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COST OF PRODUCTION OF MUTTON AND WOOL

INTRODUCTION

Estimation of the cost of production of mutton and wool in areas where sheep are maintained to get both these products presents an interesting problem. When sheep are maintained for mutton only and the fleece or milk output has practically no value, the procedure of estimation of cost of production of mutton is straight forward, the entire expenditure being debited towards the cost of production of mutton. However, in the case of sheep which yield wool or milk a suitable method of apportionment of cost has to be followed.

Three pilot enquiries sponsored by the Indian Council of Agricultural Research were undertaken with a view to developing a technique for objective and reliable estimation of the cost of sheep rearing under stationary as well as migratory type of management. The first enquiry on a very modest scale was carried out in the Deccan area of Maharashtra State during 1954-55, the second and third during 1960-61 in Nellore district of Andhra Pradesh and Nagaur, Bikaner, Jaipur and Tonk districts of Rajasthan. Data were collected for 8 stationary and 8 migratory flocks of Deccani sheep in Maharashtra, 42 stationary flocks of Nellore breed in Andhra Pradesh and 18 flocks each of stationary type of sheep of Malpura breed and of migratory type of sheep of Marwari breed in Rajasthan. Each survey was carried out over a whole year covering all the shearing seasons. Data on wool yield and supplementary feed given to sheep were recorded by direct weighment by trained enumerators and other relevant information like input of labour, wages of labour, sales and purchase of sheep, sheep-folding, etc., were collected by direct observation and careful enquiry through weekly visits in the case of stationary flocks. The data were recorded daily in the case of migratory flocks as the enumerators moved with a group of migratory flocks during the period of migration. Data obtained from these surveys were utilized to estimate the cost of production of mutton and wool by (i) method of apportionment and (ii) method of regression.

PROCEDURE OF ESTIMATION

The total expenditure for a flock during the year was worked out considering the various components on grazing, feeding, paid labour, family labour, recurring expenditure and depreciation on assets and equipment. From the gross cost the income from sources other than wool and sale of lambs was subtracted to obtain the net cost. These other sources of income were milk, manure, sheep-folding and skin.

Method of Apportionment

One method followed was the method of apportionment to estimate the cost of production of mutton and wool utilizing the total net expenditure obtained earlier.

$$\text{Let } S_i = F_i + D_i - I_i - A_i, \ldots \begin{pmatrix} i = 1 \text{ for adult,} \\ i = 2 \text{ for lamb} \end{pmatrix} \ldots$$

where S_i : surplus stock of adult (S_1)/lamb (S_2) produced during the period;

F_i : final stock of adult/lamb at the end of the period;

D_i : number sold or disposed of otherwise during the period;

I_i : initial stock at the commencement of enquiry; and

A_i : number purchased or acquired otherwise.

Let w_1 and w_2 be the quantities of wool in kg. produced during the period from adults and lambs respectively in a flock.

If E be the net expenditure incurred per flock containing adult sheep and lambs and S_1 and S_2 be the surplus stock (adults and lambs) produced during the period, then E is to be apportioned in the ratio of r_m and r_w such that

$$r_m : r_w : : (S_1P_a + S_2 P_l) : (w_1 + w_2) P_w$$

where P_a : price of an adult sheep excluding the price of wool on its body;

P_l : price of lamb excluding the price of wool on its body; and

P_w : price of wool per unit quantity (say, per kg.).

Then $\left(\frac{r_m}{r_m+r_w}\right)$ E gives the total cost for mutton production from (s_1+s_2) sheep, and $\left(\frac{r_w}{r_m+r_w}\right)$ E gives the cost for (w_1+w_2) kilogram of wool obtained from (S_1+S_2) sheep. If b_1 be the average body weight (in kg.) of an adult sheep and b_2 that of a lamb then $(S_1b_1 + S_2b_2)$ is the total live weight (in kg.) of surplus sheep in the flocks.

Therefore, the cost of production per kg. of mutton

$$= \left(\frac{r_m}{r_m+r_w}\right) E \Big/ (S_1b_1+S_2b_2)\, f \qquad .. \qquad .. \qquad .. (1)$$

where f is the conversion factor of mutton weight to live weight (or dressing percentage).

The cost of production per kg. of wool

$$= \left(\frac{r_w}{r_m+r_w}\right) E \Big/ (w_1+w_2) \qquad .. \qquad .. \qquad .. (2)$$

This method of apportionment can be used on occasions when relevant data are available for individual flock as well as for a group of flocks.

Method of Regression

Let $E = a_1 x_1 + a_2 x_2$ .. .. (3)

where E : net expenditure incurred per flock to produce x_1 kg. of mutton and x_2 kg. of wool.

Utilizing the values of E, x_1 and x_2 from each flock, regression (3) can be fitted by the method of least squares. The values obtained for a_1 and a_2 will give the average price per kg. of mutton and wool respectively. This method is applicable only if the relevant information is available for individual flock.

RESULTS

The results obtained following the two methods of estimation are given in Tables I and II, the first table showing the cost of production of wool and the second for the cost of production of mutton in the case of both stationary and migratory types of flocks.

TABLE I—COST (RS.) OF PRODUCTION PER KG. OF WOOL

Area	Stationary		Migratory		Average market rate per kg. of greasy wool
	I	II	I	II	
Maharashtra	1.34	1.60 (±0.40)	1.34	0.95 (±0.21)	2.25
Rajasthan	2.40	2.61 (±0.65)	2.29	N.A.	3.25

TABLE II—COST (RS.) OF PRODUCTION PER KG. OF MUTTON

Area	Stationary		Migratory		Average market rate per kg. of mutton
	I	II	I	II	
Maharashtra	1.55	1.74 (±0.37)	0.70	0.99 (±0.19)	2.60
Andhra Pradesh	1.11	N.A.	—	—	2.90
Rajasthan	1.18	0.92 (±0.35)	1·36	N.A.	3.00

Note : I = Method of apportionment;
II = Method of regression;
N.A. Details about individual flocks not available.

Figures in brackets are the standard errors of the estimates. The variation explained due to regression was 88 per cent for the stationary flocks in Rajasthan and 81 per cent for the stationary flocks and 97 per cent for migratory flocks in Maharashtra.

The value of f, *i.e.*, dressing percentage mentioned in expression (1) for the estimation of mutton was taken as 45 per cent on the basis of results obtained from other studies. The cost of production of wool in Maharashtra was about Rs. 1.45 per kg. in stationary flocks and Rs. 1.15 per kg. in migratory flocks. In Rajasthan, the production cost of wool was higher than that in Maharashtra although the unit cost of wool in migratory flocks was comparatively less than the wool in stationary flocks.

The main reason for higher cost of production of wool in Rajasthan was due to small size of flock and higher percentage of mortality of sheep. The average size of a stationary flock in Maharashtra was 120 as compared to only 67 sheep in Rajasthan. There were on an average 200 to 215 sheep in a migratory flock in both the States. Whereas mortality percentage was only 8 both for stationary and migratory flocks in Maharashtra, it was of the order of 20 to 25 per cent in Rajasthan.

There was about one rupee margin between the cost of production and the market rate of greasy wool in both the areas.

The cost of production of mutton in Maharashtra was about Rs. 1.65 per kg. in stationary flocks and about 85 paise per kg. in migratory flocks. As mentioned earlier, the larger size of migratory flocks was the main reason for the cheaper cost of production since labour cost was the major component of the cost and the cost per sheep naturally was high in smaller flocks. Sheep of the Nellore breed in Andhra Pradesh are of purely mutton type and the cost of production was estimated to be Rs. 1.11 per kg. of mutton. The average size of a flock in this case was 50 sheep. The cost per kg. of mutton in Rajasthan was estimated to be about a rupee for a stationary flock and Rs. 1.36 per kg. for migratory flock in spite of larger flock size in the migratory flocks. Higher mortality in migratory flocks increased the unit cost. An interesting feature observed in Rajasthan was that maintenance of some goats in stationary flocks added to the income and thereby reduced the cost on maintenance of sheep.

Each of these two methods of estimation has its merits and demerits. The method of apportionment depends upon the market rates of the two commodities. The rates of mutton and wool may not fluctuate in the same proportion because of demand and supply position. To that extent the results would be vitiated by using this method. The method of regression, on the other hand, is free from such variations as it does not depend on the market rates of the commodities. But this method can be used only when the detailed data are available for each flock. The method of apportionment is applicable if the data are available either for each flock or for a group of flocks. If the purpose is to get a quick estimate of the cost of production, the method of apportionment would be welcome. However, if detailed data are available flockwise it is preferable to follow the method of regression.

Summary

The methods of estimation of cost of production of mutton and wool has been explained along with the results obtained from these methods utilizing the

data collected from the pilot enquiries undertaken in Maharashtra, Andhra Pradesh and Rajasthan both on stationary and migratory flocks. Increase in the size of flock and lower rate of mortality reduced the cost of production of both mutton and wool.

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INELASTICITY OF LAND REVENUE IN UTTAR PRADESH

J. B. Kansal in his paper entitled "Taxation of Agricultural Land in Uttar Pradesh"[1] makes use of the farm data, according to land holding-size, of Farm Management Reports, Uttar Pradesh, for the years 1954-55, 1955-56 and 1956-57. He corrects the data of land revenue for the differences in the two tenure systems simultaneously in existence in the State and uses these data to fit linear regressions of land revenue, both uncorrected and corrected (R_u and R), on farm business income (Y_b), net income (Y_n), and the size of land holdings (S). He arrives at the following six equations :

$$(1)\quad R_u = \underset{(.750)}{12.229} - \underset{(.032)}{.037}\ Y_b \qquad R^2 = 0.313$$

$$(2)\quad R_u = \underset{(.580)}{9.096} - \underset{(.009)}{.019}\ Y_n \qquad R^2 = 0.580$$

$$(3)\quad R_u = \underset{(.625)}{9.142} - \underset{(.030)}{.061}\ S \qquad R^2 = 0.520$$

$$(4)\quad R_c = \underset{(.091)}{8.120} - \underset{(.004)}{.014}\ Y_b \qquad R^2 = 0.320$$

$$(5)\quad R_c = \underset{(.329)}{6.575} + \underset{(.005)}{.001}\ Y_n \qquad R^2 = 0.004$$

$$(6)\quad R_c = \underset{(.340)}{6.503} + \underset{(.017)}{.007}\ S \qquad R^2 = 0.050$$

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1. *Indian Journal of Agricultural Economics*, Vol. XX, No. 4, October-December, 1965, pp. 88-91.