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DEMAND ANALYSIS AND PROJECTIONS ON ANIMAL PRODUCTS IN THE UNITED STATES[1]

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Livestock -- Marketing

Trends in the per capita consumption of animal products in the United States have been mixed. Meat consumption in total has continued to edge upward, but in recent years beef consumption has declined while broiler and turkey consumption has increased. Pork consumption has remained relatively steady. Consumption of dairy products (milk equivalent, fat content basis) has declined in the long run but has leveled off and even increased in recent years. Dairy consumption trends have also been mixed with cheese and low fat milk increasing while butter and whole milk have been declining. Egg consumption has persistently moved lower.

What the longer term trends will be in the future is subject to considerable conjecture at this time. Have U.S. consumers reached a saturation level of consumption of animal products and little further gain can be expected? Will recent and on-going publicity about health concerns cause consumers to actually reduce total animal product consumption? Will structural changes in demand, such as growing interest in ethnic and foreign foods, casseroles, low fat foods, etc., result in lower consumption on animal products?

These are questions not easily answered but are, of course, crucial to the long term outlook for the livestock industry. The purpose of this study is not to address these questions directly but to provide a basis for: (1) evaluating recent and future developments in demand for animal products; and for (2) projecting future trends. Demand equations were estimated from time

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series data for 1960-84 on major livestock products. These results were compared with a similar analysis for a more recent period of 1970-84. Another comparison made was to examine the effect of adding trend variables to the analysis. Several sets of equations were used in generating projections to the year 2000.

Demand Analysis Results

The products analyzed included beef, pork, broilers, turkeys, eggs, and milk. All the equations were estimated by ordinary least squares or by AR1 as indicated for eggs and milk. The AR1 procedure corrects for serial correlation in the residuals. The functional form most commonly used was log-log with per capita consumption as the dependent variable. In this formulation, the coefficients on the independent variables are demand elasticities. Disposable income per capita and retail prices were all deflated by the Consumer Price Index.

The retail price series are estimates from the Economic Research Service of the U.S. Department of Agriculture and represent prices paid by consumers at retail stores. These prices would not fully account for the extra expenditures on animal products consumed away-from-home. Since this component of demand is relatively important and increasing in share of total animal product expenditures, use of retail store prices somewhat under-estimates demand. However, data are not available to generate a time series on retail prices which account for away-from-home consumption.

Analysis Without Trend Variables. The first approach was in the form of the traditional demand analysis with per capita consumption dependent upon income, own retail price and retail price of substitutes. In the 1960-84 equations, a dummy variable was used as a "shifter" beginning in 1970. This was designed to make the equations based on data for 1960-84 more comparable to those based on data for 1970-84. The statistical results are summarized in Table 1.

On beef, a significantly positive income elasticity (+.604) was generated from the analysis for the entire 1960-84 period; but for 1970-84, the estimate was barely positive and not statistically significant. The decline in income elasticity was not surprising but the extent of the decline was. The own-price and cross elasticities remained about the same. The cross elasticity with "non-beef," i.e., pork, broilers and turkey, was calculated with a composite retail price using relative consumption levels as weights.

The income elasticity on pork became negative, though not significant, in the 1970-84 period. The own price elasticity remained about the same in 1970-84 as in 1960-84 as did the cross elasticity with a composite price of non-pork meat (beef, broilers and turkey).

In contrast with red meat, the income elasticities on broilers and turkeys were higher in the 1970-84 period than in the entire 1960-84 period. However, in neither period was the income effect on turkey consumption statistically significant.

On eggs, the income elasticity continued to be negative in the 1970-84 period though not significant. The own and cross price elasticities continued to be very low.

The decline in demand for dairy products apparently leveled off in the past decade. The income elasticity was strongly negative in 1960-84 at -.318 but was -.023 (insignificant) for the 1970-84 period. The price elasticity remained relatively low but was significant. The consumer price index for meat, poultry and fish (LCPIMT) was tried in equations on milk demand but contributed little to the consumption predictions.

Overall, the set of equations generated for the six commodities appeared reasonable with respect to signs on the coefficients and the statistical properties were generally acceptable. Serial correlation problems are noted on some of the equations. However, to provide the most consistent set of equations with

similar specifications for comparison purposes, the decision was to employ this set in the analysis.

While reasonable, the sharp decline in the income elasticities on beef and pork and the noticeable rise in the income elasticities on poultry meat between the total period and the recent 15 years should be carefully examined. The level of the income elasticities on broilers and turkeys seems especially high. Based on the Nationwide Food Consumption Survey of 1977-78, per capita consumption of poultry meat (at home and away) is about the same in the high income households as in the low income households (U.S. Department of Agriculture).

A comprehensive study by the USDA on meat demand concluded that the market structure was characterized by a high degree of inherent stability (Haidacher). This study was based on information available up to about 1980 and drew heavily on the 1977-78 Nationwide Food Consumption Survey. A recent conversation with the senior author, Richard Haidacher, indicated that a more recent analysis confirms the study's results.

Admittedly, most demand analyses tend to focus on an individual product or classification of products and do not properly account for all the cross elasticity effects. More comprehensive demand research is clearly in order. However, the apparent magnitude of the recent demand changes indicates that important structural shifts may have occurred--structural changes not necessarily related to income, own and cross elasticities but to trends in tastes, preferences, style of living, fads, health concerns, demographic and age distribution shifts, shifts in the distribution of income and other trends, each minor but collectively important.

This possibility was indicated in recent research by Hilker and Hebert on cattle price equations (Hilker, Hebert). They determined that the introduction of time variables into cattle price equations added significantly to the explanation of prices and resulted in more stability in the income effects. The universal

problem when serial time is introduced into time series analysis is its correlation with independent variables and the resultant instability in the parameter estimates. Just the same, we have a conceptual basis for presuming that the recent unfavorable developments for beef and pork demand are gradual but progressive and reasonably represented by time variables.

Analysis With Trend Variables. A number of developments in the late 1970s seemed to stem the tide in the growing demand for meat, particularly beef. In fact, inspection of the real retail price - per capita beef consumption relationship indicated an actual reversal around 1977. Using 1977 as a turning point, the independent variables in Table 1 (except for DV70ON which was dropped) were augmented by two trend variables. One labeled "TIME6076" represented trends from 1960-76 and the other, "TIME77ON," represented trends from 1977 to date. The statistical results are presented in Table 2.

In contrast to Table 1, income elasticity on beef was nearly identical in the two time periods though lower (at +.44) than estimated for 1960-84 in Table 1. Because of the correlation between time and prices of substitute meat, the income elasticity on LRPNBFD was much lower in Table 2. The trend effect was significantly positive through 1976 and significantly negative afterward.

The income elasticity on pork was actually somewhat higher in Table 2 but did turn negative in estimates from the 1970-84 period as in Table 1. Other elasticities were not materially different. In contrast with beef, the trend factors were not highly significant.

The estimates of demand parameters on broilers remained fairly constant between 1960-84 and 1970-84. The income elasticity remained near +.9 and the own-price elasticity was somewhat lower than in Table 1 at -.5. The trend effect was negligible in 1960-76 but significantly positive in 1977-84.

Without trend factors, the income elasticity of demand for turkeys increased between 1960-84 and 1970-84; with trend factors, the income elasticity

declined as shown in Table 2. The own price elasticity of demand was noticeably lower in Table 2.

The estimates of income elasticity on the demand for eggs became positive when time factors were introduced into the equations; though the decline between 1960-84 and 1970-84 remained intact. The own price elasticities became more pronounced with the inclusion of the trend variables. The trends were significantly negative in both periods with some indication that the decline has leveled off.

As with eggs, the inclusion of time increased the income elasticity on milk. The income elasticity was higher in 1970-84 than in 1960-84, though not statistically significant. In addition, the significant negative trend in 1960-76 turned into a positive trend in 1977-84.

The statistical properties of the equations in Table 2 were generally acceptable and the $\bar{R}^2$s tended to be higher than in Table 1. In addition, the fit of the equations in Table 2 for recent years was materially improved over Table 1.

Analysis of Total Meat Demand and Component Shares. The results reported in Tables 1 and 2 clearly indicated that the introduction of trend variables can make a difference in the estimation of parameters. As noted on beef in particular, the differences are pronounced on independent variables strongly correlated with time, i.e., income and prices of competing meats.

An alternative approach designed to reduce the multicollinearity problem was to first estimate a demand equation for all meat (red meat, poultry meat and seafood). The second step was to estimate a demand relationship for each component meat as a share of total meat consumption. The aggregate meat demand equation included income, an index of retail meat prices and the two trend variables. The share equations included income, price ratios and the latter time variable, TIME77ON. The results are presented in Table 3.

On the aggregate demand equation for all meat, the estimated income elasticity of demand was about +.32 and the own-price elasticity was -.36, based on data for 1960-84. Trends were moderately positive in 1960-76 and significantly negative in 1977 to 1984. The impacts of all these factors were diminished based on 1970-84 data.

The equations predicting ratios of component meat consumption to the total all demonstrated strong statistical properties with correct signs on the independent variables. The $\bar{R}^2$ were near .90 or above. Pork and poultry meat price effects were estimated separately in the beef share equation, though the poultry price effect was insignificant. Both beef and poultry meat prices were significant in the pork share equation.

Selection of "Best" Equations. Which among the various equations to select for projecting consumer demand cannot easily be determined. For predicting demand for the next few years, there are compelling reasons to incorporate the trend effects. On the other hand, extending the trends since 1977 into the 1990s would seem presumptuous. To determine the possible impact of the application of these empirical demand equations, projections of per capita consumption were made for each of the equations to 1990 and the year 2000.

Projections to 1990 and 2000

In the near term future, consumption of animal products in the U.S. will be largely determined by the amounts available. Producer's response to expected profits will establish the level of consumption. In the longer run, however, consumer demand will essentially dictate how much is produced and thereby how much is consumed.

To generate projections to the year 2000, the equations presented in Tables 1, 2 and 3 were applied to a set of projections of exogeneous variables. Population of the U.S. was projected to increase from 232 million in 1983 to

265.5 million by the year 2000 (U.S. Department of Commerce). Real per capita disposable income was projected to increase by 2 percent per year in 1985-90 and 1-2 percent per year in 1990-2000. Consumer prices were set to increase by 5 percent per year in 1985-1990 and 5-6 percent per year in 1990-2000.

Retail prices were projected by the following procedure. Estimates were made of feed conversion for each class of livestock from 1985 through the year 2000. Prices on corn and soybean meal were projected by the MSU Agriculture Model (Department of Agricultural Economics, Michigan State University). These prices were converted to feed costs per unit of output for the major livestock enterprises by multiplying by the feed conversion rate. Nonfeed costs were projected primarily from the forecast of the Consumer Price Index. This provided a basis for projecting total costs of production. Farm prices, in turn, were projected by ordinary least squares equations with farm prices as a function of total production costs.

The spread between the farm price and the retail price was projected from equations which regressed the marketing spread on the Consumer Price Index. By adding the marketing spread to farm prices, projections of retail prices were generated (Table 4). Note that the real price spread between red meat and poultry meat is expected to continue to widen. This is likely to encourage further substitution of poultry meat for red meat.

Which demand equation is incorporated in the projection process does make a considerable difference as indicated in Table 5. With no time variables, the equation based on 1960-84 data (Demand Equation Set #1) would generate a strong growth in beef demand with per capita consumption reaching 93 pounds in the year 2000, near the peak level of 1976. Pork consumption would also push back up to near peak levels. Poultry meat consumption would continue to expand, egg consumption would stabilize and milk consumption would revert to the long term down-trend. This scenario would be considered optimistic for red meat and highly unlikely.

Applying equations based on 1970-84 data and again without trend variables would generate a more reasonable set of projections. Both beef and pork consumption would stabilize and poultry meat consumption would be enhanced. Egg consumption would be somewhat lower and milk consumption higher than with Demand Equation Set #1.

The demand equation set preferred for projecting the next 5 years would be Set #3 which includes the time variables. The application of TIME77ON in the projection period is, of course, positive for poultry meat and milk but negative for red meat and eggs. However, if this equation is applied to the year 2000, beef consumption would be only two-thirds of recent levels, poultry meat consumption would increase 75 percent and milk consumption would increase over 10 percent from recent levels. These changes would appear somewhat extreme.

Assuming that the events of the next 5 years, partly due to the red meat industry's response to heightened awareness of the demand problem, bring the recent trends to an end, an alternative assumption was made in the application of Equation Set #3. That assumption was that the trend factor, TIME77ON would become a constant in 1990. The projections with this assumption are presented under Demand Equation Set #4.

Demand Equation Set #4 indicates some growth in the red meat sector after 1990 but this will be moderate. Broilers will continue to capture an increasing share of the market.

The final equation set (#5) represents the application of the aggregate meat demand and component share equations, again with time trends ending in 1990. This set would favor beef over pork and would attenuate the growth in demand for poultry meat.

Conclusion

Which demand equation over what time period does make a difference in generating projections of annual product consumption. For the next few years,

equations employing trend variables and/or based on a recent period would appear to be the most realistic.

Most of the demand equations estimated point to no or slow growth in red meat consumption with strong expansion in poultry meat. In total, meat consumption is expected to increase in the projection period but at a slower rate than in the past two decades.

Table 1. Demand Elasticities on Major Animal Products Derived From a Time Series Analysis Without Trend Variables, 1960-84 and 1970-84

Dependent Variable: Log of Per Capita Consumption	Period	Independent Variables[a]: LDICD	LRPBFD	LRP NBFD	LRPPKD	LRP NPKD	LRPBPD	LCPI RMD	LRPTKD	LRPEGD	LCPI MTD	LRVMB DPID	DV700N	$\bar{R}^2$	D.W.
Beef (LDCBFRC)	1960-84	.604	-.578	.534									.0530	.82	1.45
		(5.06)	(-3.98)	(6.08)									(1.47)		
	1970-84	.046	-.559	.496										.72	1.92
		(.22)	(-4.25)	(5.91)											
Pork (LDCPKRC)	1960-84	.287			-.813	.620							-.0018	.85	1.81
		(3.06)			(-11.24)	(6.55)							(-.08)		
	1970-84	-.119			-.838	.596								.92	2.88
		(-.78)			(-12.02)	(6.69)									
Broilers (LDCBRC)	1960-84	.907					-.742	.384					-.0329	.99	1.98
		(8.87)					(-8.58)	(2.53)					(-1.36)		
	1970-84	1.26					-.699	.332						.96	2.01
		(7.58)					(8.15)	(2.19)							
Turkeys (LDCTKC)	1960-84	.342						.314	-.694				.0033	.92	1.64
		(1.60)						(1.14)	(-4.12)				(.09)		
	1970-84	.591						.185	-.609					.84	1.21
		(1,35)						(.55)	(-2.78)						
Eggs (LDCEGC)	1960-84 AR1 Rho=.95	-.292								-.074	.112		-.0073	.996	1.27
		(-2.22)								(-1.60)	(1.17)		(-.35)		
	1970-84 AR1 Rho=.92	-.367								-.046	.122			.998	.85
		(-1.59)								(-.73)	(1.00)				
Milk (LDCMKC)	1960-84 AR1 Rho=.73	-.318										-.295	-.0239	.999	1.46
		(-4.00)										(-2.65)	(-1.42)		
	1970-84 AR1 Rho=.71	.023										-.254		.9997	1.55
		(.21)										(-2.76)			

[a] "t" values are in parentheses. All equations are estimated by OLSQ except on eggs and milk which are estimated by AR1.

Table 2. Demand Elasticities on Major Animal Products Derived From a Time Series Analysis Using Trend Variables, 1960-84 and 1970-84

Dependent Variable Log of Per Capita Consumption		Independent Variables[a]														
		LDICD	LRPBFD	LRP NBFD	LRPPKD	LRP NPKD	LRPBRD	LCPI RMD	LRPTKD	LRPEGD	LCPI MTD	LRVMB DPID	TIME 6076	TIME 77ON	$\bar{R}^2$	D.W.
Beef (LDCBFRC)	1960-84	.435	-.514	+.023									.0116	-.0340	.98	2.35
		(4.33)	(-11.58)	(.49)									(4.40)	(-13.26)		
	1970-84	.438	-.549	.075									.0092	-.0314	.95	3.01
		(2.11)	(-9.38)	(1.01)									(2.38)	(-6.46)		
Pork (LDCPKRC)	1960-84	.388			-.869	.510							-.0013	-.0092	.87	2.04
		(2.02)			(-11.97)	(5.10)							(-.26)	(-1.95)		
	1970-84	-.184			-.831	.614							.0008	.0015	.90	2.92
		(-.52)			(-8.40)	(4.81)							(.11)	(.19)		
Broilers (LDCBRC)	1960-84	.933					-.520	.403					-.0022	.01704	.99	1.78
		(6.30)					(-6.69)	(3.76)					(-.51)	(4.89)		
	1970-84	.903					-.503	.357					-.0006	.0170	.98	1.41
		(2.75)					(-4.29)	(2.81)					(-.09)	(2.47)		
Turkeys (LDCTKC)	1960-84	.442						.280	-.369					.0207	.94	2.17
		(2.87)						(1.20)	(-2.02)					(2.83)		
	1970-84	.208						.245	-.265					.0283	.92	2.04
		(.62)						(1.00)	(-1.41)					(3.36)		
Eggs (LDCEGC)	1960-84 AR1 Rho=.58	.392								-.127	.036		-.0241	-.0152	.999	1.73
		(2.92)								(-3.64)	(.53)		(-6.55)	(-5.02)		
	1970-84 AR1 Rho=-.17	.240								-.154	.124		-.0293	-.0119	.999	2.08
		(1.84)								(-4.79)	(2.39)		(-12.07)	(-4.30)		
Milk (LDCMKC)	1960-84 AR1 Rho=.68	.041										-.150	-.014	.00728	.9996	1.49
		(.34)										(-1.42)	(-4.35)	(2.17)		
	1970-84 AR1 Rho=.22	.209										-.225	-.010	.0027	.999	1.80
		(1.67)										(-1.82)	(-3.29)	(.83)		

[a] "t" values are in parentheses. All equations are estimated by OLSQ except on eggs and milk which are estimated by AR1.

Code for Variables in Demand Equations in Table

LDCBFRC	Domestic consumption of beef, retail weight, per capita (lbs.).
LDCPKRC	Domestic consumption of pork, retail weight, per capita (lbs.).
LDCBRC	Domestic consumption of broilers, ready-to-cook weight, per capita (lbs.).
LDCTKC	Domestic consumption of turkeys, ready-to-cook weight, per capita (lbs.).
LDCEGC	Domestic consumption of eggs, per capita (number).
LDCMKC	Domestic consumption of milk, milk equivalent on fat content basis (lbs.).
LDICD	Disposable income per capita ($).
LRPBFD	Retail price of beef (¢/lb.).
LRPPKD	Retail price of pork (¢/lb.).
LCPIPMD	Consumer price index on poultry meat (1967=1.000).
LRPBRD	Retail price of broilers (¢/lb.).
LCPIRMD	Consumer price index of red meat (1967=1.000).
LRPTKD	Retail price of turkeys (¢/lb.).
LCPIMTD	Consumer price index on meat, poultry and fish (1967=1.000).
LRPEGD	Retail price of eggs (¢/doz.).
LRVMBDPID	Retail value of the market basket on dairy products, index (1967=1.000).
LRPNBFD	Weighted average retail price of pork, broilers and turkeys.
LRPNPKD	Weighted average retail price of beef, broilers and turkeys.
TIME6076	Serial time, with 1960= -16, 1961 = -15 etc. to 1975 = -1. The variable is 0 from 1976 on.
TIME77ON	Serial time, with values at 0 before 1977 and at 1 in 1977, 2 in 1978, etc.

Table 3 . Demand Equations on Meat With Total Meat Consumption and Share of Total Meat Consumption as Dependent Variables

Dependent Variable	Period	Constant	Independent Variables[a] LDICDNF	DICD	LCPI MTDNF	RRP BFPK	RRP BFPM	RRP PKBF	RRP PKPM	RRP BRRM	RRP TKRM	TIME 6076	TIME 770N	$\bar{R}^2$	D.W.
All Meat (LDCMTC)	1960-84	2.834	.318 (2.33)		-.360 (-5.31)							-.00633 (1.73)	-.00772 (-3.15)	.94	1.59
	1970-84	3.721	.207 (.85)		-.284 (-2.69)							-.00224 (.44)	-.00355 (-.87)	.56	2.18
Beef (RDCBFMTC)	1960-84	.424		.372E-4 (5.27)		-.0881 (-6.53)	-.000197 (-.86)						-.00666 (-8.31)	.94	1.77
	1970-84	.500		.175E-4 (1.05)		-.1021 (-6.42)	-.000151 (-.54)						-.00581 (-5.06)	.95	2.10
Pork (RDCPKMTC)	1960-84	.556		-.289E-4 (-5.95)				-.187 (-11.19)	-.000558 (-2.57)				-.000715 (-1.29)	.97	2.03
	1970-84	.599		-.423E-4 (-3.79)				-.191 (-8.66)	-.000529 (-1.99)				-.000287 (-.36)	.96	2.69
Broilers (RDCBRMTC)	1960-84	.146		.274E-4 (5.52)						-.00154 (-3.87)			.00544 (11.42)	.98	2.12
	1970-84	.123		.402E-4 (4.15)						-.00204 (-3.49)			.00459 (5.74)	.97	2.73
Turkeys (RDCTKMTC)	1960-84	.0591		-.126E-5 (-.58)							-.000335 (-2.22)		.00110 (5.90)	.89	1.62
	1970-84	.0471		.141E-5 (.40)							-.000256 (-1.55)		.00112 (5.34)	.92	.91

[a] "t" values are in parentheses. All equations are estimated by OLSQ.

Code for Variables in Demand Equations in Table

LDCMTC	Log of domestic consumption of all meat including red meat, poultry meat and fish, retail weight, per capita (lbs.).
RDCBFMTC	Ratio of beef consumption to all meat consumption.
RDCPKMTC	Ratio of pork consumption to all meat consumption.
RDCBRMTC	Ratio of broiler consumption to all meat consumption.
RDCTKMTC	Ratio of turkey consumption to all meat consumption.
LDICDNF	Log of disposable income per capita deflated by CPI on non-food, ($).
DICD	Disposable income per capita deflated by CPI ($).
CPIMTDNF	CPI on meat deflated by CPI on non-food (1967=1.000)
RRPBFPK	Ratio of the retail price of beef to the retail price of pork.
RRPBFPM	Ratio of the retail price of beef to the CPI of poultry meat.
RRPPKBF	Ratio of the retail price of pork to the retail price of beef.
RRPBRRM	Ratio of the retail price of broilers to the CPI of red meat.
RRPTKRM	Ratio of the retail price of turkeys to the CPI of red meat.
TIME6076, TIME770N	See footnote to Table 2.

Table 4. Trends and Projections of Real Retail Prices (1984 $) on Major Animal Products

Commodity	Unit	Year				Projections	
		1960	1970	1980	1984	1990	2000
Beef	¢/lb.	288	272	300	240	228	226
Pork	¢/lb.	192	207	176	162	152	149
Broilers	¢/lb.	146	109	91	82	72	65
Turkeys	¢/lb.	180	150	121	103	94	86
Eggs	¢/doz.	200	164	106	103	87	78
Milk[a]	Index (1984=100)	116	109	105	100	94	92

[a]Based on the retail value of the market basket on dairy products as published by the USDA in Agricultural Outlook.

Table 5. Trends and Projections on Per Capita Consumption of Major Animal Products

Commodity	Unit	Year 1960	1970	1980	1984	Demand Equation[a]	Projections 1990	2000
Beef (retail weight)	lbs.	64.3	84.0	76.5	78.6	1	88.6	93.3
						2	79.8	78.7
						3	68.6	51.6
						4	68.6	72.5
						5	74.5	81.7
Pork (retail weight)	lbs.	60.3	62.3	68.3	61.7	1	68.4	70.6
						2	63.8	62.8
						3	65.7	62.9
						4	65.7	68.9
						5	60.8	59.4
Broilers (r-t-c)	lbs.	23.4	36.8	47.0	53.0	1	60.1	72.5
						2	64.3	80.7
						3	68.1	95.4
						4	68.1	80.5
						5	66.5	74.0
Turkeys (r-t-c)	lbs.	6.2	7.8	10.5	11.4	1	11.7	13.0
						2	12.3	14.0
						3	13.9	18.6
						4	13.9	15.1
						5	11.3	11.9
Eggs	no.	335	309	272	261	1	270	262
						2	260	249
						3	254	232
						4	254	270
						5	254	270
Milk (milk equivalent, fat content basis)	lbs.	653	561	544	582	1	541	525
						2	574	579
						3	605	656
						4	605	610
						5	605	610

[a]Code for demand equations:
1. 1960-84 period, no trend variables.
2. 1970-84 period, no trend variables.
3. 1960-84 period, trend variables.
4. 1960-84 period, trend effect ends in 1990.
5. 1960-84 period, trend effect ends in 1990, aggregate meat equation used.

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