INTRODUCTION

Sheep industry is one of the chief sources of livelihood for some sections of the people in Rajasthan. About 40 per cent of wool produced in India is from Rajasthan sheep and it is estimated to be 14.97 million kilograms of greasy wool from 7.3 million sheep which forms only 10.1 per cent of the entire sheep population of the country. About one million sheep, mostly males, are slaughtered annually for meat purpose and half a million sheep are exported to other states. Directly or indirectly about a million people in the state are connected with sheep industry being engaged in sheep raising, wool cleaning, marketing and processing and wool trade. The total value of sheep and wool exported from this state is estimated to be Rs. 70 millions per annum (Narayan 1960 and 1964).

The sheep depend on native range lands for their sustenance. Stall feeding or supplemental feeding for sheep is not a practical proposition, as in even the U. S. A. Sheep industry on stall feeding results in net losses, with early maturing and high producing sheep breeds (Tuthill, 1964). These native rangelands have deteriorated very badly and there is a need for immediate improvements for raising production for sheep.

Sampson (1951), Stoddart and Smith (1955), Anonymous (1957), Morrison (1957) have reviewed the literature concerning range management. Sheep display a greater appetite for grass than any other diet, the consumption varying from 1.46 to 2.47 kg. dry matter daily for mature sheep (Woodman et al., 1937). Stapledone and Jones (1927) observed greater variations in the intake of green forage by sheep. High quality roughage is even more important for sheep than is for dairy cattle or beef cattle (Morrison, 1957). The nutritive value of forage during its early stage of growth is very high, and declines with its maturity (Christensen et al., 1937; Cook et al. 1950, Cook et al., 1961; Gomm 1956; Sen and Ray, 1964). Short term studies on performance of adult sheep and lambs have been reported by Das et al. (1963), and Chakarvarty and Das (1964). The
studies concerning performance of sheep under different pastoral treatments conducive to regeneration of native rangelands are extremely essential. Growth in lambs was studied to assess the suitability of the system of grazing which would yield optimum products from the sheep.

EXPERIMENTAL

The Range Management and Soil Conservation paddocks in Pali District, Western Rajasthan, viz., Sojat and Jadan, each of about 80 hectares were selected for the study. The rainfall in these paddocks for the year under study was 278.6 and 315.9 m.m. respectively, 94 to 96 per cent of which was received from July to September 1962. The average air dried forage in both paddocks was 1396 kg/hect. of which 27.6, 28.7 and 43.7 per cent, contributed by high perennial, low perennial and annual grass species, respectively. The average vegetative cover as studied through linear transects based on Parkers' Loop method, was 31.55 per cent of which high perennial, low perennial, annual grass species and bushes etc were 2.0, 5.35, 21.50 and 2.70 percent respectively. The range condition had been classified as 'Fair' on the basis of botanical composition as reported by Prakash and Ahuja (1964). Considering the various managerial aspects for regeneration of native rangelands six pastoral treatments as detailed below were given. These paddocks were divided into six parts, each part for the study of one of the pastoral treatment namely:

PT₁ Continuous grazing at controlled rate.

PT₂ Closed to grazing throughout the year with different experiments on seeding and fertilisation. No grazing was conducted.

PT₃ Deferred to grazing from 1st July for 8 weeks followed by grazing at controlled rate.

PT₄ Deferred to grazing from 1st July for 16 weeks followed by grazing at controlled rate.

PT₅ Deferred to grazing from 26th August for 8 weeks preceded and followed by grazing at controlled rate.

PT₆ Deferred to grazing from 26th August for 16 weeks preceded and followed by grazing at controlled rate.
Marwari breed of sheep is commonly found in the tract and produces medium to fine quality wool. Ram lambs 10 to 12 months in age having an average body weight of 18.8 kg were borrowed from the Department of Sheep and Wool of the State Government. The body weights were recorded with the help of Salter's spring balances at fortnightly intervals. The stocking rate was fixed at 1.33 hectares per animal (Ahuja 1964). Ten animals grazed under each treatment in each paddock. For the purpose of the present studies the year was divided into six seasons namely early monsoon (1st July to 26th August), late monsoon (27th August to 21st October), autumn (22nd October to 2nd December), winter (3rd December to 10th February), spring (11th February to 24th March) and summer (25th March to 30th June). The studies were performed for a period of one year from 1.7.1962 to 30.6.1963. No supplemental feeds by way of roughage or concentrates were fed during the period of study. Common salt was given at 12 gm. per lamb per day. Drinking water was freely offered in troughs. For grazing behaviour notes were recorded for the entire period of study.

RESULTS

The average gains in body weight per lamb under different pastoral treatments and various seasons during the year are presented in Table 1.

Table 1. Average increase in body wt. in kg per lamb under various pastoral treatments and seasons.

<table>
<thead>
<tr>
<th>Season (Period of the year)</th>
<th>PT_1</th>
<th>PT_2</th>
<th>PT_3</th>
<th>PT_4</th>
<th>PT_5</th>
<th>PT_6</th>
<th>Percentage of gain per increase lamb per animal during the period total increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Early monsoon (1.7.62 to 26.8.62)</td>
<td>4.50</td>
<td>—</td>
<td>—</td>
<td>4.40</td>
<td>4.35</td>
<td>4.42</td>
<td>33.1</td>
</tr>
<tr>
<td>2. Late monsoon (27.8.62 to 21.10.62)</td>
<td>1.40</td>
<td>0.55</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.97</td>
<td>7.3</td>
</tr>
</tbody>
</table>
3. Autumn  
(22.10.62 to 2.12.62) 3.60 2.85 3.10 3.60 — 3.28 24.6  
4. Winter  
(3.12.62 to 10.2.63) 1.45 1.90 1.45 1.75 1.15 1.54 11.5  
5. Spring  
(11.2.63 to 24.3.63) 0.70 0.55 0.45 0.75 0.75 0.64 4.8  
6. Summer  
(25.3.63 to 30.6.63) 2.40 2.40 2.20 3.00 2.45 2.49 18.7  
7. Total gains per  
pastoral treatment 14.05 8.25 7.20 13.50 8.70 13.34 100.0  

Maximum average gains in body weight of yearling lambs of Marwari breed have been obtained under continuous grazing at controlled rate (PT₁) followed by the treatment where the rangeland was deferred to grazing for 8 weeks from 27.8.62 (PT₆). These gains are 14.05 and 13.50 kg per lamb, respectively. The least gains in body weights of lambs are under the pastoral treatment where the rangeland is deferred to grazing for 16 weeks from 1st July (PT₄). Assuming the gains per lamb during deferment period as the average gains shown under column 7 in Table 1 and adding these to the actual gains under PT₁, PT₄, PT₅ and PT₆, the calculated average gains amount to 12.67, 12.59, 14.47, and 12.96 kg for the respective treatments on yearlong basis. The least gains are show by treatment PT₄. Maximum gains in body weight of lambs are obtained during the 4 fortnights of early monsoon period and 3 fortnights of autumn. These gains account for 33.1 and 24.6 per cent respectively which is 57.7 percent of the gains achieved on yearlong basis of grazing. In the rest of seasons the gains in body weight of lambs show a decline. The gains during late monsoon, winter, spring and summer are only 0.97, 1.54, 0.64 and 2.49 kg, respectively.

The gains in body weight of lambs per fortnight under different seasons were worked out and are presented in Table 2 below.
Table 2. Average increase (in kg) in body weight of Marwari yearling lambs per fortnight under different pastoral treatments and seasons.

<table>
<thead>
<tr>
<th>Season</th>
<th>Average gains per lamb per fortnight</th>
<th>Average relative value of increase in body weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PT₁</td>
<td>PT₂</td>
</tr>
<tr>
<td>1. Early monsoon</td>
<td>1.13</td>
<td>—</td>
</tr>
<tr>
<td>(17.62 to 26.8.62)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Late monsoon</td>
<td>0.35</td>
<td>0.14</td>
</tr>
<tr>
<td>(27.8.62 to 21.10.62)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Autumn</td>
<td>1.20</td>
<td>—</td>
</tr>
<tr>
<td>(22.10.62 to 2.12.62)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Winter</td>
<td>0.29</td>
<td>0.38</td>
</tr>
<tr>
<td>(3.12.62 to 10.2.63)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Spring</td>
<td>0.23</td>
<td>0.19</td>
</tr>
<tr>
<td>(11.2.63 to 24.3.63)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Summer</td>
<td>0.34</td>
<td>0.34</td>
</tr>
<tr>
<td>(25.3.63 to 30.6.63)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Average per fortnight per treatment for the year</td>
<td>0.54</td>
<td>0.38</td>
</tr>
</tbody>
</table>

The highest gains in body weight per lamb per fortnight are achieved during early monsoon and autumn period and these are 1.10 and 1.09 kg respectively. During spring the average gains per fortnight are the least and these are 0.21 kg per lamb. The average fortnightly gains during late monsoon, winter and summer are 0.24, 0.32 and 0.35 kg, respectively.

DISCUSSION

The growth of lambs during early monsoon period is the highest, obviously due to availability of large variety of succulent grasses and top feed as sheep can...
From their studies on performance of Marwari lambs on a pasture at Pali, Chakarvarty and Das (1964) reported an increase of 6.3 kg per lamb for a period of 7 months (30.10.63 to 27.5.64). As against the gains in body weight of the experimental lambs under the present study for the above period of 15 fortinights works out to 6.6 kg per lamb. The body weight of rams at maturity of Chokla and Marwari breed of sheep in Rajasthan is practically identical (Narayan, 1959). Sapre (1963) reported the average difference in the body weights between a ram lamb of 12 months of age and a mature ram of chokla

The highest gains in body weight of lambs have been received under PT₁, i.e., continuous controlled grazing system followed by PT₆, the treatment where the rangeland is deferred to grazing for 8 weeks from 27th August. This is due to the fact that animals receive the nutritious feeds on the range during various seasons as discussed above. The least gains in body weight of lambs are received under PT₄, PT₃ and PT₆ and these are due to the fact that animals under each of the treatments did not receive the benefit of nutritious forage as during early monsoon or autumn period which have indicated to be the most favourable growing seasons for sheep on the range.

From their studies on performance of Marwari lambs on a pasture at Pali, Chakarvarty and Das (1964) reported an increase of 6.3 kg per lamb for a period of 7 months (30.10.63 to 27.5.64). As against the gains in body weight of the experimental lambs under the present study for the above period of 15 fortinights works out to 6.6 kg per lamb. The body weight of rams at maturity of Chokla and Marwari breed of sheep in Rajasthan is practically identical (Narayan, 1959). Sapre (1963) reported the average difference in the body weights between a ram lamb of 12 months of age and a mature ram of chokla
breed to be 10.1 kg maintained under fairly high level of nutrition on farm conditions. Under the present study the growth of a yearling ram lamb of Marwari breed under continuous controlled grazing system on yearlong basis is 14.05 kg and seems to be satisfactory.

SUMMARY

Grazing trials with yearling ram lambs of Marwari breed under different pastoral treatments were conducted for one year from July 1962 to June 1963, on two “Fair” condition class rangelands in Pali District of western Rajasthan with rainfall of 278.6 to 315.9 mm during the year.

1. Maximum gains in body weights of lambs were observed under continuous controlled grazing on yearlong basis followed by the treatment where rangeland was deferred to grazing during late monsoon.

2. Of the total increase in body weight of lambs on yearlong basis the gains during early monsoon and autumn account for 33.1 and 24.6 per cent respectively and are the highest per fortnight per lamb for both periods.

ACKNOWLEDGEMENTS

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REFERENCES


