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RESEARCH NOTE: DECOMPOSIT

WF Lubbe
Department of Agricultural Economics, University of Pretoria, Pret

1. Introduction

The beef price time series components has been decomposed into trend, cyclical and seasonal components (Lubbe, 1990). Corresponding decomposition of the sheep producer price time series was done using the same techniques and methods. Deterministic price cycles and seasonality in prices of sheep have been reported on in South Africa (Adendorf, 1958; Lubbe, 1983; Lubbe 1989). This research is aimed at identifying, isolating and estimating seasonal, cyclic and trend components of sheep producer prices for the Witwatersrand controlled market. The purpose is to develop a suitable basis for predicting cyclical price movements by isolating the components in the time domain, and also relating cycles in other variables, such as the rainfall and wool prices, to the predictive base.

2. Data, Techniques and methods

The trends and cyclic components of sheep prices (1970 - 1989) were isolated from yearly data, while monthly data (1970 - 1989) were used for the seasonal components. The price data are for the Witwatersrand controlled market and were supplied by the Meat Board. Average annual wool auction prices (1961 - 1989) were obtained from the Abstract of Agricultural Statistics (Directorate of Agricultural Trends, 1990). The model specifications, techniques and methods of Lubbe (1990) were used.

3. Results

Significant trends were isolated for sheep (all grades and super lamb) as well as for the national averaged wool auction prices. In all these cases, the exponential functional form gave the best estimates. Coefficients of the derived functions are summarised in Table 1. The original price time series data of all grades, sheep prices, predicted prices (1990 to 1996) and the estimated trend (extrapolated to 1996), are illustrated in Figure 3. A larger price difference exists between the all grades and super prices for sheep than for beef (Lubbe 1990), but does not show a fixed pattern.

Table 1: Trend functions for sheep prices (all grades and supers) at the Witwatersrand market and the average wool price, with year as the predictor variable.

Series	Coefficients and statistics			
	B_0	B_1	R^2_{adj}	Time Period
Sheep all grades	0.0069298*** (12.66)	0.1275787*** (25.90)	0.9739	70 - 89
Super Lamb	0.0137683*** (13.34)	0.1212803*** (32.59)	0.9805	70 - 89
Wool price	0.0049953*** (7.71)	0.1346276*** (15.61)	0.9312	61 - 89

Note: Exponential function fitted $Y_t = B_0.EXP(B_1.T_t) + E_t$.
Absolute T-values in brackets.

the 1990 to 1996 illustrations represent static forecasts. From Figure 3 it is evident that the actual price for 1989 was higher than estimated with the model.

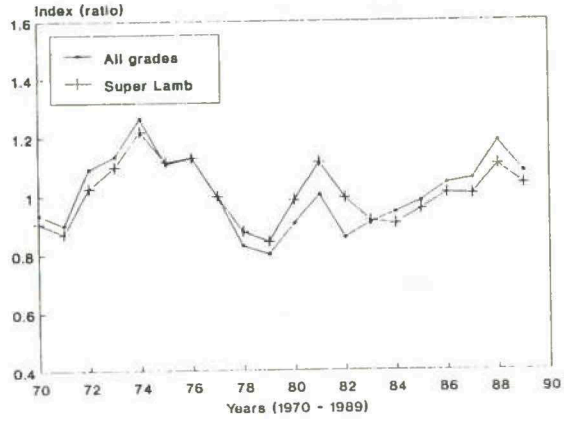

Figure 1: Specific cyclic indices for super and all grades shee prices at the Witwatersrand controlled market.

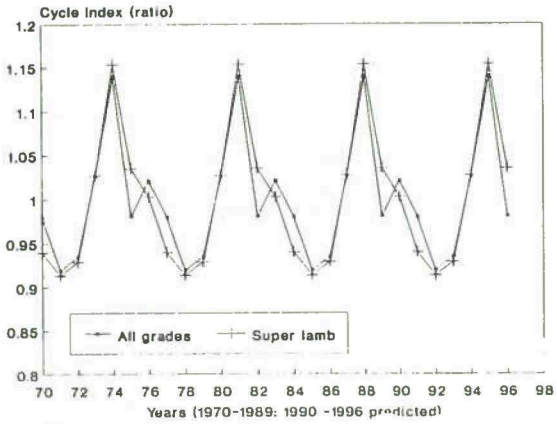

Figure 2: Typical seven year cycles for all grades and sup sheep prices at the Witwatersrand controlled market (predict 1990 - 1996).

Significant seasonal indices were estimated for all grades she and super lamb prices. The indices and coefficients are su marised in Table 3 and graphically illustrated in Figure 4.

From Figure 4 it is evident that quite different seasonal pri cycles exist for super lamb and all grades sheep. The sup lamb cycle is smoother and has a near opposite pattern to t all grades cycle. These seasonal price cycles are results of t combined short term demand and production effects. The s per lamb cycle peaks in December and April to June, while t

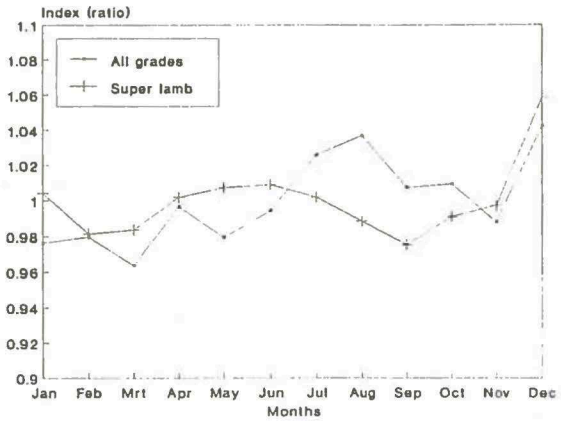

Figure 4: Seasonal indices of sheep prices for the Witwatersrand controlled market (averaged indices for 12 months).

The seven year cycles of beef and sheep prices (all grades for both) and the seven year rainfall cycle are illustrated in Figure 5. From Figure 5 it is evident that the minima of the price cycles coincide with the second highest year of the seven year rainfall cycle, while the two minima of the rainfall cycle coincide with the first and second year after the price cycle minima. The maximum of the rainfall cycle coincides with the maxima of the price cycles. From Figure 5 it is also evident that the decline in sheep prices during the downswing and the increase in sheep prices during the upswing is less than for beef. Mutton is thus relatively more expensive during the low phase of the price cycles and *vice versa*. All grades sheep prices apparently also follow the rainfall closely from the price cycle maxima for two years. This explains the difference between super and all grades sheep price cycles during the downswing (see Figure 2).

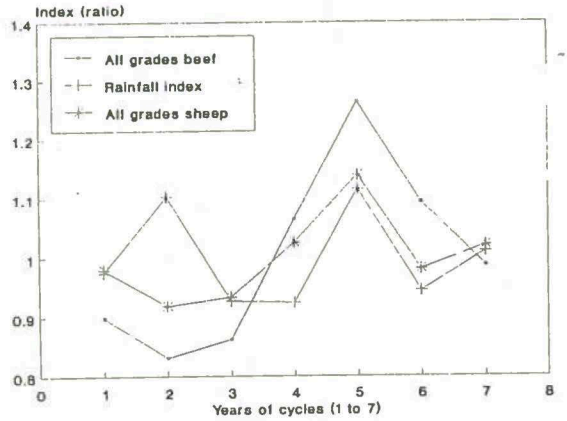

Figure 5: Seven year cycles (typical) for all grades sheep and beef prices and average rainfall.

basically the same cycle generation process that was found for beef (Lubbe, 1990), but it is weakened or strengthened by the W/S ratio of the previous two years.

Consumer demand can also affect the sheep price cycles. The demand for mutton is relative price-elastic and strong substitutes, such as beef, poultry and pork exist (Du Toit, 1982; Hancock *et al*, 1984). During the high price period sheep substitutes beef as a result of sheep price increases being relative lower in comparison with beef price increases (Figure 5) and also the unavailability of beef due to production expansion. The opposite process occurs place during low price periods.

5. Conclusion

Although producer prices of sheep are erratic over the long, medium and short terms, relative stable price patterns exist. These price patterns were successfully isolated as significant trends, seven year cycles and seasonal indices. Sheep prices are influenced by wool and beef prices. The supply of sheep is related to both wool and sheep prices simultaneously, as well as to rainfall, beef price cycles, price expectations, demand effects and marketing policy. This multi-variable influences on sheep prices render substantial variation which influence any obvious identification of cycles without special analysis thereof.

References

ADENDORF, J. (1958). Ekonomiese neigings, die produksie, verbruik en pryse van vleis in die Unie van Suid Afrika. DCom. thesis, University of Pretoria.