THE SUPPLY OF WOOL IN LESOTHO

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Lesotho is a very small producer of wool (1 thousand tonnes per year) and therefore has no influence on world prices and on world wool production. However, the earnings generated from wool exports contribute significantly to the economy, thus making wool an important product. This paper determines the factors that producers consider in their decisions to produce wool. An econometric supply model is developed which hypothesizes the variables that affect wool production. Lagged wool and mohair prices and rainfall are important variables that influence farmers' decisions to produce wool. The previous years' wool production is less important because of the biological lag associated with production. Other variables such as the marketing arrangements of wool and domestic policies might influence farmers' decisions to produce wool but were not considered in detail.

DIE AANBOD VAN WOL IN LESOTHO

Lesotho is 'n baie klein produsent van wol (eenduisend ton per jaar) en het dus geen invloed op wêreldpryse en op wêreld wolproduksie nie. Die verdienste uit woluitvoer dra egter betekenisvol tot die ekonomie by en maak wol dus 'n belangrike produk. Hierdie artikel bepaal die faktore wat produsente in ag neem in hul besluite om wol te produseer. 'n Ekonometriese aanbodmodel word ontwikkel waarin die veranderlikes wat boere se besluite om wol te produseer, gehipotetiseer word. Die vorige jare se wolproduksie is minder belangrik weens die biologiese sloering wat met produksie geassosieer word. Ander veranderlikes soos bemarkingsreëlings vir wol en plaaslike beleide mag boere se besluite om wol te produseer beïnvloed, maar is nie in besonderhede oorweeg nie.

1. INTRODUCTION

The countries of the southern hemisphere have a long history of wool production. Two decades ago, about 60 percent of the world wool production came from Australia, New Zealand, South Africa, Argentina and Uruguay. Australia, the major wool producer produced 29 percent of the world production of greasy wool in 1991/92. World wool production increased by only 4.8 percent from 1970 to 1988. The increase has diminished from 10.6 percent from 1960 to 1970 as a result of increasing competition from artificial textiles. Wool consumption also decreased, in the 1970s, 80 percent was consumed by eight countries, mainly in the European Community.

Although, the production and consumption of world wool increased slowly, wool continues to play an important role. Wool is also an important product for Lesotho, even though the country produces only 0.1 percent of world wool. Lesotho has no influence on the price of wool and is a price taker. The average prices for greasy wool followed a pattern similar to that of South Africa but always at a lower level. This is because Lesotho's wools are susceptible to breakage and tend to command low prices at South African auctions. However, the wool earnings averaged M12,305,799 for the period 1985 to 1991 and accounted for an average of 12 percent of the total value of exported goods, generating much of the economy's income. Lesotho's wool exports are destined for markets in the European Community but are marketed through South African wool auctions.

Wool production is a source of income to households in Lesotho and provides employment, particularly to herdboys. Sheep are basically reared for wool with the occasional one slaughtered for meat during feasts. The farmers perceive livestock as a form of investment and will not slaughter on a regular basis. Wool sales and the accumulation of sheep are a key component in a migrant labourer's strategy to supplement his mine wage to provide for his family and later for retirement.

The wool production sector in Lesotho is assessed by developing an econometric supply model and hypothesizing the variables that affect wool production.

2. OTHER WORKS SUMMARIZED

Most studies on the wool industry have been concerned primarily with Australia and New Zealand. This article is based on studies that have described production processes and/or estimated supply functions. Five studies were reviewed: from China, New Zealand, Uruguay and two from Australia. The most important study and the one that many researchers appear to draw from is the one by W. H. Witherell (1969).

Witherell compared the determinants of wool production in the six leading wool producing countries for the period 1949-1965. The countries included Australia, New Zealand, South Africa, Argentina, Uruguay and the United States. A theoretical model of the seasonal production of wool was described based on the assumptions of lagged adjustment of actual to desired output and 'naive' price expectations. He discussed various data series used and problems encountered in the research. He also compared the estimation results for the six countries, and in the conclusions provided further explanation of the nature of seasonal wool production. The assumptions specified in this study will be applied to the Lesotho wool equation. Witherell determined that wool production is quite stable in all the countries but varies slightly and after a long lag in response to changing economic conditions.

A.C. Rayner (1968) developed a model of the New Zealand sheep industry to predict the number of animals in various categories based on sex and age splits. The estimated equations showed the influence of price on farmer's decisions and that a lag is involved between price changes and the implementation of the resultant change in stock numbers.

P. Simmons, B. Trendle and K. Brewer (1980) examined the future of Chinese wool production. Wool prices paid by the Chinese government strongly influenced wool output. To increase wool production further, the authors recommended that government can increase wool prices with higher producer payments and incentives for quality.

R.G. Reynolds and B. Gardiner (1980) examined the supply response in the Australian sheep industry. The authors used economic procedures to analyze sheep producers decision-making processes regarding the annual supplies of wool, mutton and lamb. The authors determined that the sheep and beef industries are substitutes and that seasonal conditions play an important role in influencing the size and composition of the flock.

The econometric supply model developed in this paper is based mainly on the study of Witherell. The other studies introduced additional variables that affect the production of wool and were also incorporated into the equations.

3. WOOL PRODUCTION IN LESOTHO

The mountains of Lesotho support the largest percentage of sheep. In 1975/76, the four mountain districts: Mokhotlong, Thaba-Tseka, Qacha's Nek and Quthing supported 42 percent of the total Lesotho sheep flock. In 1985/86, the mountains supported 59 percent of the total flock. Natural grasslands grow on these mountains which are well suited to the sheep industry. In addition, in the 1990/91 wool season, the mountain districts produced 57 percent of the total tonnage of wool produced. The foothills produced 43 percent of the total wool produced with Maseru producing 12 percent.

However, several problems are faced in Lesotho's efforts to increase wool production. Overstocking and range degradation have had a direct impact on the production of wool. Low productivity rates for sheep have been the result and this is reflected in low fleece weights and progeny produced per female. In 1986, the fleece weight per sheep averaged 2.4 kilograms of wool in Lesotho as compared to South Africa where the average was 3.96 kilograms. Lesotho's wool tends to be fine because of the high altitudes, poor nutrition and disease and is used for blending with strong wools in processing woollens.

Lesotho's mountains are suited to wool production as opposed to other forms of agriculture. An abundance of low quality wool is produced as one of the main products for export. Sheep production occurs in a mixed crop or livestock production system. Other problems, Lesotho faces are ineffective marketing outlets, domestic policies and the fact that she is a price taker.

4. CONSTRUCTING A GENERAL LINEAR MODEL

The supply of any livestock product is the quantity that producers are willing to put on the market at various prices during a given time period. Current livestock production will be based on previous years' prices and other factors such as changes in input prices and the development of new technology.

The price elasticity of supply is important since it indicates how sensitive changes in quantities supplied are to changes in price. The coefficient of supply elasticity normally has a positive sign. In the short-run, the supply of most livestock products will be very inelastic because supply cannot be increased. The production process for wool is relatively fixed in the short-run, therefore producers cannot respond quickly to market changes. However, as the time period is lengthened greater flexibility in production exists and supply will become more elastic.

The production of wool in Lesotho has fluctuated from 1973/74 to 1987/88, as indicated in Figure 1. The variables that could affect the production process are the prices that farmers receive, prices of inputs, seasonal conditions and the prices of substitutes. Short-run changes that affect wool production are weather conditions and outbreaks of disease. Excessive rainfall or drought conditions will have a direct impact on wool production.

In the long-run, producers will consider the relative expected returns of alternative agricultural commodities. However, the majority of wool production is concentrated in the mountains, therefore farmers may have no alternative use for the land, therefore will be forced to continue to produce wool.

The supply of any product is generally a function of the prices of inputs and the prices of the output. Expected prices are important in the production of wool, therefore they will be represented by various lags. The general hypothesis used in this model is similar to the one developed by Witherell. In this model, the fact that Lesotho cannot respond quickly to a change in the market is built into the equation. A distributed lag model of partial supply adjustment will be used:

$$W_{Lt} - W_{Lt-1} = D(W_{Lt}^* - W_{Lt-1}) \quad O < D < 1 \qquad (1)$$
$$\text{or} \quad W_{Lt} = (1-D)W_{Lt}-1 + DW_{Lt}^*$$

W_{Lt} and W_{Lt-1} are the actual level of wool produced in Lesotho in year t and year t-1. W_{Lt}^* is the desired or equilibrium level of production in Lesotho for year t. The assumption can be made that the change in actual production in year t over t-1 is a fraction D of the desired or equilibrium level. D measures the speed with which actual production adjusts in response to factors determining desired production. D in Lesotho could be affected by production factors, behavioural factors and economic factors. Equation (1) is a difference equation, and when solving for W_{Lt} yields the following equation:

$$W_{Lt} = D(1-D)^i W^*_{Lt-i} \qquad (2)$$

Actual production in year t is a distributed lag function of current and past desired levels of production. Supply theory suggests that the desired level of wool production for year t, W_{Lt}^*, is a linear function of the expected prices for wool in year t, PWLte, and other substitutes such as mohair, PM_{Lt}^e and the stochastic term, V_{Lt}:

$$W_{Lt}^* = a + bP_{WLt}^e + cP_{MLt}^e + V_{Lt} \qquad (3)$$

A one-year lag will exist in the impact of production decisions in actual output since adjustments to market changes are not instantaneous. The one-year lag is selected because it is consistent with the biological lag.

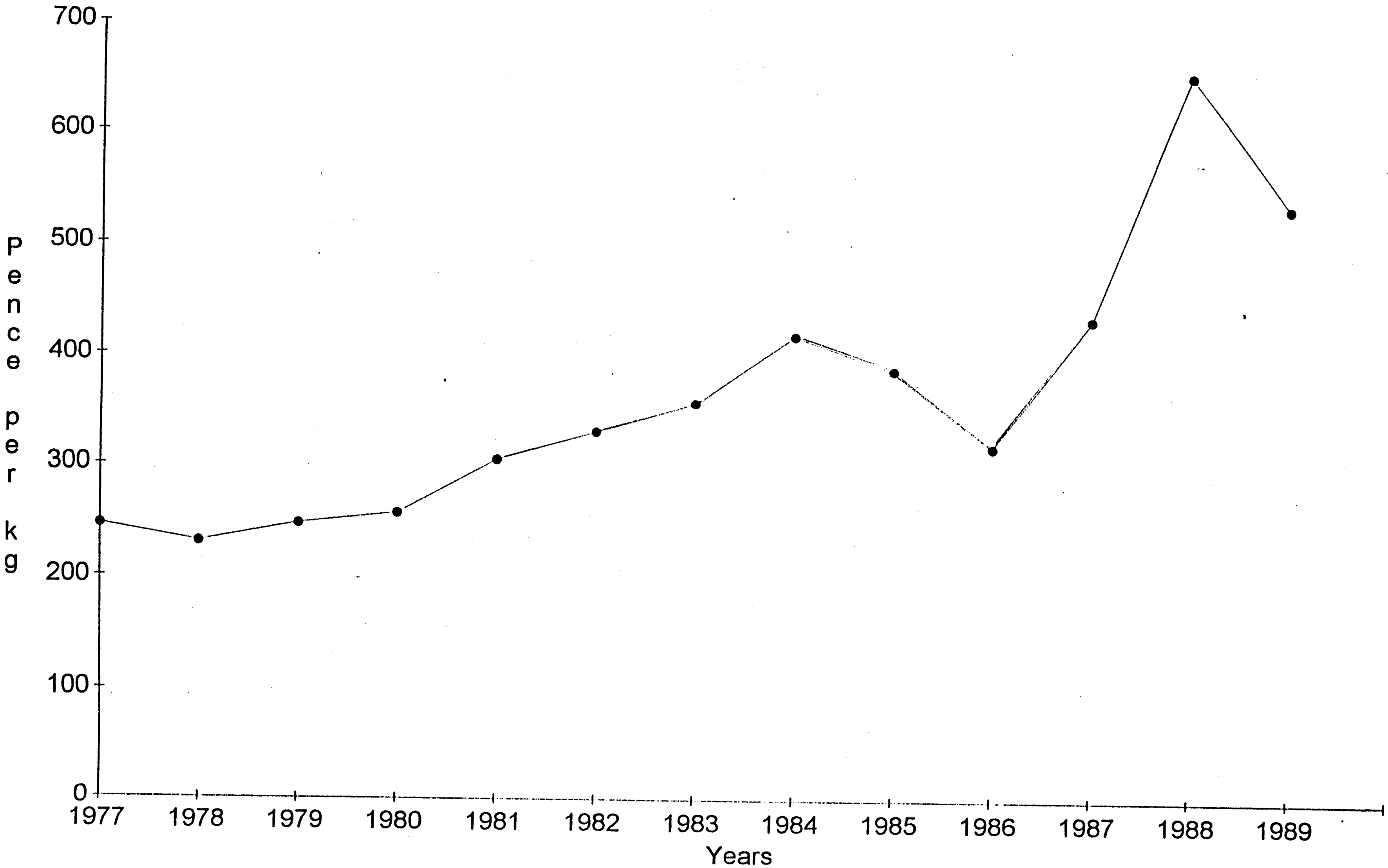

Figure 1: **Seasonal average prices of raw wool**

The simple model of price expectations will be assumed:

$$PW_{Lt}^{e} = PW_{Lt-1} \quad (4)$$

and

$$PM_{Lt}^{e} = PM_{Lt-1} \quad (4a)$$

The price for Lesotho wool expected for year t is the actual price of wool in year t-1. A similar assumption is made for mohair. This simple model is used as opposed to other models such as extrapolative expectations since the set is small. Equation (3) then becomes:

$$W_{Lt}^{*} = a + bP_{WLt-1} + cP_{MLt-1} + V_{Lt} \quad (5)$$

The final equation determining wool production in Lesotho will be obtained by substituting equation (5) into equation (1), thus making it a linear equation:

$$W_{Lt} = Da + (1\text{-}D)W_{Lt-1} + DbPW_{Lt-1} + DcPM_{Lt-1} + DvLt \quad (6)$$

In the short-run, the supply of factors to the farms are fixed. The short-run is taken as a one-year period, therefore the wool price elasticities will be evaluated and compared to those obtained in Witherell's study. In the longer run, alternative actions by producers become more feasible.

4.1 Data (Sources) and Estimation Method Used

The data used in the econometric supply model are from the Ministry of Agriculture and the Bureau of Statistics in Lesotho for the period 1973/74 to 1987/88. Wool production in Lesotho is seasonal (September to May) but, the data are scaled to an annual basis in this paper. Other/suitably scaled variables such as wool prices and mohair prices are also expressed on a yearly basis.

The previous year's wool production is incorporated into the model because of the expectation model. This is expected to have a positive impact on current production. Farmers cannot change their herd size quickly in response to price changes. As a result, the current wool production will be similar to last year's wool production.

The main economic factor that influences wool production is the price that farmers receive for wool. Current production will be based on prices that farmers received in a prior period according to the model. Wool export prices lagged one year will be used in the model. Farmers in Lesotho do not receive this full price since deductions still have to be made for marketing and handling the wool. The more accurate prices to use in the supply model are the producer prices for wool in Lesotho. These prices were not available for the entire period. The export prices of wool are deflated using the agriculture Gross Domestic Product (GDP) and are expressed in South African cents per kilogram. The Lesotho currency is on par with South Africa's currency.

Wool production may be influenced by the prices of mohair if goats are a substitute for sheep. However, farmers tend to own both sheep and goats, therefore wool and mohair are produced side by side. If mohair production is a substitute for wool production, mohair prices are expected to be negatively related with wool production. The mohair prices are deflated by the Lesotho agriculture GDP and are expressed in South African cents per kilogram.

Year to year variations in wool production can be caused by rainfall fluctuations which tend to affect the size of the sheep population and the average fleece weight per sheep. In arid conditions, rainfall is expected to have a positive relationship with the current wool production. This was the case for all the equations that Witherell estimated. For the Lesotho model, rainfall is expected to have a positive impact on wool production. Excessive rainfall will be associated with improved rangelands on which the sheep graze. The quality of the wool will also tend to improve as the sheep get better nutrition unlike during drought conditions. The effect of soil erosion, caused by heavy rainfall, on sheep will be evident after a period of time has elapsed.

The quality of the pasture for sheep was considered as an additional variable for the Lesotho supply model but data were not available. Farmers in Lesotho do not allot a certain area to various livestock animals, they all graze on the same land, therefore it is difficult to determine how much of the land pertains to sheep, goats or to cattle grazing.

The linear equation that was used to determine the variables that affected Lesotho wool production were as follows:

$$W_{Lt} = b_o + b_1W_{Lt-1} + b_2P_{WLt-1} + b_3P_{MLt-1} + b_4R_{Lt} + V_{Lt}$$

The dependent variable is:

W_{Lt} = greasy wool production in time t in millions of kilograms, and the explanatory variables include:

W_{Lt-1} = greasy wool production lagged one year in millions of kilograms.

P_{WLt-1} = deflated wool export prices lagged one year in South African cents per kilogram.

P_{MLt-1} = deflated mohair export prices lagged one year in South African cents per kilogram.

R_{Lt} = rainfall index for Lesotho.

V_{Lt} = error term associated with the supply equation.

In this model, the method of ordinary least squares (OLS) was used to obtain the initial estimates for the equations. The use of time series data often leads to a violation of the nonautocorrelation assumption. The concept of autocorrelation refers to the effects of factors in one period carrying over to the following period, resulting in error terms being related to each other. If autoco:elation occurs, the OLS estimates may be inefficient and the test statistics may not be reliable.

The Durbin-Watson statistic which tests the absence of autocorrelation is not applicable where the lagged dependent variable is an explanatory variable. However, for this model the Durbin-Watson statistic will still be computed since it provides a rough comparison of the degree of autocorrelation present in the residuals of the equation. A more accurate test called the h-test will be used since the Durbin-Watson statistic may not be applicable. The h-statistic will be computed and tested against the null hypothesis of no autocorrelation.

Generalized least squares by the Cochrane-Orcutt procedure will be considered as an alternative to re-estimate the equations where OLS produces unusually high or low Durbin-Watson statistics. However, this procedure does have problems where the explanatory variables follows a trend because of the importance of the first observation in the sample.

5. RESULTS OF THE LESOTHO WOOL SUPPLY MODEL

The initial wool supply model estimated by ordinary least squares provided the following results:

$$
\begin{aligned}
W_{Lt} = \; & .00000037 + .230W_{Lt-1} - 3869.4PW_{Lt-1} \\
& (3.92)^{*} \qquad (1.09) \qquad -1.42)^{**} \\
& + 212.2P_{MLt-1} - .1535.1R_{Lt} \\
& (0.94) \qquad\qquad (-1.95)^{**1} \qquad\qquad (7)
\end{aligned}
$$

$R2 = .797$
Adjusted $R2 = .707$
$D.W. = 2.29$

The previous years' wool production has the expected positive sign, indicating the adjustment process in wool production. The lamb will be sheared a year after birth and yearly thereafter. Increases in the herd size and thus the quantity of wool cannot occur in a period less than a year. This coefficient, however, is not significant in explaining wool production at the 5 or the 10 percent level of significance.

The deflated lagged wool export price does not appear with the expected positive sign. A decrease in wool prices in the previous year results in farmers producing more wool in the current period. The Lesotho wool supply model was estimated using current wool export prices and wool prices lagged two years to determine if the negative sign would change. However, this sign was consistently negative and several factors could be the cause. Sheep are not raised solely for wool production but they impart social status to owners because of their role in social and ceremonial obligations and they are a secure rural investment. The fact that they are perceived as an investment could be one explanation for the backward sloping supply curve. Commercial mutton production in Lesotho is constrained by a premium placed on wool which favours the holding of sheep for as long they can produce saleable fleeces. In addition, the low costs of production associated with free access to communally grazed rangelands means that farmers are even more reluctant to sell their sheep (Food Security Group, 1995). Farmers do not only respond to wool export prices in determining the amount of wool to produce since when prices of wool are low, more wool will be produced in the next season. Thus, even if the price of wool is low, farmers will not sell their sheep. Whatever attempts have been made by government or Livestock Associations to facilitate livestock sales by providing formal and informal markets, where livestock can be sold and to alleviate overstocking, the effects are negligible. Livestock sales are primarily stimulated by the need to meet immediate cash requirements and are not motivated by commercial motives.

The mutton prices generated from the sale of meat to local butcheries, even though might play a minor role, considering farmers reluctance to sell sheep is a variable worth considering in explaining Lesotho's wool supply. Mutton prices could have declined resulting in more sheep retained in the flock. The amount of wool produced would increase, even though wool prices have decreased in the previous year. Sheep farmers could be making production decisions based on the price of mutton or on their perception of sheep as an investment. Thus, wool production is the by-product of several factors in which case specifying a supply function might not be possible.

Ghatak and K. Ingersent (1984) assumed a unitary elasticity of demand for money income to explain a negative sloping supply curve. As prices fall by a certain proportion, farmers will raise the marketed output by the same proportion to maintain the same level of income. The demand for the same level of income could be caused by the farmer's obligations to purchase nonagricultural products. Price expectations play an important role in explaining negative signs on prices. L.H. Myers, J. Havlicek Jr. and P.L. Henderson (1970) determine that price expectations will affect the amount of pork or cattle sold. These authors indicate that when the prices for hogs and cattle increase, producers tend to supply less in the current period. They believe that this trend will continue therefore they will supply more in a later period. This arguments is plausible for Lesotho farmers if they store wool in warehouses. Supply for wool is fixed in the short run. If the prices of wool are expected to decrease further, the wool in the warehouses would be sent to the South African auctions thus increasing the wool supply. Sufficient data do not exist to test among these competing hypothesis.

The deflated lagged mohair export price does not appear with the expected negative sign indicating that mohair production is not a substitute for wool production. Farmers in Lesotho tend to own both sheep and goats and the income generated from one complements the other. The positive relationship between the deflated lagged mohair prices and the current wool production could mean that these products are jointly supplied. From 1977/78 to 1984/85, the wool and mohair production figures increased then in 1985/86, they both decreased. The variable is not significant at the 5 and 10 percent.

The rainfall variable enters the model with an unexpected negative sign indicating that high rainfall is associated with low wool production. This sign could be due to the extremely high rainfall figure in 1976, which is associated with extemely low wool production and in 1985, high wool production is associated with very low rainfall (Figures 1 and 2). However, these extreme data points could be outliers. The rainfall variable should be a positive sign because high rainfall improves the rangelands on which the sheep graze thus improving the quality of wool. The rainfall variable is significant at the 10 percent level.

The coefficient of determination (R^2) indicates that 79.7 percent of the variation in Lesotho wool supply has been explained by the variables on the right hand side of the equation. The adjusted R^2 is included in the results because it adjusts for the number of variables when modifications are made to the equation above.

The Durbin-Watson statistic (D.W.) indicates that no autocorrelation is associated with this equation. The h-

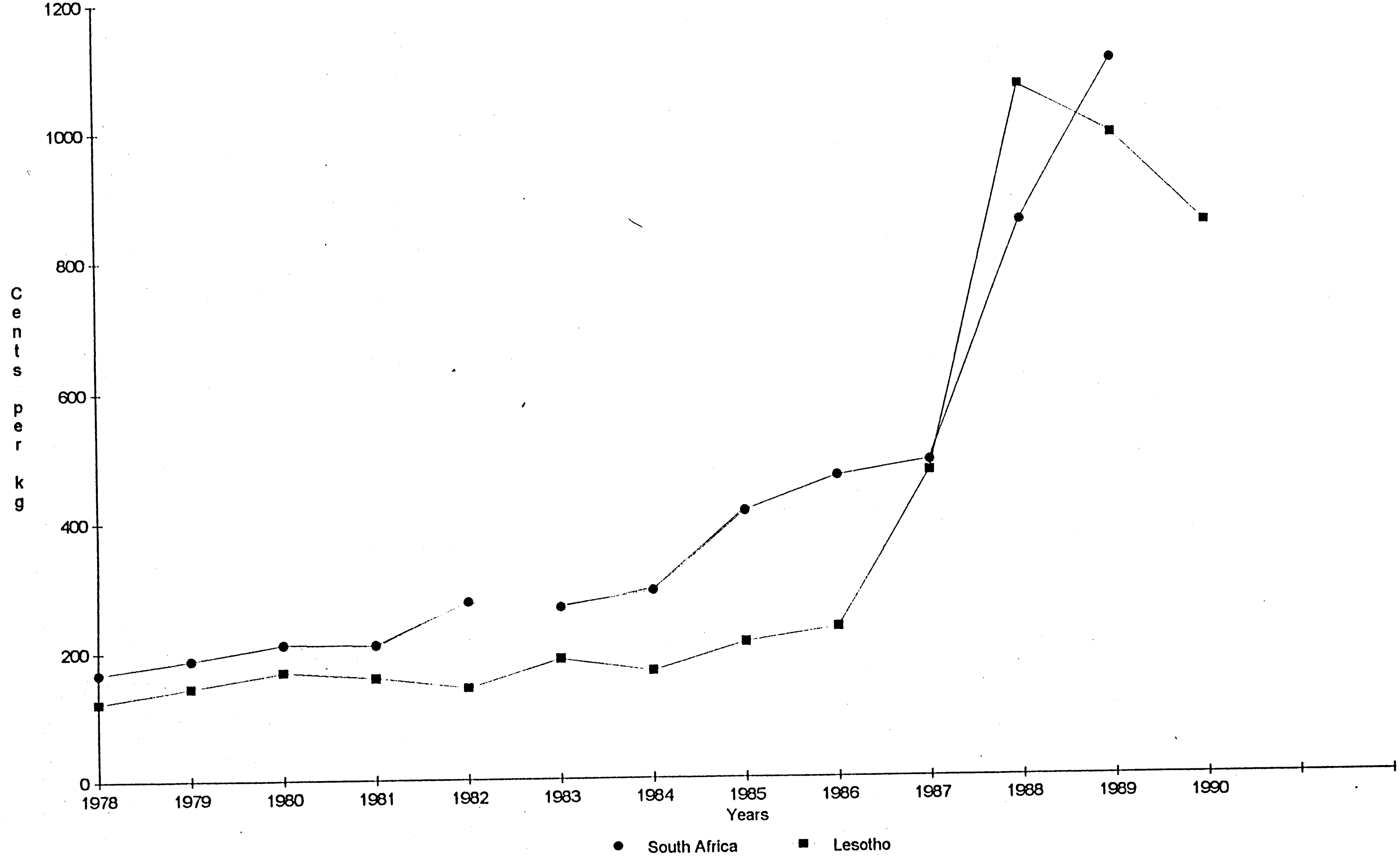

Figure 2: **Average price of greasy wool**

statistic also indicated the absence of autocorrelation. The coefficient of adjustment (.770) reveals that the adjustment of actual to desired production will be almost complete after a lag of one year.

A modification to the model was estimated. The rainfall variable was replaced with a dummy variable. Where the number of observations are so few, outliers could affect the OLS results. A dummy variable (DV) was generated where the years of high rainfall, 1975/76 and 1987/88 were represented with zeros and all the other years were represented with ones. The revised Lesotho wool supply model was as thus:

$$\begin{aligned} W_{Lt} = {} & .00000015 + .427W_{Lt-1} - 4157.8P_{WLt-1} \\ & (3.32)^{*} \qquad 1.74)^{**} \qquad (2.50)^{*} \\ & + 223.4P_{MLt-1} + .00000072DV_{Lt} \\ & (-2.26)^{*} \qquad (1.29) \end{aligned} \qquad (8)$$

R^2 = .870
Adjusted R^2 = .812
D.W. = 1.93

The coefficient of determination increased whereas the Durbin-Watson statistic declined, but there is still no autocorrelation. All the variables, except for the deflated lagged mohair export price are significant at the 5 or 10 percent level. The signs of the coefficients remained the same. The coefficient for the dummy variable is positive as expected because of how the variable was defined.

As mentioned previously, the deflated lagged wool export prices may not be the accurate prices to use in the Lesotho wool supply model. Marketing margins for wool marketed by traders and by the Wool Grower's Associations for eight years (1980-1988) can be added and averaged to provide an average margin that could be deducted from the wool export price. This value was then deflated using the Lesotho agriculture GDP to produce an approximation for producer prices, labelled as PPW. The producer prices were lagged one year. The following equation resulted for just the eight observations in the 1980s:

$$\begin{aligned} W_{lt} = {} & .00000013 + 509W_{Lt-1} - 4381.4PPW_{Lt-1} + 504.4PM_{Lt-1} + 102.3R_{Lt} \\ & (1.02) \qquad (1.71)^{**} \quad (-1.95)^{**} \qquad (1.79)^{**} \qquad (0.09) \end{aligned} \qquad (9)$$

R^2 = .960
Adjusted R^2 = .907
D.W. = 3.02

The coefficient of determination increased indicating that 96 percent of the variation in the Lesotho supply has been explained by the explanatory variables. The adjusted R^2 and the Durbin-Watson statistic also increased. The h-statistic was computed and indicated the absence of autocorrelation. All the variables, except for the rainfall variables are significant at the 10 percent level. The signs of the coefficients remained the same, with the exception of the rainfall variable. Rainfall becomes positively related with current wool production but is not significant. This sign is consistent with the rainfall sign derived by Witherell. This model indicates that the use of an approximation for deflated lagged producer prices instead of the deflated lagged wool export prices produces an improved fit, yet the signs on the lagged price variables remain the same as when export prices are used. The equation that best hypothesizes the variables that affect Lesotho wool production is selected on the basis of the following four criteria:

1) Coefficient of determination (R2)
2) Expected signs of the coefficients
3) Durbin-Watson statistics (D.W.)
4) Significance of the t ratios (5 and 10 percent)

Equation (9) best hypothesizes the variables that affect wool production in Lesotho. This equation produces the highest coefficient of determination but the highest Durbin-Watson statistic. Three of the variables are significant at a 10 percent level of significance unlike previous equations where the variables are significant at 5 percent. The signs of the coefficients are correct for the equation except for the deflated lagged producer price estimated for wool supply in Lesotho.

The short-run (one year) elasticities at the means were generated for the Lesotho wool supply model. The wool price elasticities have negative signs which are associated with the negative sign related with the deflated lagged wool export prices. These negative wool price elasticities imply that a one percent increase in wool price will lead to a decrease in wool production.

In Table 1, the coefficients of adjustments and the price elasticities of supply are presented.

The short-run wool price elasticities derived by Witherell ranged from .028 to .212 indicating that wool supply is inelastic relative to wool price. The short-run wool price elasticities produced from the equations estimated ranged from -.249 to -.307. The short-run mohair price elasticities range from .076 to .142 indicating that a one percent increase in lagged mohair prices will cause a 7.6 to 14.2 percent increase in wool production.

The estimates of the long-run elasticities were generated by dividing the estimated short-run elasticities by 1-b1. The estimates of the long -run elasticities range from -.303 to -.637 implying that wool supply will still be relatively inelastic to wool prices. The wool price elasticities in the long-run derived by Witherell ranged from .125 to .764.

The generalized least squares by the Cochrane-Orcutt procedure was not used as an alternative or to re-estimate the equations. The Durbin-Watson statistic and the h-statistic indicated the absence of autocorrelation in the equations presented. However, when the high R^2 figures, the weak regression terms and the prevalence of negative lagged wool prices are considered, implies the possibility that the assumption of multicollinearity is violated. Some explanatory variables are correlated with other variables, thus the specification of a supply model might be irrelevant or impossible as mentioned previously.

The estimation procedure has indicated that lagged wool production and the lagged producer price are important determinants in explaining the current wool production. The negative sign resulting in a backward sloping supply curve is inconsistent with theory. It would be expected that farmers will produce increased quantities of wool, if the prices are favourable. Wool production is not only affected by lagged wool production and lagged producer prices but also by other related factors such as

Table 1: Summary of estimates of coefficients of adjustment and price elasticities of supply.

	Coefficient of Adjustment	Wool price elasticity		Mohair price elasticity	
		SR	LR	SR	LR
Initial wool supply (7)	.770	-.286	-.371	.076	.100
First modification (8)	.573	-.307	-.537	.080	.140
Second modification (9)	.391	-.249	-.637	.142	.363

farmers' perception of sheep as an investment and therefore their reluctance to sell them. Thus, even when the prices for wool is low, the quantity of wool produced will resulting in a backward sloping supply curve. Other variables such as, the deflated lagged mohair export price and the rainfall variable were incorporated into the model. Sheep and goats are reared jointly, mainly for commercial production of wool and mohair. The rainfall variable is not significant in explaining current wool production but indicates that high rainfall, is associated with high wool production. However, in the short-run and in the long-run, wool supply is inelastic relative to wool prices in Lesotho. The coefficient of adjustment indicates that in the short-runthe adjustment of actual to desired wool production levels will be incomplete after a lag of one year.

6. CONCLUSIONS

World wool production is likely to continue increasing slowly in the future. Some countries such as Australia do not have many alternatives for their land, therefore wool production will continue to play an important role. World wool production is not likely to face the monumental challenge that was associated with the competing fibres possessing new textile properties. The consumption of wool will remain stable since some importing countries will continue to demand wool for the qualities that it possesses. Man-made fibres are cheaper, but they do not possess the same characteristics associated with wool. Additionally, the trend for the wool figures indicate that other countries such as the Soviet Union, China and Korea will continue to import large quantities of wool.

Wool is an important product in Lesotho and the potential still exists for farmers to realize increased incomes from this industry. However, Lesotho faces several problems in its efforts to increase wool production. Overstocking and range degradation have had a direct impact on wool production. The quality of Lesotho wool tends to be low thus fetches lower prices at auction markets. These factors that prevent an increase Lesotho's wool production need to be eliminated. Previous studies conducted on estimated supply functions for wool indicated that wool prices play an important role in explaining wool production.

7. SUGGESTIONS FOR FURTHER RESEARCH

Further research may be considered to determine the role that lamb or mutton play in explaining the backward sloping supply curve. Farmers could respond to these variables, therefore they should be incorporated into the model. Additionally, there is the need to recognize the alternative production possibilities that occur in rural households. The different production processes used, the variety of crops grown and livestock raised, and the demand for land and labour are factors that could further explain the production of wool in Lesotho. These factors need to be examined further.

The costs that farmers incur in producing wool in Lesotho should be studied to determine if farmers are breaking even or earning profits. Production of wooi in Lesotho cannot be evaluated independently of the costs associated with wool production.
Research should be conducted to examine which prices farmers respond to in making their decisions to produce wool. Farmers could be responding to the current producer price, the producer price in the past year, the advance payment or to an average of the advance and the post payment.

Wool production could be further analysed by breaking it into its components, that is, the number of sheep and the yield per animal. Adopting global functions may not be justified since each country is influenced by different variables. Some of the influences such as rainfall, climate and migrant wages could be separated and their impact on the number of sheep and the yield could be studied. In addition, the relationship between nutrition and yearly wool production could be examined. Variations in wool production will be affected by nutrition which is affected by rainfall and climate.

NOTE:

1. The star (*) indicates the significance level of t-ratios at 10 percent and the double star (**) indicates the significance of t-ratios at 5 percent.

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