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WHAT FACTORS AFFECT RETAIL SALE OF MEAT?

by

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What factors affect the sale of individual products in retail meat departments? Can these factors be measured and related to sales with sufficient accuracy to enable forecasting product movement from week to week?

These were the central questions behind a research inquiry that examined the product sales in two Ohio retail meat departments over a 52-week period. The results were somewhat mixed, with excellent predictive models for some products, but relatively poor models for other products. Among the variables influencing product sales, nearness to payday was found to be far more important than anticipated.

Model Development Problems

Conceptually, predictive sales models pose few problems. However, the characteristics of fresh meat distribution present serious operational problems. While meat is priced, advertised, and sold to consumers by retail cuts (e.g., round steak, English roast, etc.), most fresh meat products are distributed to retail stores as wholesale primal cuts (e.g., beef round, beef chuck, pork loin, etc.). Since retail firms generally have no way of recording the pounds sold of retail cuts, in most cases the pounds sold of a wholesale primal must be related to the pricing and advertising of the retail cuts originating in that wholesale primal.

Unfortunately, the "mix" of retail cuts sold is seldom in perfect harmony with the pounds of each retail cut derived from the wholesale primal. A particular store, for example, may find that of the retail cuts from a beef loin, sirloin steaks sell much better than porterhouse steaks. This type of imbalance is overcome in a retail chain by manipulating store level factors that influence sales, such as the size and location of displays, the use of different cutting methods (e.g., bone-in vs. boneless), the closeness of trim, etc. Since store level manipulation varies from week to week depending upon what is advertised, it poses definite problems in measuring short-run demand relationships.

The cooperating chain in this study was selected because less store level manipulation of meat sales occurs than in most chains. Display space allocations are carefully controlled by chain management.

The firm also follows a "specializing" strategy of advertising many items at moderate price reductions each week, instead of a few items with large price reductions. This results in less distortion of the mix of products sold, and hence calls for fewer adjustments at store level to sell all the retail cuts from a wholesale primal. (When a few items with large price reductions are advertised, a store

may sell many times its normal volume of round steak, for example, but have difficulty moving the remaining cuts in the round.) While these factors resulted in less store level manipulation in the operating chain, it was not eliminated altogether and was a sales influencing factor not included in the models.

Obtaining accurate data on the pounds sold of wholesale primals also posed a problem. The pounds delivered of each product to a store are readily available. In order to calculate the pounds sold, beginning and ending inventories are needed for each week. The obvious inaccuracies in the inventories taken by store personnel in this study caused considerable difficulty and probably reduced the explanatory level of models tested.

Predictive Models

Ten predictive models were tested through multiple linear regression. These all explored the proposition that product sales were a function of numerous variables, such as product price, prices of alternative products, firm growth, weather conditions (temperature and rainfall), seasonal variations, nearness to paydays, and newspaper advertising of different meat cuts.

The models were tested on six fresh meat products in each of two stores. The six wholesale cuts were beef round, beef loin, beef chuck, beef rib, pork loin, and fresh fryers. The percentage of the variation in pounds sold that was explained by the models ranged from 55 percent for beef rib to over 90 percent for fresh fryers.

The explanatory variables that proved significant varied from product to product. For the same products, the appropriate models for the two stores were similar, though not identical. The only variables that showed no significant relationship in any of the product-store models were newspaper advertising and days of rain. The lack of importance of newspaper advertisements may be due to the relatively small changes that occurred in the meat ads of

the cooperating chain from week to week. Many of the same items appeared in the ads week after week with slight changes in prices or cuts. Under these circumstances, either advertising had no significant influence on sales, or the variable used to indicate advertising did not effectively discriminate between changes in emphasis.

As might be expected, the composite price of the retail cuts in a wholesale cut had a significant influence in all cases on the quantity sold of that cut. The prices of certain competing items were also significant for most of the products studied.

The importance of paydays in these models was not fully anticipated. For 10 product-store models (five products in two stores), payday variables entered all but one of these solutions, and were the first or second most important variable in several cases.

Two types of payday dummy variables were employed, one which allowed different levels of demand curves from week to week (i.e., adjustments in the Y intercept), and one which allowed different slopes of the demand curves for different weeks (i.e., adjustments in the beta coefficients). The first set entered seven out of ten models; the second set entered six of the models.

The nearness to payday variables reflect the variance in the cash available to store customers from week to week. Thus, they can be viewed as short-term income elasticity variables. If product sales in the short run respond to changes in income (or cash available) in a similar way that they do over time, then past studies of income elasticity suggest that, with other things held constant, the sale of beef products should be greater during pay weeks than during non-pay weeks; and that the sale of pork and poultry products should be about the same -- demonstrating little income effect. At "regular" prices, this pattern was apparent for some products; however, it was not consistently true in all models.

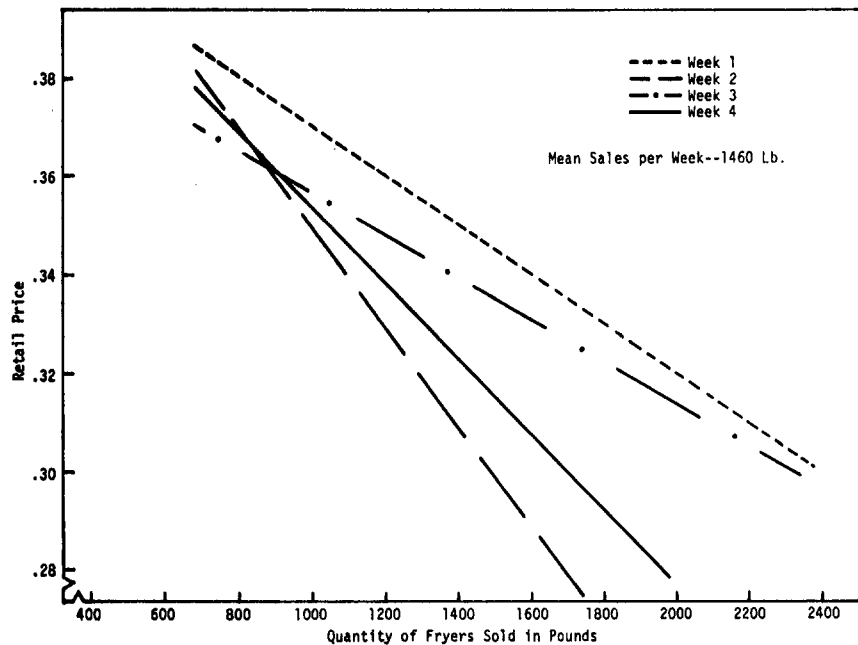


Figure 1—Price-quantity relationships for fryers by week of the month in Store B.

The influence of paydays on the responsiveness of product sales to reduced prices varied in important ways for different products. Figures 1 and 2, for example, indicate the demand curves for fryers and beef round by week of the month. It was found that while fryer sales responded most to price reductions during pay weeks (Weeks 1 and 3), almost the

opposite was true for beef round sales which were most responsive during Week 4 and least during Week 3. Although not completely uniform, beef products generally exhibited more price sensitivity during non-payday weeks (Weeks 2 and 4).

One explanation for this pattern is that during periods of high cash availability (Weeks 1 and 3), consumers allowed their preference patterns to govern their purchases to a greater extent than when cash was in shorter supply. Thus, during Weeks 1 and 3, consumer demand for beef (their preferred product) tended to be relatively inelastic. However, during Weeks 2 and 4, when consumers were more concerned with conserving expenditures, the demand for fryers (an economizing product for many consumers even when it is not featured) was less responsive to price changes. During Weeks 2 and 4, the quantity of beef consumers felt they could afford seemed to depend more heavily on whether those products were reduced in price.

If upon further study the payday

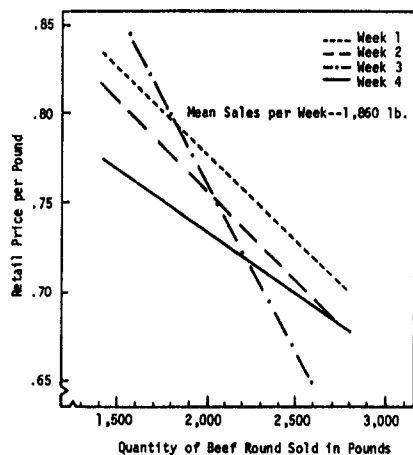


Figure 2—Price-quantity relationships for beef round by week of the month in Store B.

relationships are confirmed, they carry definite implications for retail featuring policies and for meat and poultry processors. A broiler processor that finds his inventories building up, for example, could eliminate his excess inventory best by dropping his price and encouraging retail customers to run fryer specials during payday weeks. These are the weeks when price reductions will stimulate the greatest sales response on fryers. The opposite is true for beef suppliers. Price concessions to encourage retail beef specials are most appropriate during non-payday weeks.

The predictive capabilities of the models developed were found to be acceptable during many weeks, but occasionally subject to relatively large errors. (Figure 3 presents predicted and actual sales of beef round sales in one store.) This

suggests that some sales-influencing factors were present that were either not included or not adequately measured in the models. It may be that predictive models used in conjunction with the judgement of individual meat department managers may provide more accurate results than reliance on either alone. This combination was not tested in the OARDC project.

The development of short-term forecasting models -- while still in the exploratory stages -- holds sufficient promise for success to justify additional effort. If accurate predictive models can be developed, an important barrier to more scientific and precise planning and decision-making in marketing firms will have been overcome. Consumers should be better served and marketing firms should at the same time experience lower levels of inventories and product loss.

Figure 3—Actual and predicted sales of beef round in one Ohio supermarket for 52 weeks.

