1992 in this study. We obtained market-hog prices (per cwt) for the Omaha terminal market from the United States Department of Agriculture (USDA), Agricultural Marketing Service.³ We obtained US #1 and US #2 carcass and wholesale-cut prices from issues of the USDA Wholesale Price Sheet. We averaged the US #1 and US #2 carcass prices to obtain the carcass prices used in the analyses.

Lagged versus contemporaneous pricing correlations

To assess whether contemporaneous market-hog prices were more highly correlated to carcass prices than lagged market-hog prices, we calculated correlation coefficients for current carcass prices and market-hog prices that were contemporaneous and lagged from 1-4 weeks.

Relationships among market hog, carcass, and wholesale-cut prices

We examined the relationships among contemporaneous market hog, carcass, and wholesale-cut prices using correlation analysis. Wholesale-cut price data were available for loins, hams, spareribs, Boston butts, and bellies. We would expect market hog and carcass prices to be highly correlated. We would also expect all of the wholesale-cut prices to be

Table 1

Correlation matrix for market-hog, carcass, and wholesale-cut prices.

	Market hog	Carcass	Wholesale cuts:				
Market hog	1.00		Loins	Boston butts	Spareribs	Hams	Bellies
Carcass	.97*	1.00					
Wholesale cuts:			1.00				
Loins	.82*	.80*	.84*	1.00			
Boston butts	.84*	.82*	.56*	.66*	1.00		
Spareribs	.68*	.60*	.16*	.23*	-.02	1.00	
Hams	.46*	.55*	.48*	.58*	.63*	.43*	1.00
Bellies	.81*	.79*					

* $P < .05$

correlated with market-hog prices. We used individual correlation coefficients to explore the relationships among individual wholesale-cut prices, carcass prices, and market-hog prices.

Using contemporaneous prices, we used ordinary least squares regression to formulate equations to estimate the degree to which market-hog prices were associated with carcass prices and market-hog prices were associated with wholesale-cut prices.⁴

We calculated coefficients of separate determination using the regression results.⁵⁻⁷ Coefficients of separate determination compute the percent of the variation in market-hog price associated with each individual wholesale cut, allowing us to determine the relative association of each wholesale cut with market-hog prices.

Seasonality of prices

To determine seasonal patterns in prices, we computed monthly average prices for the study period. To facilitate comparisons, we report all seasonal prices as indices. An index value of 100 represents the average annual price. An index value of 105 indicates that the price during that month is typically 5 percent higher than the annual average price.

Results and discussion

The average market-hog price from January 1987 to December 1992 was \$48.39. Carcass prices averaged \$65.90 over the study period. Thus, the average difference between carcass and market-hog prices (i.e., the amount the packer was paid per hog for its services) was \$17.51 for the entire study period. The weekly price spread ranged from \$12.83 to \$24.45 over the 6-year period. The spread was typically wider when both prices were relatively high and narrower when both prices were relatively low.

Lagged versus contemporaneous pricing correlations

Although previous research has shown lagged market-hog prices to be highly correlated with current carcass prices,² in

this study current market-hog price was typically more highly correlated with current carcass price than were lagged market-hog prices. For example, although the correlation between market-hog price lagged 4 weeks and current carcass price was .88 ($P < .0001$), the correlation between the market-hog price lagged 2 weeks and current carcass price was .93 ($P < .0001$). Current market-hog prices were most highly correlated with current carcass prices: the correlation between current carcass and current market-hog prices over the study period was .97 ($P < .0001$). In light of these correlation results, the estimates below use the relationship between current prices.

Relationships among market-hog, carcass, and wholesale-cut prices

Market hog and carcass prices were highly correlated over the 6-year period ($P < .0001$; $r = .97$) (Table 1). Loin prices, Boston butt prices, and the prices of bellies were correlated more highly with market-hog prices and carcass prices than the other two cuts. Correlation coefficients between these cuts and market hog/carcass prices ranged from .79 to .84 ($P < .0001$). Ham prices and sparerib prices were also correlated with market-hog prices and carcass prices, but to a lesser degree than the other three wholesale cuts. Correlation coefficients between ham and sparerib prices, and market hog and carcass prices ranged from .46 to .68 ($P < .0001$).

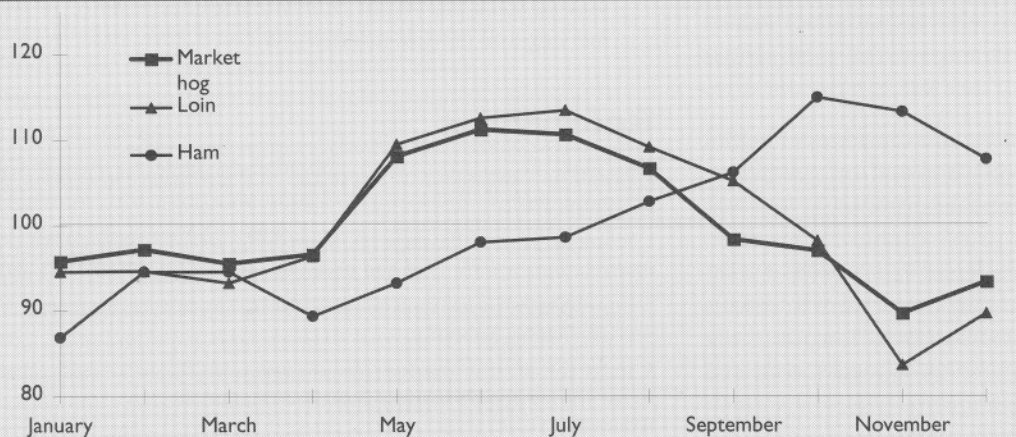
Carcass price explained 94.3% of the variation in market-hog prices over the study period. Parameter estimates were all significant ($P < .01$). We would expect a \$1 per cwt change in carcass price to lead to a \$0.82 per cwt change in market-hog price.

Total individual wholesale-cut prices explained 94.3% of the variability in market-hog prices over the study period. Loin prices are the wholesale cut most highly correlated with market-hog prices. A \$1 change in loin price is associated with a \$0.20 change in market-hog price. A \$1 change in the price of bellies or ham prices is associated with a \$0.16 and \$0.12 change in market-hog prices. A \$1 change in the other two wholesale cuts is associated with a change of less \$0.10 in market-hog prices.

Table 2

Seasonal indices of market hog, carcass, and wholesale cut prices, 1987-1992
(Standard deviations are in parentheses.)

Month	Market hog	Carcass	Loin	Ham	Spare ribs	Boston butt	Bellies
January	95.77 (6.71)	94.52 (6.77)	94.57 (6.24)	86.87 (6.92)	92.75 (5.69)	91.31 (4.25)	108.81 (14.42)
February	97.16 (6.34)	95.50 (6.05)	94.61 (4.38)	94.56 (9.78)	99.10 (5.81)	89.55 (5.37)	100.14 (15.84)
March	95.51 (4.28)	95.15 (4.20)	93.18 (4.62)	94.54 (6.00)	102.20 (3.55)	89.25 (6.06)	97.54 (13.65)
April	96.59 (5.72)	97.17 (4.59)	96.33 (3.35)	89.32 (4.58)	109.13 (4.91)	96.33 (6.06)	97.99 (14.03)
May	108.06 (5.47)	107.10 (4.43)	109.49 (5.61)	93.17 (4.75)	118.33 (5.12)	115.49 (4.96)	107.61 (10.77)
June	111.23 (4.02)	109.11 (3.30)	112.56 (3.60)	98.04 (3.28)	118.55 (6.41)	122.18 (5.35)	113.43 (9.78)
July	110.61 (4.34)	107.91 (4.20)	113.47 (5.33)	98.58 (4.90)	110.86 (8.80)	120.01 (4.76)	105.41 (12.47)
August	106.70 (4.19)	104.80 (4.55)	109.17 (4.03)	102.77 (4.34)	108.92 (3.53)	107.72 (3.29)	100.08 (17.02)
September	98.31 (3.64)	101.64 (3.47)	105.21 (6.70)	106.15 (5.14)	89.22 (2.35)	99.37 (5.89)	91.07 (7.63)
October	96.99 (7.20)	99.12 (5.64)	98.15 (6.88)	114.94 (5.35)	84.09 (7.76)	91.75 (3.80)	92.36 (16.29)
November	89.69 (9.01)	94.25 (7.49)	83.64 (5.10)	113.28 (7.79)	83.73 (8.17)	84.05 (4.64)	95.53 (27.56)
December	93.38 (11.02)	93.74 (9.41)	89.63 (8.71)	107.75 (12.60)	83.12 (5.44)	92.99 (12.20)	90.02 (22.98)



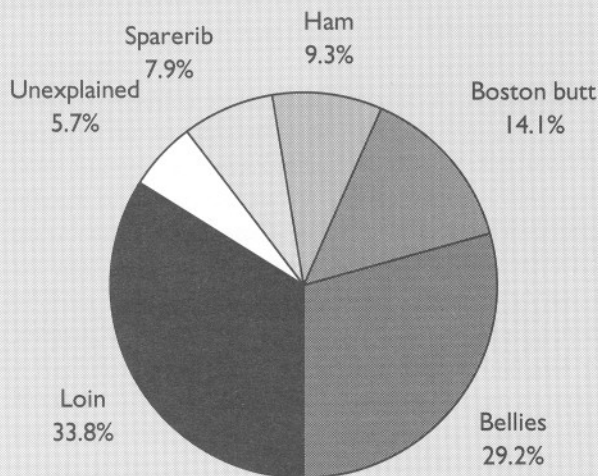
The accompanying figure shows the three most important of these indices.

Coefficients of separate determination

Coefficients of separate determination (Figure 1) provide a measure of the relative association of the individual wholesale-cut prices to the variability in market-hog prices. All of the wholesale-cut prices we included in this study were correlated with market-hog prices. A higher percent in Figure 1 indicates that a particular wholesale-cut price was more important in explaining the variability in market-hog prices than a different wholesale-cut price.

Seasonality of prices

Depending upon cut, wholesale-cut prices could vary considerably from one season to another (Table 2). The standard deviations of each seasonal index measure the variability of the indices from one year to the next. A relatively small standard deviation indicates that a particular index does not vary as much as another index from year to year. Conversely, a relatively large standard deviation indicates that a particular index varies considerably among years.

Figure 1

Relative association of individual wholesale-cut prices to the variability in market-hog prices.

An index value of 100 represents the annual average price. An index value of 111 (e.g., market-hog price in July) means that the value is 11 percent above the annual average price. As expected, market hog and carcass prices follow a similar seasonal pattern. Two observations are worth noting:

- the peak in market-hog prices was slightly higher than that for carcass prices; and
- compared to the average price, market-hog prices tended to decline more rapidly from summer to fall than carcass prices.

Because loin prices, Boston butt prices, and the prices of bellies were highly correlated with market hog and carcass prices, the seasonal pattern for these wholesale cuts closely followed that of market hog and carcass prices (Table 2). However, wholesale cuts were correlated to a lesser extent with market hog and carcass prices than market-hog prices were to carcass prices. Thus, we would expect at least some difference in the seasonal patterns of wholesale-cut prices, carcass prices, and market-hog prices.

For example, the seasonal pattern of loin prices during the last 4 months of the year differed from the seasonal pattern of market hog and carcass prices during these months. Loin prices were relatively higher than the average price in September and relatively lower than the average price in November and December. Boston butt prices reached a higher peak in May, June, and July and were somewhat lower compared to the average price in October and November. The seasonal index for the price of bellies was higher in January, February, and March and lower in September, October, and December compared to that of market hog or carcass prices.

The seasonal patterns of ham and sparerib prices differed from those of the other wholesale cuts and from carcass and market-hog prices. Ham prices did not increase as rapidly during the summer months, and strengthened during the holiday buying season (Thanksgiving and Christmas). This increased support of ham prices in the fall tended to offset the seasonal weakness in the other wholesale-cut prices. There is an enormous demand for spareribs during the summer outdoor cooking season, the seasonal index of sparerib prices in the last 3 months of the year was lower than that for any other wholesale cut (Table 2).

Implications

- Market-hog, carcass, and wholesale-cut prices were highly correlated; and contemporaneous carcass and market-hog prices were more highly correlated than were current carcass prices and lagged market-hog prices.
- Our study involved only correlation, and is not meant to imply that wholesale-cut prices drive or cause market-hog prices.
- In our study, the variability of market-hog prices was most highly correlated with loin prices, the price of bellies, and Boston butt prices. These three cuts accounted for 77% of the variability of market-hog prices.
- The seasonal pattern of prices for the individual wholesale cuts differed somewhat from the seasonal patterns of market hog and carcass prices.

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