

ECONOMIC EVALUATION OF PASTURE ESTABLISHMENTS IN ARID REGION

G.N. BHATI, T.K. BHATI AND K.A. SHANKARNARAYAN

Central Arid Zone Research Institute, Jodhpur - 342003

ABSTRACT

Studies were conducted on grazing behaviour of mixed flock of ram lambs and he-goats at a fixed stocking rate of 10 animals ha⁻¹ on shrub (*Ziziphus nummularia*) and legume (*Clitoria ternatea*) based pastures of buffel grass, *Cenchrus ciliaris*. Pure pastures of *C. ciliaris* were profitable and could recover investment cost in the second year, but in the long run, shrub based pasture showed a more productive trend. Shrub based pastures involved more investment cost for planting and maintenance of *Ziziphus*. Legume based pastures could not sustain the grazing stress and failed to regenerate under prevailing droughts of 1983-84.

INTRODUCTION

The usual practice of pasture establishment involves raising of pure pastures of recognised grasses and legumes (Bhati et al. 1981, 1983, and Anonymous 1983). Introduction of forage shrubs like 'bordi' (*Ziziphus nummularia*) is emphasized to ensure the availability of top feed in the event of the failure of the monsoon. The present study attempts economic evaluation of five types of pastures established at CAZRI Research Farm, Jodhpur.

MATERIAL AND METHODS

A protected natural grazing land for experimental animals at CAZRI Farm, Jodhpur was fenced and divided into 5 pastures, each 0.75 ha. in area. The pastures were reseeded with *Cenchrus ciliaris* cv CAZRI 358, *Clitoria ternatea* 'Aparajita' on the onset of monsoon 1982. Seedlings of *Ziziphus nummularia* were also planted in the pastures. The five pastures were: A) *C. ciliaris* (pure), B) *C. ciliaris*+*Clitoria ternatea* (1:1), C) *C. ciliaris*+*Clitoria ternatea* (2:1), D) *C. ciliaris*+*Z. nummularia* (1:1) and E) *C. ciliaris*+*Z. nummularia* (2:1).

The shrub or the legume based pastures required gap filling in the second year during the monsoon season. In the 1st and 2nd years returns were realised in terms of forage, seed and 'pala' (*Z. nummularia* leaves). In the third year, grazing commenced from December and continued upto the end of June. Four ram lambs and four he-goats of 9-10 months age group were grazed in each pasture. The stocking rate was fixed after estimating the overall carrying capacity of the pastures. In the 4th year,

pastures B and C were eliminated from the experiment as the legume component was severely affected by drought. Therefore, grazing was carried out only for 75 days with 4 sheep and 4 goats in the pastures A, D and E. In the 5th year, grazing commenced from September and continued upto January and with three sheep and three goats in pastures A, D and E. Grazing round the year was not possible due to drought throughout the experimental period and animals had to be grazed on other sites. Therefore, the gain in body weight of animals, wool and manure produced only while grazing on experimental pastures were taken for economic evaluation. Increase in the body weight is taken as a broad indicator representing meat production from animals grazed in the respective pastures.

RESULTS AND DISCUSSION

Establishment of pastures

The cost structure towards establishment of the pastures comprised cleaning, fencing, soil working, sowing, planting, watering, weeding, hoeing and cost of plants (Table 1). Sixty per cent of the total expenditure was incurred on fencing and the rest on other items in case of pastures A, B and C, whereas in pastures D and E highest expenditure (34%) was incurred for planting of *Ziziphus nummularia* followed by fencing (30%), and the rest on other items. The Total expenditures towards the pasture establishment phase worked out to be Rs. 1718.00, 2275.00, 2058.50, 4608.00 and 4241.50 for pastures A, B, C, D and E, respectively. Due to regular drought after the establishment of pastures, extra expenditure was incurred in the second year on pastures B, C, D and E. Pastures D and E consumed more labour and tractor hours as compared to pastures A, B and C due to requirements of planting *Ziziphus*.

Performance of Animals over the Pastures

The live weight gains by sheep and goats (Table 2) grazing on *Ziziphus nummularia* based buffel grass pastures was higher than pure pasture of *C. ciliaris*. Sheep gained live weight by 92% and 84% and goats by 40% and 60% in pastures D and E, respectively. There was no significant variation in wool production of sheep, except 6% increase in pasture E over pastures A and D. But in case of goats, the body weight gain showed increase of 30% and 44% in pastures D and E over pure pastures of *C. ciliaris*. The overall performance of animals remained better when they were grazed on *Z. nummularia* based buffel grass (*C. ciliaris*) pasture.

Economic Evaluation

Besides establishment costs, the cost flows comprised seed collection, harvesting of grass and 'pala', deworming of animals, shearing of wool, concentrates and payments to grazier. As it was an experiment, each pasture (0.75 ha) was allotted one grazier. Similarly, the return structure comprised forage, seed, 'pala' fuel wood,

Table—1. Establishment costs (Rs) of different types (A to E) of pastures (details vide material & methods)

Particulars	A		B		C		D		E	
	1982-83	83-84	82-83	83-84	82-83	83-84	82-83	83-84	82-83	83-84
Cleaning	45.0	—	45.0	—	45.0	—	45.0	—	45.0	—
Fencing	1040.0	—	1040.0	—	1040.0	—	1040.0	—	1040.0	—
Soil working	258.0	—	258.0	—	258.0	—	258.0	—	258.0	—
Digging of pits	—	—	—	—	—	—	297.0	—	297.0	—
Seeds/Seedlings	90.0	—	95.0	—	97.50	—	1161.0	640.0	811.50	560.0
Sowing of seed	105.0	—	105.0	183.0	105.0	—	57.0	—	57.0	—
Planting	—	—	—	—	—	—	210.0	135.0	138.0	315.0
Watering of plants	—	—	—	—	—	—	135.0	180.0	135.0	180.0
Hoing + Weeding	180.0	—	180.0	369.0	180.0	333.0	180.0	270.0	180.0	225.0
	1718	—	1723	552.0	1725.50	333.0	3383.0	1225.0	2961.50	1280.0

*Labour @ Rs. 9/- per day; Tractor charges @ Rs. 30/- per ha, water, tanker (1000 gallons) for Rs. 30/- each Grass and legume seed (*Clitoria ternatea*) @ Rs. 15/kg and 10/kg respectively, *Z. nummularia* seeding cos/ Rs. 0.93 and 0.80 per seedling in 1982 and 1983 respectively.

Table 2. Live weight gain and wool production from the pastures (A, B, C, D and E) in different years (I, II, III).

Pastures	Wool production pasture (kg)						Live weight gain/pasture (kg)					
	Sheep			Goat			Sheep			Goat		
	I	II	III	I	II	III	I	II	III	I	II	III
A	4.5	2.9	—	0.85	0.95	—	18.5	3.0	3.0	22.0	4.5	10.0
B	5.0	—	—	1.250	—	—	19.0	—	—	20.0	—	—
C	4.1	—	—	1.200	—	—	19.5	—	—	22.0	—	—
D	4.2	3.2	—	1.300	1.05	—	25.0	13.0	9.0	23.5	16.0	11.5
E	4.75	3.1	—	1.350	1.250	—	24.5	16.0	4.5	24.0	17.0	16.0

Table 3. Year-wise details of costs and returns (Rs) from pastures (A, B, C, D and E)

Year	Pastures					Return from Pastures				
	A	B	C	D	E	A	B	C	D	E
1.	1988.00	1723.00	1860.50	3428.00	3006.50	832.50	—	241.50	51.75	238.50
2.	1399.50	1065.00	1188.00	1730.00	1811.00	3520.50	930.30	1919.40	1425.43	1652.80
3.	679.60	679.60	679.60	679.60	679.60	1139.30	1125.00	1152.10	1295.40	1309.55
4.	845.00	—	—	845.00	845.00	321.75	—	—	881.50	994.45
5.	323.00	—	—	1323.00	1323.00	412.50	—	—	600.00	600.00
	6235.10	3467.60	3728.10	8005.60	7665.10	6226.55	2055.30	3313.00	4.53.08	4795.30

Besides establishment costs, labour cost included charges for seed collection, forage cutting, grazier, shearing of animals, concentrates and de-worming of animals.

Returns included seed and forage @ 15/- per kg and Rs. 15/- per q, respectively; Manure @ Rs. 20/- and Rs 25/- per Wool @ Rs. 22/- and 25/- per kg, Goat hair @ Rs 11/kg, Meat Rs 25/kg, Leaf from *Z. nummularia* @ Rs. 80/q

manure and meat production. The total expenditures incurred for the period of five years under each pasture were highest in pastures D and E, and the least in pasture A (Table 3). Similarly returns were realised more by pasture A and the least by D and E. The cost and return flows clearly indicate that pasture A recovered its investment, whereas pastures D and E could not. Economically, the superiority of the pasture A over to pastures D and E is evident.

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