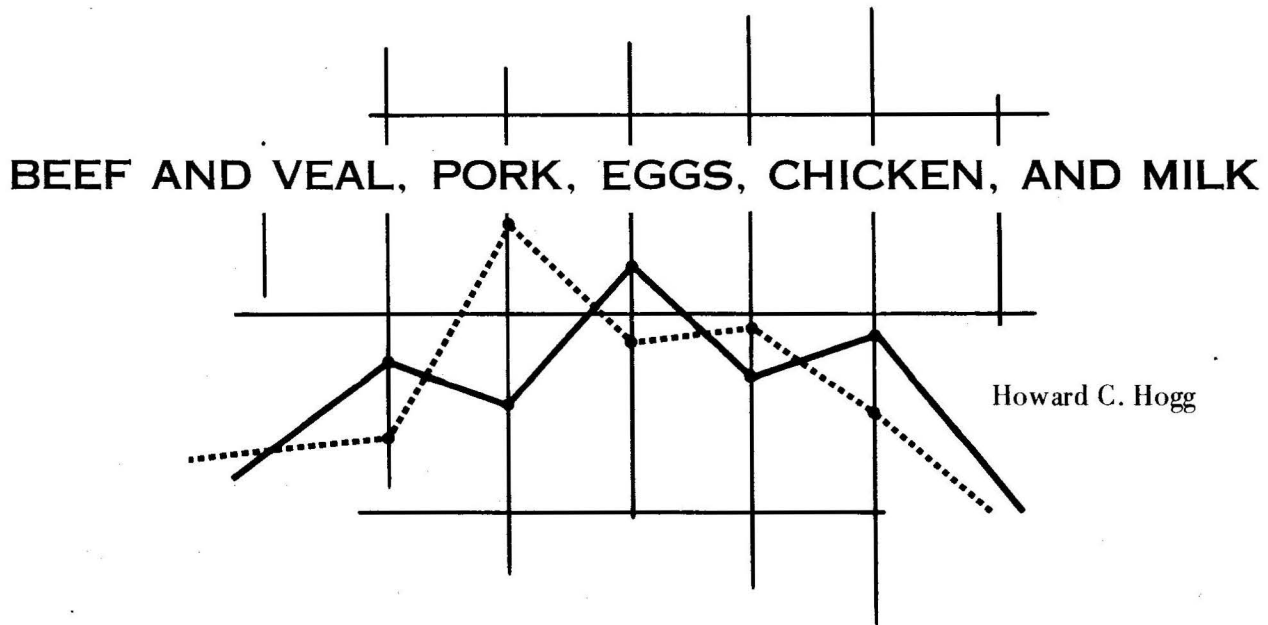


### HONOLULU MARKET PROJECTIONS FOR SELECTED LIVESTOCK PRODUCTS:



College of Tropical Agriculture  
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Patterns of consumption for livestock products sold in the Honolulu market are currently undergoing some significant shifts. This paper reports the results of a statistical demand analysis for beef and veal, pork, eggs, chicken, and milk. A subjective evaluation of supply, by source, is also included. The material presented here represents an evaluation of historical market data for the 20-year period ending in 1972 for beef and veal and in 1971 for the other commodities, and it reflects consumption patterns that evolved during this period. Projections through 1980 are also presented. The estimated demand functions and related tests of significance are given in the statistical summary.

In 1968 Renaud (1) estimated a series of Statewide demand functions for the commodities considered in this paper. Revision of the population series upon which the Renaud study was based and an apparent shift in consumption trends for several products indicated that an updating would be desirable. There are two basic differences between the projections presented in the present paper and those prepared by Renaud. First, de facto population estimates are used, which include visitors present but exclude

residents temporarily absent, rather than the resident population estimates used by Renaud. Second, the present projections are for the Honolulu market rather than for the State of Hawaii as a whole.

#### *Beef and Veal*

Hawaii per capita consumption of fresh and frozen beef and veal was 79.0 pounds in 1972. This compares to a U.S. Mainland level of 115.7 pounds in 1971 and an estimated 1972 level of 118 pounds. Honolulu estimates were made by multiplying Statewide per capita consumption figures by de facto Honolulu population projections. The estimated function predicts a rapidly declining consumption of beef if the real price rises above the 1972 level, even if per capita real income continues to climb. The effects of recent dramatic price increases cannot yet be measured. For the purposes of this paper, a liveweight average price of \$28 per cwt is assumed to 1975. The 1972 price on this basis was \$27.70. Allowing for continuing increases in real income results in a predicted consumption of from 76 to 80 pounds for the next 8 years. One reason for this conservative view of price is that the recent increases may not be permanent. Also, there is some evidence that reductions in consumption below 80 pounds per capita would meet strong consumer resistance. The estimated demand equation is based on quantity sold, consumer income, and product price. Table 1 contains estimates of per capita consumption and total demand levels to 1980.

### Pork

The simple trend equation fitted by Renaud (1) was used to estimate aggregate quantities of fresh and frozen pork sold. State per capita consumption levels were then calculated and multiplied by Honolulu population estimates to derive the projected demand levels. The function predicts a very slight increase in consumption over the projection period. Efforts to develop a demand relationship containing product price and consumer income were unsuccessful. The projected values are given in Table 2.

### Eggs

Shell egg consumption estimates are made from a demand function which includes trend and income variables. Again, the function was fitted to Statewide data to estimate State per capita consumption. This value was subsequently multiplied by Honolulu de facto population estimates to calculate aggregate Honolulu consumption. The function predicted a State per capita consumption of 22.4 dozen eggs for 1972 as compared to the United States' average of 26.4 dozen. United States' consumption levels have been relatively stable for the past 19 years, but in Hawaii consumption is expected to rise by about .3 dozen per year to 1980. The projected values are given in Table 3.

### Chicken

Hawaii consumption of all types of chicken in 1971 was 29.9 pounds per capita compared to 41.4 pounds for the United States as a whole. The estimated demand function predicts a rising per capita demand, reaching 42.8 pounds in 1980. This function, which is based on trend and consumer income, is highly significant. Honolulu aggregate demand levels were estimated from State per capita consumption levels by multiplying by the Honolulu de facto population estimates. Table 4 contains the projected market quantities.

### Milk

Consumption of fluid milk in Hawaii was about 160 pounds per capita in 1971 compared to a U.S. Mainland level of 271 pounds during the same year. The estimated demand function, which contains trend and consumer income as explanatory variables, predicts a decline from about 150 pounds to 115 pounds per capita by 1975. This result is probably overly pessimistic, so for the purposes of this study no decline beyond this point is assumed. Scott (2) estimated, from a consumer survey, that the 1962 consumption of fresh fluid milk products was 173 pounds per capita in Honolulu and 254 pounds in Kailua. This compares to observed values used in the present study and by Renaud (1) of 184 pounds for the City and County of Honolulu, including the entire island of Oahu. The decline in consumption over this period then was about 24 pounds per capita. Table 5 contains the applicable projected market components, with aggregate Honolulu demand estimated from State per capita estimates.

### Statistical Summary

The demand functions used in making the projections and related tests of significance are summarized in Table 6.

### References

- (1) Renaud, Bertrand M. *The Impact of Economic Growth on the Agricultural Trade Structure of an Island Economy*. Hawaii Agr. Exp. Sta. Research Bulletin 150. August 1971.
- (2) Scott, Frank S., Jr. *Transition in Consumer Demand for Milk in Kailua and Honolulu*. Hawaii Agr. Exp. Sta. Bulletin 25. January 1967.

Table 1. Beef and veal: Supply-demand projections, Honolulu, 1972-80

Projection	Year				
	1972	1973	1974	1975	1980
Hawaii per capita demand (pounds) <sup>1</sup>	78.0	76.6	76.4	77.2	80.0
Honolulu total demand (1000 pounds) <sup>2</sup>	47970	48410	49580	51420	60640
Honolulu supply originating on Oahu (1000 pounds) <sup>3</sup>	2600	2550	2500	2450	2200
Honolulu supply originating on outer islands (1000 pounds) <sup>3</sup>	21380	21660	22300	23260	28120
Imports to Honolulu market (1000 pounds) <sup>4</sup>	23980	24210	24800	25710	30320
Estimated population (1000) <sup>2</sup>	615	632	649	666	758

<sup>1</sup>Assumes a liveweight of \$28.00 per cwt to 1975. The 1972 price on this basis was \$27.70. An alternative function form as fitted by Renaud but incorporating the more recent data predicts a declining demand to 1980. This function is given in Table 6.

<sup>2</sup>Based on Honolulu de facto population estimates which include visitors present and exclude residents temporarily absent.

<sup>3</sup>Supply estimates are based on the assumptions that (a) The State of Hawaii will continue to produce 50 percent of the Honolulu market supply of beef, and (b) Oahu will produce a gradually declining share of the State total.

<sup>4</sup>Based on the difference between Honolulu demand and the sum of Oahu and outer island supply.

Table 2. Pork: Supply-demand projections, Honolulu, 1972-80

Projection	Year				
	1972	1973	1974	1975	1980
Hawaii per capita demand (pounds) <sup>1</sup>	29.5	29.5	29.5	29.6	30.0
Honolulu total demand (1000 pounds) <sup>2</sup>	13130	18620	19150	19680	22680
Honolulu supply originating on Oahu (1000 pounds) <sup>3</sup>	5760	5580	5400	5400	5400
Honolulu supply originating on outer islands (1000 pounds) <sup>4</sup>	500	500	500	500	500
Imports to Honolulu market (1000 pounds) <sup>5</sup>	11870	12540	13250	13780	16780
Estimated population (1000) <sup>2</sup>	615	632	649	666	758

<sup>1</sup>Dressed weight. U.S. per capita consumption in 1971 was 73 pounds.

<sup>2</sup>Based on Honolulu de facto population estimates which include visitors present and exclude residents temporarily absent.

<sup>3</sup>It is assumed that State production will remain relatively constant at 9 million pounds. Oahu's share is assumed to be 64, 62, and 60 percent of this total for the years 1972-74, stabilizing thereafter.

<sup>4</sup>Stable annual imports from the outer islands of 500,000 pounds assumed.

<sup>5</sup>Based on the difference between Honolulu demand and the sum of Oahu and outer island supply.

Table 3. Eggs: Supply-demand projections, Honolulu, 1972-80

Projection	Year				
	1972	1973	1974	1975	1980
Hawaii per capita demand (dozen)	22.4	22.8	23.1	23.4	24.5
Honolulu total demand (1000 dozen) <sup>1</sup>	13780	14410	15010	15600	18580
Estimated population (1000) <sup>2</sup>	615	632	649	666	758

<sup>1</sup>No basis exists for making market share projections. Oahu is assumed to be self-sufficient in egg production, although 1 to 2 million dozen eggs are marketed each year from other sources.

<sup>2</sup>Based on Honolulu de facto population estimates which include visitors present and exclude residents temporarily absent.

Table 4. Chicken: Supply-demand projections, Honolulu, 1972-80

Projection	Year				
	1972	1973	1974	1975	1980
Hawaii per capita demand (pounds)	31.4	32.8	34.3	35.7	42.8
Honolulu total demand (1000 pounds) <sup>1</sup>	19290	20760	22240	23760	32410
Honolulu supply originating on Oahu (1000 pounds) <sup>2</sup>	5260	5360	5420	5540	5540
Imports to Honolulu market (1000 pounds) <sup>3</sup>	14030	15400	16820	18220	26870
Estimated population (1000) <sup>1</sup>	615	532	649	666	758

<sup>1</sup>Based on Honolulu de facto population estimates which include visitors present and exclude residents temporarily absent.

<sup>2</sup>State production is assumed to rise from current levels to 6150 (1000 pounds) in 1975. Beyond 1975 constant production is assumed with Oahu accounting for 90 percent of the State total.

<sup>3</sup>Based on the difference between Honolulu demand and the sum of Oahu and outer island supply.

Table 5. Milk: Supply-demand projections, Honolulu, 1972-80

Projection	Year				
	1972	1973	1974	1975	1980
Hawaii per capita demand (pounds) <sup>1</sup>	149	135	124	115	115
Honolulu total demand (1000 pounds) <sup>2</sup>	91635	85320	80476	76590	87170
Estimated population (1000) <sup>2</sup>	615	632	649	666	758

<sup>1</sup>The estimated demand function predicts a demand level of 80 pounds per capita in 1983. The per capita demand level reported assumes a leveling of demand in the late 1970s.

<sup>2</sup>Based on Honolulu de facto population estimates which include visitors present and exclude residents temporarily absent. Oahu is assumed to be self-sufficient in fresh milk production.

Table 6. Estimated demand functions, State of Hawaii<sup>1</sup>

Commodity	R <sup>2</sup>	F	Regression coefficients <sup>2</sup>				
			a	Q <sub>t-1</sub>	Y <sub>t</sub>	P <sub>t</sub>	T
Beef and veal	.92	76.7	38.04	.76 (.14)	.0025 (.0022)	-1.23 (.73)	
Pork	.92	174.40	-17097.52				581.41 (44.03)
Eggs	.95	149.30	4.70	.75 (.07)	.0003 (.0004)		
Chicken	.98	426.24	-2.60	.73 (.09)	.0029 (.001)		
Milk	.65	16.05	.075	.690 (.12)	-.00001 (t = 1.81)		

<sup>1</sup>With the exception of milk the functions estimate current per capita consumption which is then multiplied by the Honolulu de facto population estimates. Milk consumption is coded and must be stated in units of 1000 pounds per capita. The pork equation is a simple trend and estimates total quantity. The price and income variables for the beef and veal function are stated in terms of current dollars. The alternative Renaud formulation is:

$$Q_t = 11.08 + .89 Q_{t-1} - .0005 Y_t \quad R^2 = .91$$

(.12)                      (.0022)      F = 100.9

<sup>2</sup>a = intercept; Q<sub>t-1</sub> = lagged quantity per capita; Y<sub>t</sub> = real per capita income; P<sub>t</sub> = Honolulu wholesale price (cents/pound); T = time. Values in parentheses are standard errors unless otherwise specified.

Readers interested in demand evaluations for other agricultural commodities sold on the Honolulu market may be interested in HAES Dep. Paper 9, *Honolulu market projections for selected diversified crops: mustard cabbage, lettuce, and watermelon* or HAES Dep. Paper 15, *Honolulu market projections for selected diversified crops: snap beans, cucumber, green onions, green peppers, and tomatoes*.

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