

SHEEP IN RAJASTHAN

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PREFACE

Sheep husbandry has traditionally been one of the most viable elements of the agro-economic system of the State of Rajasthan. Recognising the importance of sheep rearing, particularly in the marginal lands in the drier western part of the state, a Sheep and Wool Department of the State Government has been functioning as an apex body for coordinating research, development and extension efforts in this area. The National Commission on Agriculture has, in its report on developmental strategies for the desert areas, laid strong emphasis on the need for strengthening the sheep sector of Rajasthan. While C. A. Z. R. I. has since its inception, been involved in sheep research, both under farm and rangeland conditions, a full-fledged sheep and Wool Research Institute of the I. C. A. R. has also been operating at Avikanagar in this state. Lately, sheep development activities have been initiated in the districts covered by the D. P. A. P.

Thus, while there has been a consciousness at official levels about the need for revamping the sheep sector in Rajasthan, no attempt seems to have been made so far to project an integrated eco-

logical picture of the status of sheep in Rajasthan. The Division of Basic Resources Studies of C. A. Z. R. I. has acquired, through years of painstaking survey, a wealth of information on climate, land use, vegetation types, etc. of different parts of the state, while the Sheep and Wool Department and the Livestock Census Department of the Government of Rajasthan have been collecting valuable information on sheep breeds — their population densities and distribution patterns, wool production, etc. I am glad that Scientists of the Divisions of Basic Resources Studies and Animal Studies at C. A. Z. R. I. have joined hands to collate, for the first time in this country, the available information on Rajasthan's sheep breeds and their relationship to their respective environments. The maps and Tables in this monograph provides a good deal of quantitative information on this relationship and serve to present an ecological framework within which the sheep sector in Rajasthan is operating.

It is hoped that the information presented here will be useful to sheep research and environment programme.

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23 March 1981

INTRODUCTION

Sheep husbandry has been practised in Rajasthan for centuries. In fact, the ideal land use practice for the dry, western part of the state would seem to be sheep and goat husbandry, as rainfall is too uncertain, and too unpredictable here to sustain any sedentary form of agriculture. Basically, sheep husbandry involves transhumance, i.e. periodical migration of the flocks, in search of forage, particularly in years of drought and famine. In the sociological milieu of the desert, this hard task of driving the sheep over vast distances and bringing them back to their home tracts as the situation improves, has been traditionally assigned to a dedicated community — the *Raika*. These people have kept alive a way of life that is almost akin to pastoral nomadism — which once held sway over vast tracts of the Central Asian uplands. Thus, sheep rearing is not just another means of earning a livelihood in Rajasthan, it is interwoven with the whole texture of rural society here.

The origin of the sheep breeds of Rajasthan is not known with any certainty. However, it has been believed, on the basis of certain inherited blood characteristics of the present day breeds, that their ancestors could have descended from the mountainous regions of Afghanistan. The continued prevalence of pastoral nomadism in this region is indicative of an arrested society, somewhere midway between the domestica-

tion of animals, after the hunter gathering stage, and the settled forms of agriculture. The impact of physical forces in sustaining this sociological phenomenon is clearly evident. The excavations of Harappan and pre-Harappan settlements along the bed of the now dry Ghaggar river show evidences of a thriving, crop-growing community of 4000 years ago. When sudden and successive flooding of the river wiped out these settlements, only vast stretches of sand formed the landscape. In other parts of western Rajasthan, adverse elemental forces of a diverse nature created similarly inhospitable terrains. The net result was that the impetus for sedentary agriculture got checked with time and pastoral nomadism became the mainstay of human survival in this region. The preeminence of livestock husbandry in western Rajasthan may thus be ascribed to historio-geographical reasons, although the continuing impact of biotic interference on the eco-system has undoubtedly aggravated the 'dust bowl' conditions.

The sheep has, therefore, sufficient reason to be present in large numbers in Rajasthan. Its contribution to the sustenance of the rural economy of the state has been well documented, although poor husbandry conditions, meagre feed and water availability, intense solar radiation, the need to walk over long distances in search of forage and the generally low genetic potential of the animals preclude

any possibility of even a fair return to the stock — owners. The recent formation of the Wool Marketing Federation in the state is aimed at mitigating some of these disadvantages and at ensuring a fair deal to the wool growers.

In order to properly assess the status and potentials of the sheep sector in Rajasthan, it is necessary to have recourse to some sort of perspective planning, taking into consideration the ecological imperatives that govern the flow of the marketable produce. The objective of this monograph is to provide the needed perspective. A good deal of livestock census data collected by various state government agencies have of necessity been used for this purpose. The survey reports of the Division of Basic Resources Studies of CAZRI have

naturally formed the basis for an ecological evaluation of the whole situation. As far as we are aware, this monograph provides the first cartographic representation of all relevant aspects of the ecology of sheep in Rajasthan. We sincerely thank all those numerous workers and agencies whose painstaking work has made this monograph possible.

We wish to record our deep sense of gratitude for the inspiration, guidance and support that we have constantly received from Dr. H. S. Mann, Director, and Dr. K. A. Shankarnarayan, Head, Division of Basic Resources Studies, CAZRI, in the course of preparation of this monograph. We would also like to thank Shri B. L. Tak and Shri R. K. Abichandani for their help in the production of this monograph.

Authors

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CHAPTER I

Livestock Population And Grazing Land Per Head Of Animal

The total livestock population in Rajasthan during the livestock census in 1972 was estimated as 3,88,77,506 out of which cattle, goats, sheep, buffaloes and others (including horses, camels and other livestock, etc.) constitute 32.07, 31.28, 22.00, 11.81 and 2.81 per cent respectively of the total livestock population. The available grazing area per head of livestock is, however, very small, viz. 0.20 ha. The total grazing land comprises 79,18,869 ha which constitutes 23.14 per cent of the total geographical area of the state. This indicates that the livestock population in Rajasthan is considerably high and that pressure on the grazing land is also great. The net result has been overgrazing and deterioration of the surface vegetation — conditions largely responsible for increased desertification hazards.

Table 1 (A,B,C&D) gives an account of the variation in livestock population

and their pressure on grazing land in different climatic regions of Rajasthan.

Maps 1 & 2 and Table 1 clearly indicate that there is a distinct relation between rainfall and the distribution of different livestock species and grazing land in Rajasthan. Thus, in the arid zone where pressure on the grazing land is very high, sheep and goat predominate. In the semi-arid zone, sheep and goats are important in the Aravalli areas whereas cattle predominate in the plains. The number of buffaloes increase with increase in the rainfall. Cattle are, however, important in both the sub-humid and the humid belts. While the percentage of grazing areas is more in the Aravalli districts, in Rajasthan as a whole, grazing area/livestock is generally low (Map 3).

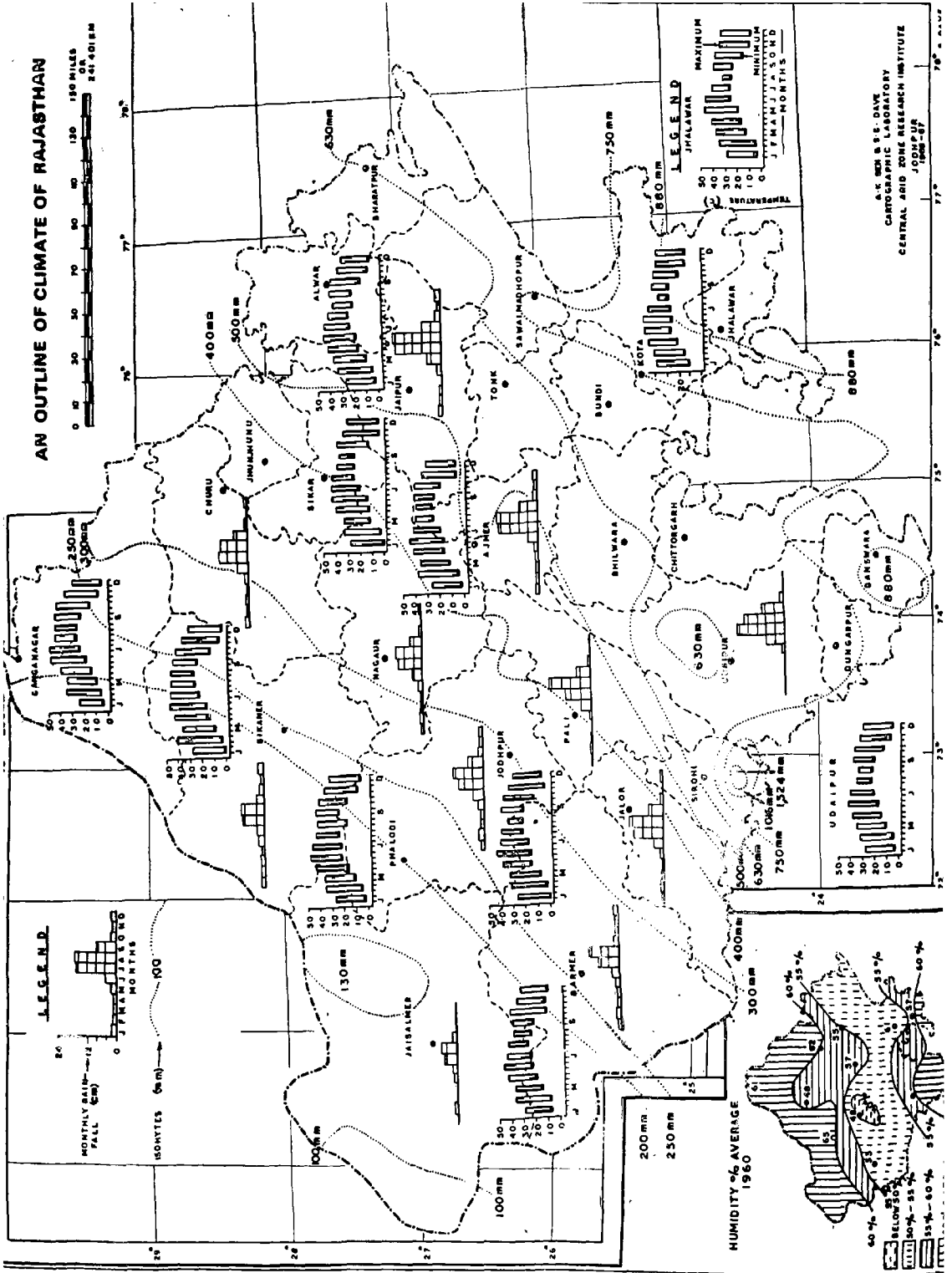
In general, the pressure of livestock population on grazing area is quite high in all these climatic belts.

Table 1. Livestock population in Rajasthan

S. No.	District	Total live-stock	Livestock population (%)				Others	Grazing area, % of total area	Grazing area, per livestock in ha
			Cattle	Buffaloes	Sheep	Goats			
1-A. Arid zone (Annual rainfall below 500 mm)									
1.	Barmer	1974350	9.09	0.68	28.75	55.15	6.30	22.08	0.32
2.	Bikaner	898760	24.85	3.21	44.70	21.07	6.13	68.13	1.93
3.	Churu	1426375	20.02	9.34	29.50	34.24	6.85	7.03	0.08
4.	Ganganagar	1533671	30.43	16.86	18.44	26.22	8.01	2.04	0.27
5.	Jaisalmer	616435	10.56	0.05	50.80	31.23	7.82	4.44	3.08
6.	Jaore	1234772	20.15	5.31	36.70	35.46	2.36	5.99	0.05
7.	Jhunjhunu	978508	18.56	14.53	21.62	39.95	5.31	8.83	0.05
8.	Jodhpur	1893200	22.50	2.53	36.05	35.56	3.26	6.69	0.08
9.	Nagaur	2304209	25.08	5.92	34.80	31.99	2.18	4.80	0.08
10.	Pali	1893650	27.55	6.42	33.11	31.43	1.46	8.21	0.05
11.	Sikar	1530178	19.85	10.46	25.91	40.41	3.33	8.59	0.04
1-B. Semi-arid zone (Annual rainfall between 500-650 mm)									
12.	Alwar	1405255	34.26	24.52	6.47	3.14	3.47	7.83	0.05
13.	Jaipur	2545345	36.59	18.25	14.49	28.52	2.12	14.63	0.08
14.	Bharatpur	1161393	40.57	35.32	4.51	16.10	3.46	7.59	0.05
15.	Ajmer	1686459	30.72	9.23	32.88	26.00	1.11	21.21	0.11
16.	Bhilwara	2471205	33.21	10.00	31.56	23.95	1.26	38.57	0.16
17.	Tonk	1203044	38.72	13.80	25.15	21.35	0.96	19.97	0.12
18.	Sawai								
	Madhopur	1499776	39.39	2.59	5.72	31.99	2.28	13.39	0.09
1-C. Sub-humid zone (Annual rainfall between 650-750 mm)									
19.	Sirohi	772117	29.99	7.56	22.24	38.20	1.28	10.75	0.07
20.	Bundi	791395	41.70	10.29	12.25	34.44	1.30	34.27	0.22
21.	Chittorgarh	1695353	47.65	12.71	11.95	26.49	1.17	10.35	0.07
22.	Udaipur	3465880	38.24	11.82	13.75	35.18	9.90	24.36	0.12
1-D. Humid zone (Annual rainfall above 750 mm)									
23.	Dungarpur	923026	40.87	14.06	13.81	30.27	0.95	19.97	0.08
24.	Banswara	916494	52.99	14.37	2.20	29.71	0.69	11.04	0.06
25.	Jhalawar	851942	56.02	16.85	2.93	22.60	1.50	24.21	0.17
26.	Kota	1204524	58.24	13.34	3.61	22.60	1.88	16.16	0.17
Total		38877506							
Total (%)		100	32.07	11.81	22.00	31.28	2.81	23.14	0.20

In general, the pressure of livestock population on grazing area is quite high in all these climatic belts.

AN OUTLINE OF CLIMATE OF RAJASTHAN



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CHAPTER II

Sheep Concentration Zones In Rajasthan

Map 4 represents the *tehsil*wise sheep population as per cent of the total sheep population of Rajasthan. The object of this map is to depict the sheep concentration areas. The mappable informations have been collected from the report on the livestock census of Rajasthan, 1972, published by the Board of Revenue (Land Records), Rajasthan (1974) and from Statistical Abstracts (1977) published by the Directorate of Economics and Statistics, Government of Rajasthan. The map has been prepared on the choropleth technique taking the *tehsil* as the unit. Six sheep concentration zones are identified and mapped. The concentration is high in the areas having less than 300 mm annual rainfall and in the *tehsils* lying along the foothills of the Aravallis, and low in humid and sub-humid belts—the maximum concentration being in Jaisalmer (2.13%) *tehsil* of the same district and Phalodi and Osian *tehsils* (2.11%) in Jodhpur district. Except in Ganganagar district (excluding Nohar and Bhadra *tehsils*) and in Barmer *tehsil* of Barmer district, in general, the concentration is more than 0.51% of the total sheep population. The concentration is, however, low (below 0.50%) in Churu *tehsil* of Churu district and Nagaur district (excluding

Parbatsar and Degana). The concentration is the lowest (below 0.10%) in the *tehsils* of the humid and sub-humid zones, particularly the Gang and Bhakra canal irrigated areas of Ganganagar district. Interestingly, however, the *tehsil*wise lowest concentration has been recorded in Barmer *tehsil* (0.03%) which is in the arid zone. On the whole, the central portion of the western region has the highest concentration of sheep population.

The map again emphasises that sheep thrive mostly in the drier areas.

Dynamics of sheep population in Rajasthan

Map 5 represents the following factors: (i) districtwise sheep population as per cent of total livestock, (ii) districtwise growth of sheep population as recorded during 1956, 1961, 1966 and 1972 (livestock census years), and (iii) the relationship between the increase or decrease of sheep population during 1966-72 (shown in inset). The mappable informations have been collected from the Board of Revenue (Land Records), Government of Rajasthan, Ajmer, and the Indian Meteorological

Department. The map reveals the following characteristics:

(a) Sheep population as per cent of total livestock population is higher in the districts of the arid zone (25 per cent to 51 per cent) except in the irrigated areas of Ganganagar (18.4%). In the transitional districts (between arid and semi-arid) the percentage varies between 25.1 per cent and 35.0 per cent of total livestock. In the humid and sub-humid districts the percentage is between 15 and 5, whereas in the humid districts the percentage is the lowest, being 5 or below 5.

(b) The sheep population increased considerably, and steadily, in almost all the districts between 1956 and 1966. The trend, however, declined slightly during 1966-72, except in the districts transitional between arid and semi-arid. The sheep population declined by 2.84 per cent in Rajasthan during 1966-72. The significant fall in sheep population during 1966-72 in Jaisalmer, Barmer and Bikaner are most likely to be due to the shifting of the population of a number of villages along the border because of the prevailing drought conditions. Earlier sheep rearing was one of the most important occupations of the inhabitants of these villages.

(c) It is evident that there is a direct relation between the growth or decline of sheep population and rainfall pattern. Sheep population increased in the districts where rainfall decreased during the decades under consideration.

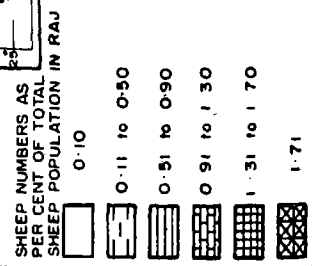
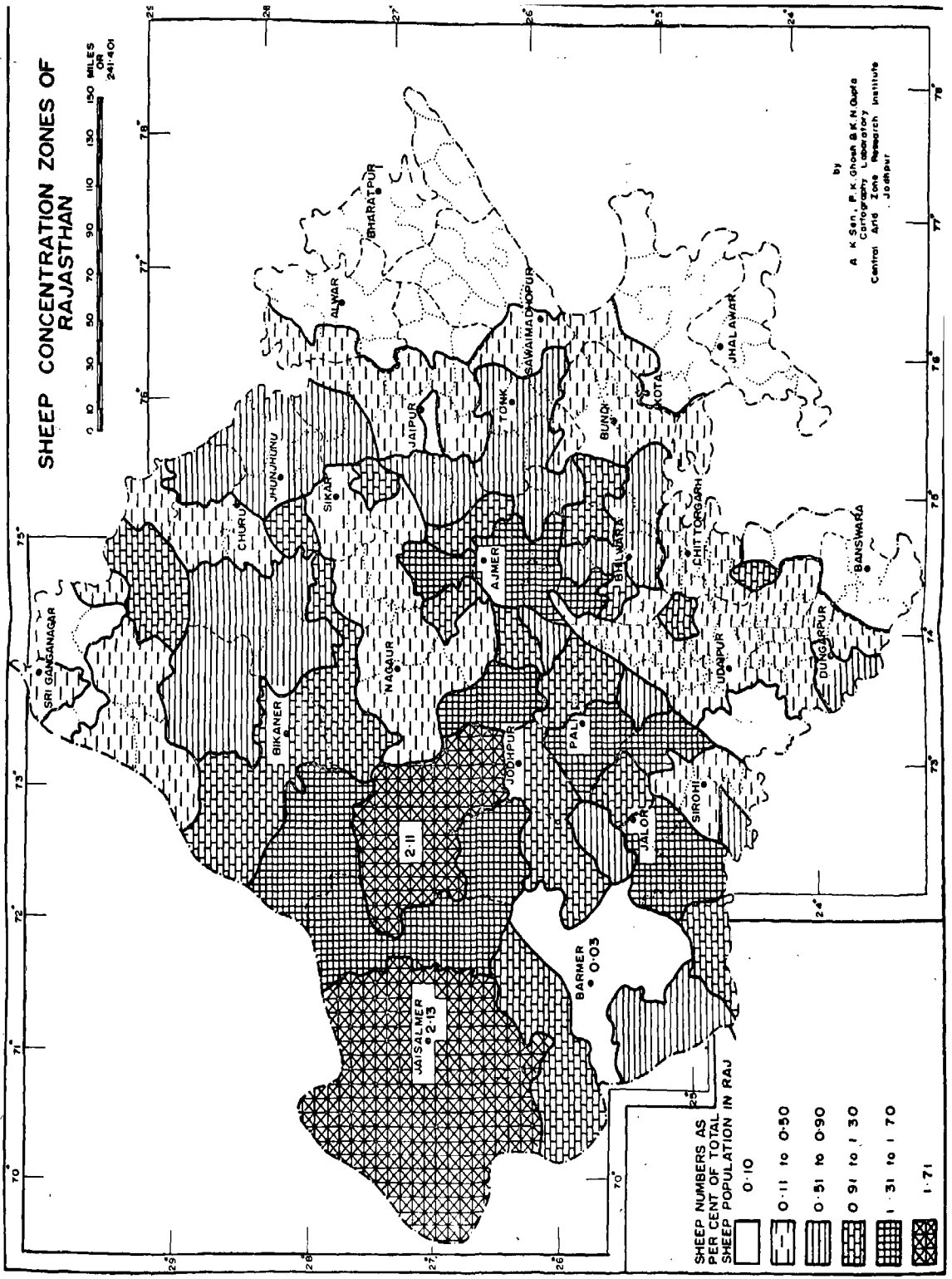
Sheep population — pasture land and grassland types of Rajasthan

Sheep population in relation to total livestock population has been shown in

map 6. That the percentage of sheep population is higher in the arid zone as is evident from the data presented in the map—(i) rainfall below 200 mm: Jaisalmer—47.23%; Bikaner—48.10%; (ii) rainfall 200 mm—300 mm: Ganganagar—24.63%; Jodhpur—33.70%; Barmer—27.74%; Jalore—34.64%; (iii) rainfall 300 mm—500 mm: Churu—29.76%; Nagaur—25.68%; Pali—29.98%; Sikar—26.18%; Jhunjhunu—27.05; (iv) rainfall 500 mm—650 mm: Alwar—8.4%; Bharatpur—6.31%; (v) rainfall 650 mm—750 mm: Bhanswara—3.13%; Jhalawar—2.72% and Kota—4.36%. The percentages of pasture land (sum total of culturable current fallow, long fallow and permanent pasture) are also incorporated in the map. The informations presented have been collected from the maps prepared earlier for the Agricultural Atlas of Rajasthan (1972). The percentages of permanent grasslands of each district are shown in an inset map. It is evident that due to the scarcity of permanent grassland the sheep need to be grazed in other uncultivable lands also. The grassland types of different pasture lands have been indicated to show the relationships of the different pasture types with sheep population.

In the dry districts of Jaisalmer, Bikaner and Barmer 80 per cent of the area is available for grazing. This consists of culturable waste lands, *oran* or permanent pasture lands, waste lands, and short and long fallows. The area available for livestock grazing in Jodhpur, Nagaur, Jalore, Ganganagar and Churu ranges from 50 to 80 per cent. The districts of Jhunjhunu, Sikar, Sirohi have 30 to 50 per cent of the area for grazing of livestock. In the eastern districts the

SHEEP CONCENTRATION ZONES OF RAJASTHAN



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extent of grazing lands for maintaining livestock is very high in Sawai Madhopur, Bhilwara, Chittorgarh, Dungarpur, Udaipur and Banswara. It ranges from 50 to 80 per cent. In Kota, Banswara, Jaisalmer and Ajmer the rangelands account for less than 50 per cent of the gross area. In districts where the range-

lands cannot be grazed continuously due to limitation of stock water, cattle population is relatively higher than sheep or goat population. In rangelands where annual and creeping perennial grasses dominate, sheep is the predominant grazing animal.

Distribution Of Sheep Breeds In Rajasthan

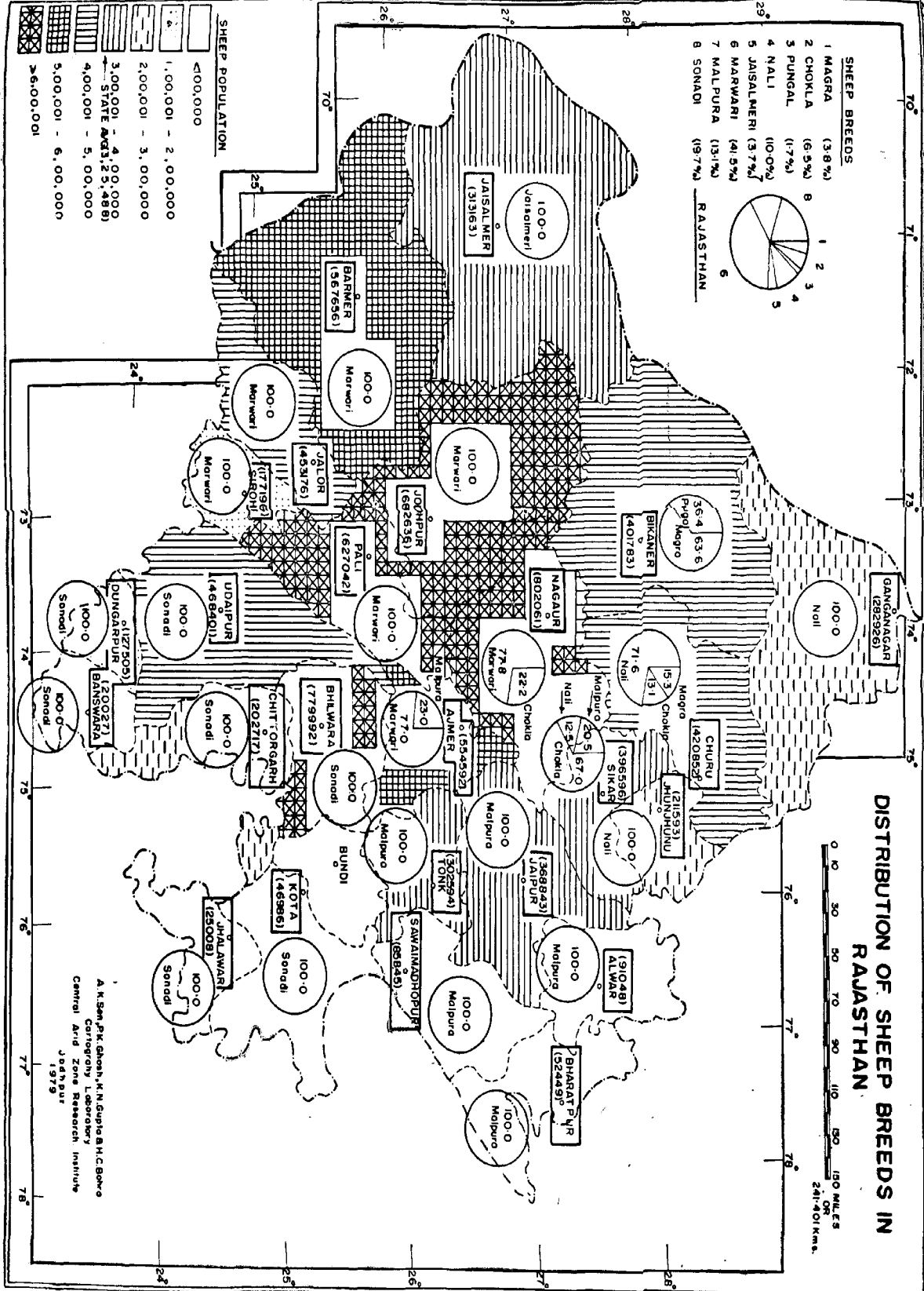
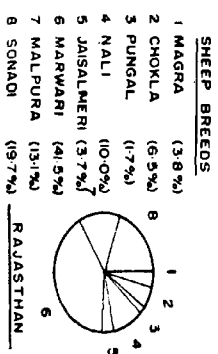
Map 7 represents the population of different types of sheep breeds in Rajasthan. The data have been collected from the Sheep and Wool Department of the Government of Rajasthan. Eight different sheep breeds have been identified in Rajasthan. These are: Magra (320214), Chokla (546816), Pungal (146079), Nali (845410), Jaisalmeri (313613), Marwari (3511456), Malpura (1108913) and Sonadi (1670636) which constituted 3.8, 6.5, 1.7, 10.0, 3.7, 41.5, 13.1 and 19.7 per cent respectively of the total sheep population in Rajasthan during 1972. It is interesting to compare this map with earlier maps prepared to show the dynamics and density distribution of sheep population in Rajasthan. The *Marwari* (3511456) group is concentrated in the desert, i.e. Barmer, Jodhpur, Pali, Sirohi and Jalore (all 100%), Nagaur (71.8%) and Ajmer (77.1%). The *Sonadi* is found exclusively in Udaipur, Bhilwara, Dungarpur, Banswara, Chittorgarh, Jhalawar, Kota and Bundi, i.e. in the central and southern Aravalli districts. The *Malpura* breed is concentrated in central Rajasthan (semi-arid region). Sikar (20%), Alwar (22%), Jaipur, Tonk and Sawai Madhopur (100%) are the important districts for this breed. The *Jaisalmeri* breed is found exclusively in the district

of the same name. Bikaner has *Magra* (63.6%) and *Pungal* (36.4%), while Churu has *Magra* (15.3%), *Chokla* (13.1%) and *Nali* (71.6%). Nagaur (22.2%) and Sikar (67%) also have the *Chokla* breed. The *Nali* breed is also found in Sikar (12.5%), Jhunjhunu (100%) and Ganganagar (100%).

The total sheep population of the state has been recorded as 84,62,687. According to the pattern of distribution of sheep population, 8 belts may be demarcated. The belt having the densest sheep population comprises Jodhpur, Nagaur, Pali and Bhilwara (above 6,000,00). The belt with the lowest sheep population covers the eastern alluvial plain in Alwar, Bharatpur, Sawai Madhopur, Bundi, Kota, Jhalawar and Banswara (below 1,00,000).

Distributional pattern of sheep breeds in Rajasthan

On the basis of analysis of the previous maps along with the maps prepared on sheep population, an attempt has been made to map (Map 8) the sheep breed association belts in Rajasthan. The map, in general indicates the predominance of the *Malpura* and *Sonadi* breeds in eastern Rajasthan and of the *Jaisalmeri*, *Marwari*, *Pungal*, *Chokla*, *Magra*

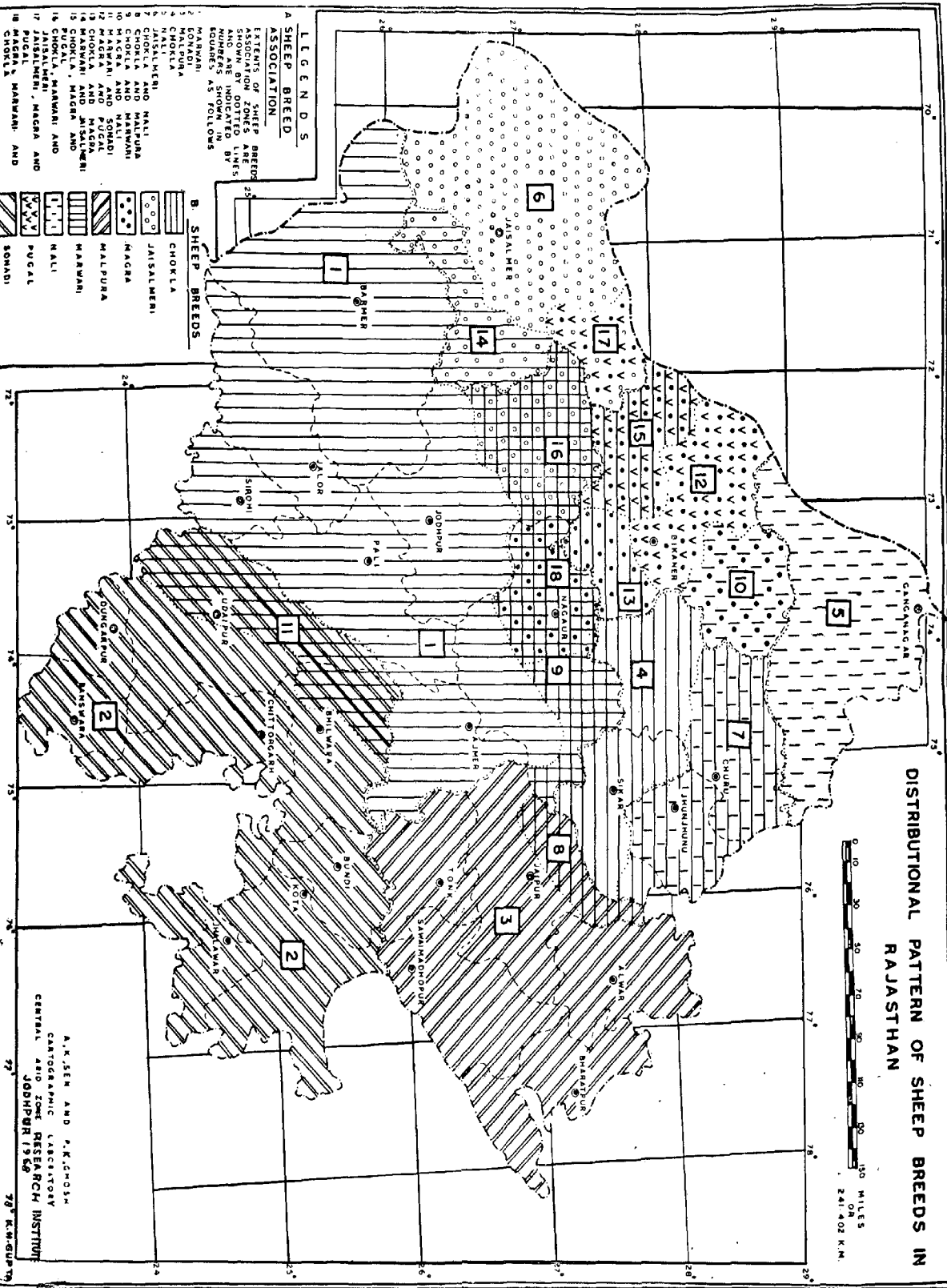


DISTRIBUTION OF SHEEP BREEDS IN RAJASTHAN



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DISTRIBUTIONAL PATTERN OF SHEEP BREEDS IN RAJASTHAN



A SHEEP BREED ASSOCIATION

EXTENTS OF SHEEP BREED ASSOCIATION ZONES ARE INDICATED BY DOTTED LINES. NUMBERS SHOWN IN SQUARES AS FOLLOWS

B SHEEP BREEDS

- 1 MALPURA
- 2 SONADI
- 3 CHOKLA
- 4 NALLI
- 5 JAISALMERI
- 6 CHOKLA AND MALPURA
- 7 CHOKLA AND MARWARI
- 8 MARGA AND NALLI
- 9 MARGA AND PUGAL
- 10 MARGA AND PUGAL
- 11 CHOKLA AND MARGA
- 12 CHOKLA, MARGA AND PUGAL
- 13 CHOKLA, MARGA AND PUGAL
- 14 MARWARI AND PUGAL
- 15 MARWARI AND PUGAL
- 16 MARWARI AND PUGAL
- 17 JAISALMERI, MARGA AND PUGAL
- 18 CHOKLA, MARWARI AND PUGAL

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and *Nali* breeds in the arid zone. The their occurrences are shown in different sheep breed associations and Table 2.

Table 2. Distribution of sheep breeds

Mapping unit	Association	Location	Sheep characteristics
1	2	3	4
1	Marwari	Barmer, Jalore, Sirohi, Pali, Ajmer, Jodhpur (excluding Phalodi <i>tehsil</i>), Parbatsar, Merta and part of Didwana and Nawa <i>tehsils</i> of Nagaur.	Black faced, stocky and medium built, adult males weighing on an average 45 kgs. This is a highly stabilised breed, capable of undertaking long journeys and possessing high resistance to diseases and worms.
2	Sonadi	E. Udaipur, Dungarpur, Banswara, Chittorgarh, E. Bhilwara, Bundi, Kota and Jhalawar.	Appears light brown in colour, weighing more than 60 kgs; withstands heavy rainfall and can walk through hilly areas.
5	Malpura	Alwar, Bharatpur, Sawai Madhopur, Tonk and Jaipur (excluding N.W. adjacent to Sikar and Nagaur).	Appears almost completely white; weighs about 50 kgs.
6	Chokla	Sikar and southern Churu.	Very light built, weighing about 26 kgs.
5	Nali	Ganganagar.	Light brown faced, weighing about 35 kgs.
6	Jaisalmeri	Jaisalmer <i>tehsil</i> .	Brown and black faced, weighing about 45 kgs.
7	Chokla-Nali	N. Churu and Jhunjhunu	—
8	Chokla-Malpura	N.W. Jaipur bordering Sikar.	—
9	Chokla-Marwari	Jayal, Didwana, Ladnu <i>tehsils</i> of Nagaur.	—

Table 2 (contd.)

Mapping unit	Association	Location	Sheep characteristics
1	2	3	4
10	Magra-Nali	Lunkaransar of Bikaner.	Magra are of good built, weighing about 35 kgs.
11	Marwari-Sonadi	W. Udaipur and W. Bhilwara.	—
12	Magra & Pungal	Bikaner <i>tehsil</i> .	Pungal are fairly well built, weighing about 30 kgs.
13	Chokla-Magra	Nokha <i>tehsil</i> of Bikaner.	—
14	Marwari-Jaisalmeri	South of Pokran <i>tehsil</i> .	—
15	Chokla-Magra-Pungal	Kolayat <i>tehsil</i> of Bikaner.	—
16	Chokla-Marwari-Jaisalmeri	Phalodi <i>tehsil</i> .	—
17	Jaisalmeri-Magra-Pungal	Nachna area of north Pokran <i>tehsil</i> of Jaisalmer district.	—
18	Magra-Marwari-Chokla	Nagaur <i>tehsil</i> adjacent to Phalodi <i>tehsil</i> of Jodhpur.	—

Nali are found along the northern border of Bikaner division, particularly Ganganagar. *Magra* are distributed along the borders of Jaisalmer, Nagaur and Bikaner districts. *Chokla* or *Shekhawati* are common in Churu, Jhunjhunu and Sikar districts. *Marwari* are found all over Jodhpur, Jaipur and parts of Ajmer division. *Jaisalmeri* are concentrat-

ed in Jaisalmer district and in Phalodi *tehsil* of Jodhpur. *Malpura* are found in Jaipur, Tonk and Sawai Madhopur districts. *Sonadi* are distributed in Udaipur and Kota division and are common in sub-humid and humid areas. They withstand heavy rainfall conditions and extend into Gujarat state to the south.

CHAPTER IV

Production Of Wool In Rajasthan

Rajasthan is a leading wool growing state in India, producing about one third, or 40 per cent of the country's total output of wool. Map 9 represents the districtwise production and the percentage of the total wool production of the state in different agro-climatic conditions. Mappable informations have been collected from the Sheep and Wool Department of the Government of Rajasthan. The total production of wool in Rajasthan state has been estimated as 1148873 kg. Sheep of Chokla, Magra, Pungal, Nali, Jaisalmeri, Marwari, Malpura and Sonadi breeds yielded 841814 kg (7.3%), 608819 kg (5.3%), 243952 kg (2.1%), 1796383 kg (15.7%), 516719 kg (4.5%), 4648968 kg (40.5%), 1058273 kg (9.2%) and 1773804 kg (15.4%) respectively of the total wool produced in the state. It is thus evident that the Marwari breed contributes the largest share of the annual clip, followed by the Nali and the Sonadi. The percentage of total wool produced by different sheep breeds in different districts have been shown by pie graphs in the map. The map attempts to give a realistic picture of the status of wool production in Rajasthan. Data on production of wool in different climatic regions of the state have been

presented in Table 3 (A, B, C, D, E and F).

According to the agroclimatic regions, as shown in the Agricultural Atlas of Rajasthan (1972), the production of wool may be accounted for as follows:

1.	Arid	41.3	Per cent
1a.	<i>Kharif</i> Mono cropping	35.1	„
1b.	Irrigated <i>kharif & rabi</i> cropping	6.2	„
2.	Transitional (between arid and semi-arid)	27.9	„
3.	Semi-arid	19.9	„
4.	Sub-humid	6.9	„
5.	Humid	4.0	„

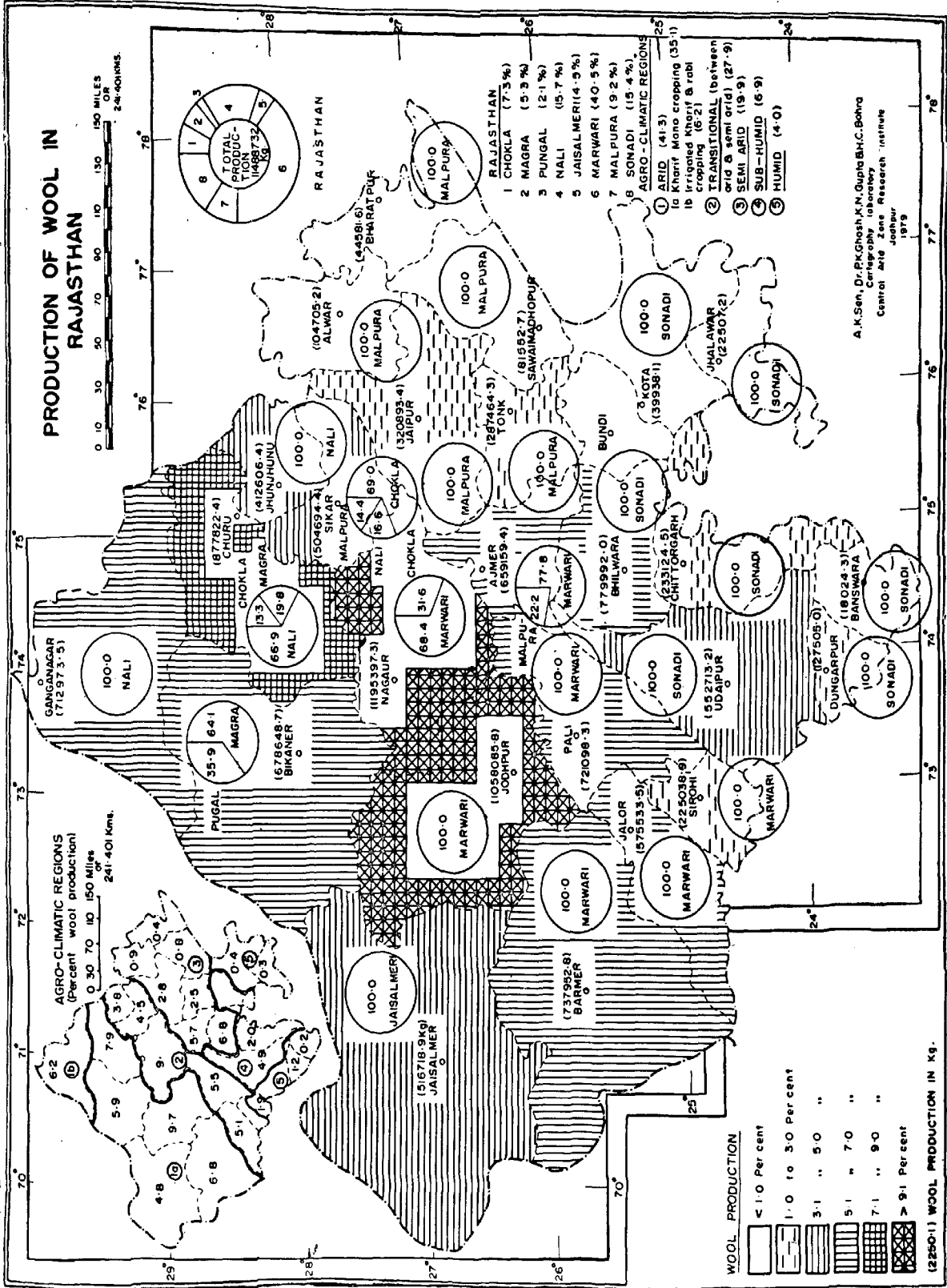
Wool production (g/ha) of grazing land in Rajasthan

Map 10 depicts districtwise wool production (g/ha) of grazing land in Rajasthan. The wool production data have been collected from the Sheep and Wool Department, Government of Rajasthan, Jodhpur. The figures for grazing land comprises the sum total of culturable wastes and permanent pasture land as collected from the Board of Revenue

Table 3. Production of wool in Rajasthan

District	Production (kg)	Percentage of total production of the state
<i>3-A. Arid region</i>		
Jaisalmer	516719	4.8
Barmer	737952	6.6
Bikaner	678649	5.9
Churu	877822	7.8
Jodhpur	1058086	9.7
Total	3869228	34.8
<i>3-B. Transitional between arid and semi arid</i>		
Jhunjhunu	412606	3.8
Jalore	575534	5.1
Nagaur	1195397	9.3
Pali	721098	5.5
Sikar	504694	4.5
Total	3409329	28.2
<i>3-C. Arid irrigated</i>		
Ganganagar	712974	6.2
<i>3-D. Semi arid region</i>		
Ajmer	659159	5.7
Alwar	104705	0.9
Jaipur	320893	2.8
Tonk	287464	2.5
Sawai Madhopur	81553	0.8
Bharatpur	44582	0.4
Bhilwara	779992	6.8
Total	2278348	19.9
<i>3-E. Sub-humid region</i>		
Sirohi	225039	1.9
Udaipur	552713	4.9
Chittorgarh	233125	2.0
Bundi	—	0.0
Total	1010877	8.8
<i>3-F. Humid region</i>		
Banswara	18024	0.2
Jhalawar	22507	0.3
Kota	39938	0.4
Dungarpur	127505	1.2
Total	207974	2.1

PRODUCTION OF WOOL IN RAJASTHAN



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 Cartography Laboratory
 Central Arid Zone Research Institute
 Jaipur
 1979

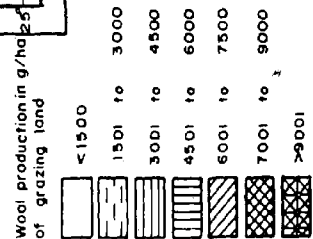
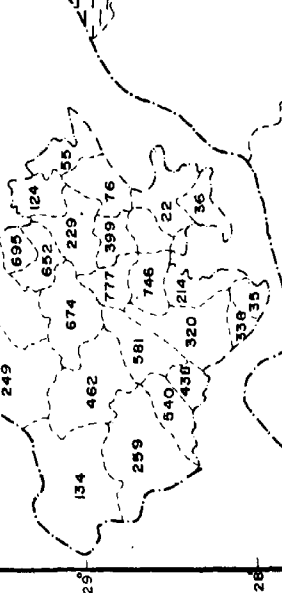
WOOL PRODUCTION IN g/ha OF GRAZING LAND IN RAJASTHAN

0 10 20 30 40 50 60 70 80 90 100 150 MILES
OR
0 10 20 30 40 50 60 70 80 90 100 150 Kms.

76° 77° 78°

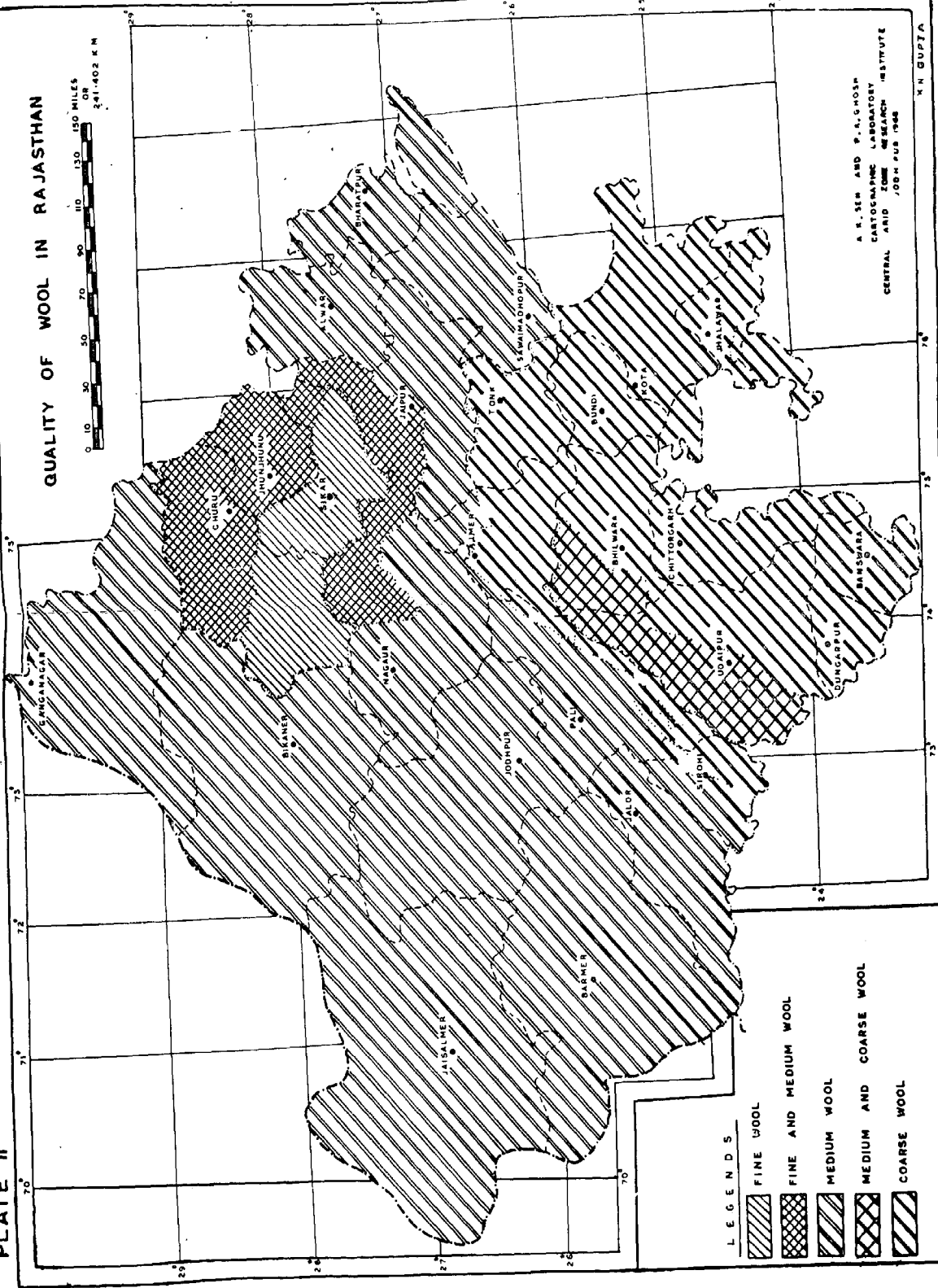
70° 71° 72° 73° 74° 75° 76° 77° 78°

Wool production in grams / ha in Raj.
0 30 70 100 150 MILES
OR
0 30 70 100 150 Kms.








A. K. Sen, P. K. Ghosh, K. N. Gupta & H. C. Bohra
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Central Arid Zone Research Institute
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1979

QUALITY OF WOOL IN RAJASTHAN



LEGENDS

-  FINE WOOL
-  FINE AND MEDIUM WOOL
-  MEDIUM WOOL
-  MEDIUM AND COARSE WOOL
-  COARSE WOOL

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(Land Records), Statistics Section, Government of Rajasthan, Ajmer. As districtwise figures were available, a choropleth map has been designed. In an inset map wool production (g/ha) of the total geographical areas of each district has also been shown for purposes of comparison. Seven wool producing belts have been distinguished. The map shows that wool production per unit of land is high in Jalore (9022 g/ha) and Nagaur (14038 g/ha). The extreme arid zone and the humid and sub-humid districts have low production (below 1500 g/ha). The recorded low yield per unit of land in the arid zone, where the total production is high, is presumably due to high grazing pressure on the land and the relatively poor quality of the forage available.

Quality of wool in Rajasthan

Map 11 represents the quality of wool produced in different parts of Rajasthan. This synthetic map has been cartographed on the basis of correlation and analysis of all the other 10 maps prepared and described earlier. The quality of wool produced obviously depends on the genetic potentials of the sheep breeds and hence the map prepared on the sheep breeds in Rajasthan has been the basis for cartographing this particular map. In Rajasthan three grades of wool are produced—fine, medium and coarse. The medium quality wool, however, is predominantly produced in the state. *Tehsils* have been taken as the mapping unit. It is evident that with the increase in rainfall the quality of wool deteriorates. The *Nali* sheep produces about 1.5 to 3 kgs of washed wool of medium quality per sheep per year. Accordingly,

the areas dominated by the *Nali* breed, like Ganganagar, produces mainly medium quality wool. The *Magra* sheep which are shorn three times in a year, produces about 1.5 to 2 kgs of washed wool of medium quality per year. The *Marwari*, which is a highly stabilized breed, is capable of producing 1 to 2 kgs of washed wool of medium and coarse type per year per sheep. The *Chokla* or *Shekhawati* produces 1 to 2 kgs of washed wool of fine and medium quality per sheep per year. The districts dominated by the *Chokla*, like Churu and Sikar, produces fine grade wool in Rajasthan. On an average, the *Jaisalmeri* breed yields about 2 to 3.5 kgs of medium type wool per sheep per year. *Pungal* wool is generally medium to coarse in quality. These animals are shorn twice in a year and give 1.5 to 2 kgs washed wool per animal per year. *Malpura* sheep produce extremely coarse, hairy and straight wool, the weight of washed fleece being about 0.75 to 1 kg per sheep per year. Production of the *Sonadi* is also of the order of 0.75 to 1 kg of coarse wool and almost completely hairy fibres per sheep per year. Accordingly, on the basis of the distribution pattern of these eight sheep breeds five wool producing belts in Rajasthan have been demarcated. These are: (i) Fine wool belt—Sikar, part of Churu and Nagaur, (ii) Medium wool—Ganganagar, Bikaner, Jaisalmer, Barmer, Jalore, Jodhpur, part of Sirohi, Nagaur and Pali (all in the arid zone), (iii) Coarse wool—Udaipur, Bhilwara, Dungarpur, Banswara, Chittorgarh, Kota, Jhalawar, Bundi, Tonk, Ajmer (all in the humid, sub-humid and semi-arid zones), (iv) Fine and medium—Churu, Jhunjhunu, Jaipur and part of Nagaur,

and (v) Medium and coarse—Udaipur, Bhilwara, Sirohi (east of the Aravallis).

Table 4 gives details of the wool belts in Rajasthan. It will be seen from the Table that the different qualities of wool produced in the state and their contri-

bution to the total wool production of the state (11488731.8 kg) as percentage are as follows: fine — 548182.8 kg (4.77%), medium — 6760124.2 kg (58.84%), coarse — 1354939.6 kg (11.79%), fine and medium—1872055.8

Table 4. Wool quality belts of Rajasthan and production statistics

Wool belt	Districts	Wool production (kg)	
Fine	Sikar	431691.8	(Chokla + Nali)
	Churu	116491.0	(Chokla)
	Total	548182.8	(4.77%)
Medium	Bharatpur	44581.6	(Malpura)
	Ganganagar	712973.5	(Nali)
	Sawai Madhopur	81552.7	(Malpura)
	Bikaner	434696.8 + 243951.9 = 678648.7	(Magra) (Pungal)
	Jaisalmer	516718.9	(Jaisalmeri)
	Barmer	737952.8	(Marwari)
	Jalore	575533.5	(Marwari)
	Sirohi	124011.5	(Marwari)
	Pali	721098.3	(Marwari)
	Jodhpur	1058085.8	(Marwari)
	Nagaur	818172.7	(Marwari)
	Sikar	73002.6	
	Alwar	104705.2	(Malpura)
	Ajmer	513086.4	(Marwari)
	Total	6760124.2	(58.84%)
Coarse	Udaipur	402213.2	(Sonadi)
	Bhilwara	78090.0	(Sonadi)
	Dungarpur	127505.0	(Sonadi)
	Banswara	18024.3	(Sonadi)
	Chittorgarh	233124.3	(Sonadi)
	Kota	39938.1	(Sonadi)
	Jhalawar	22507.2	(Sonadi)
	Bundi	—	
	Tonk	287464.3	(Malpura)
	Ajmer	146073.0	(Malpura)
	Total	1354939.6	(11.79%)

Table 4 (contd.)

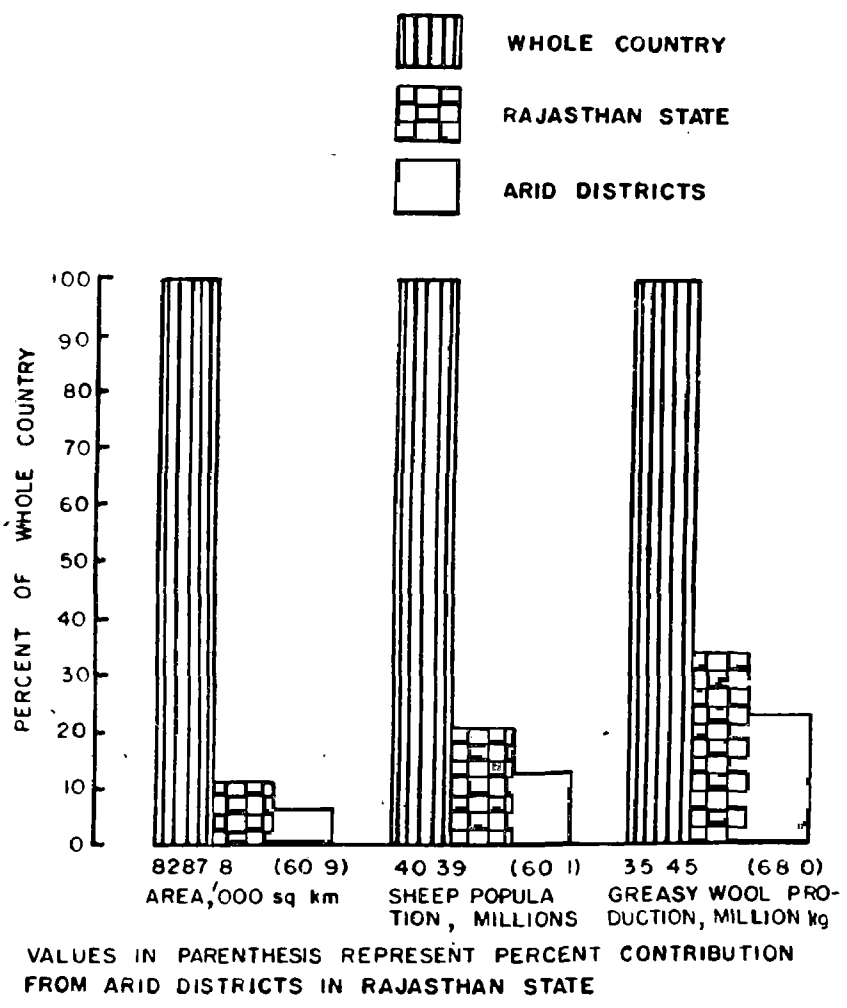
Table 4 (contd.)

Wool belt	Districts	Wool production (kg)	
Fine & medium	Churu	174122.1 + 587209.3 = 761331.4	(Magra) (Nali)
	Jhunjhunu	412606.4	(Nali)
	Jaipur	320893.4	(Malpura)
	Nagaur	377224.6	(Chokla)
	Total	1872055.8	(16.29%)
Medium & coarse	Udaipur	150500.0	(Sonadi)
	Bhilwara	701902.0	(Sonadi)
	Sirohi	101021.4	(Marwari)
	Total	953423.4	(8.29%)

Note : All data pertain to Livestock Census, 1972.

kg (16.29%), and medium and coarse— 953423.4 kg (8.29%). The Table further highlights the predominantly me-
dium quality of the wool produced in the state.

SHEEP POPULATION AND WOOL PRODUCTION FROM ARID DISTRICTS, IN RELATION TO THE WHOLE COUNTRY AND RAJASTHAN STATE.

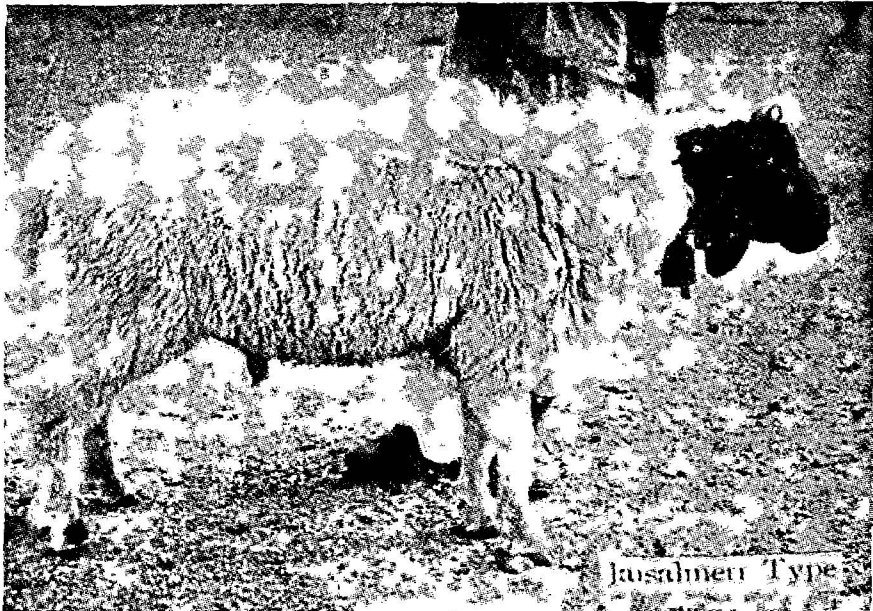
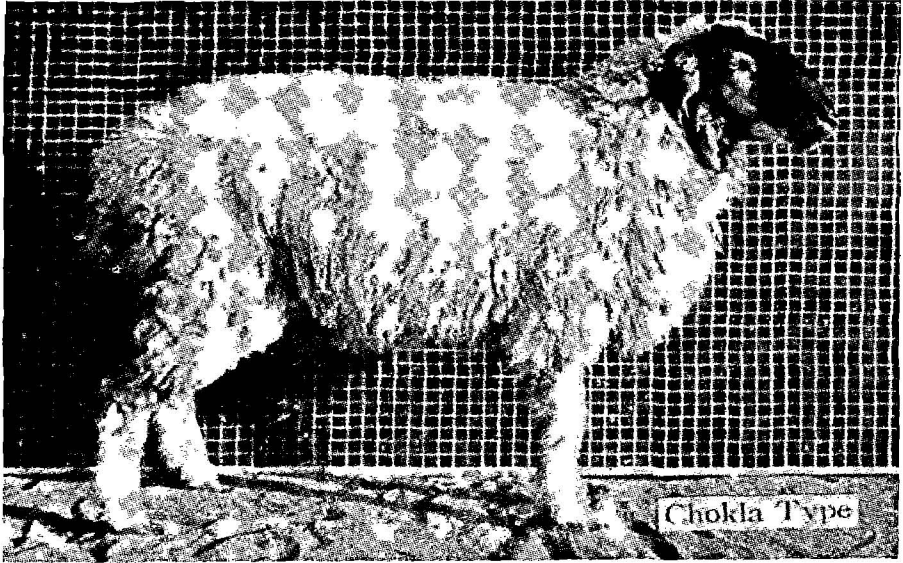


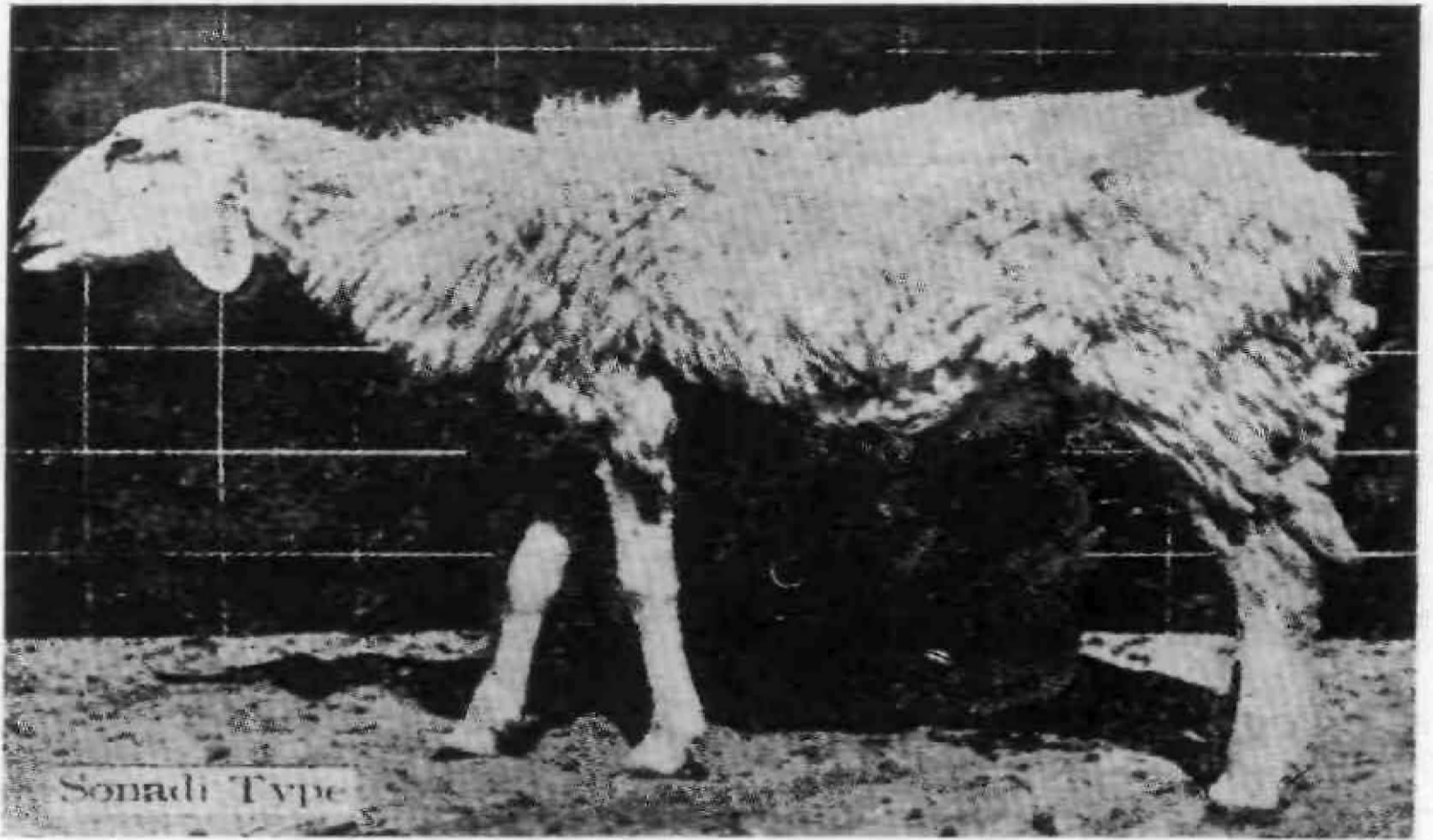
LITERATURE CONSULTED

- Acharya, R. M., Patnayak, B. C. and Ahuja, L. D. (1977). Livestock production—problems and prospects. In: *“Desertification and its Control”*. ICAR, New Delhi. pp. 275-280.
- Acharya, R. M. and Patnayak, B. C. (1977). Role of sheep in the desert eco-system and drought proofing through improved sheep production. In: *“Desert eco-system and its improvement”*. Ed. H. S. Mann, CAZRI Monograph No. 1, pp. 350-370.
- Anonymous *Annual Reports*. Central Arid Zone Research Institute, Jodhpur.
- Anonymous *Report on the livestock census of Rajasthan, 1972*. Board of Revenue (Land Records), Rajasthan, Ajmer.
- Anonymous (1973). Report of the Sub-Group on Sheep & Goat Development. National Commission on Agriculture, Govt. of India.
- Anonymous (1974). *Interim Report on Desert Development*. National Commission on Agriculture, Govt. of India.
- Kalla, J. C., Ghosh, P. K. and Joshi, B. R. (1977). Livestock productivity and desertification in the arid lands of western Rajasthan. *Ann. Arid Zone* 16 (3): 360-366.
- Kaila, J. C., Ghosh, P. K. and Joshi, B. R. (1978). Perspectives of sheep production in the arid region of western Rajasthan. In: *“Arid Zone Research in India (1952-1977)—Souvenir”*. Central Arid Zone Research Institute, Jodhpur. pp. 56-60.
- Narayan, N. L. (1964). Sheep and Wool. In: *“Recent Advances in Rajasthan”*. Ministry of Food & Agriculture, Govt. of India. pp. 63-76.
- Rajasthan Stud Sheep Breeders' Association (1957-58). *Hand Book for Stud Sheep Farmers*.
- Sen, A. K. (1972). *Agricultural Atlas of Rajasthan*. ICAR, New Delhi.
- Taneja, G. C. (1978). *Sheep Husbandry in India*. Orient Longman, New Delhi.

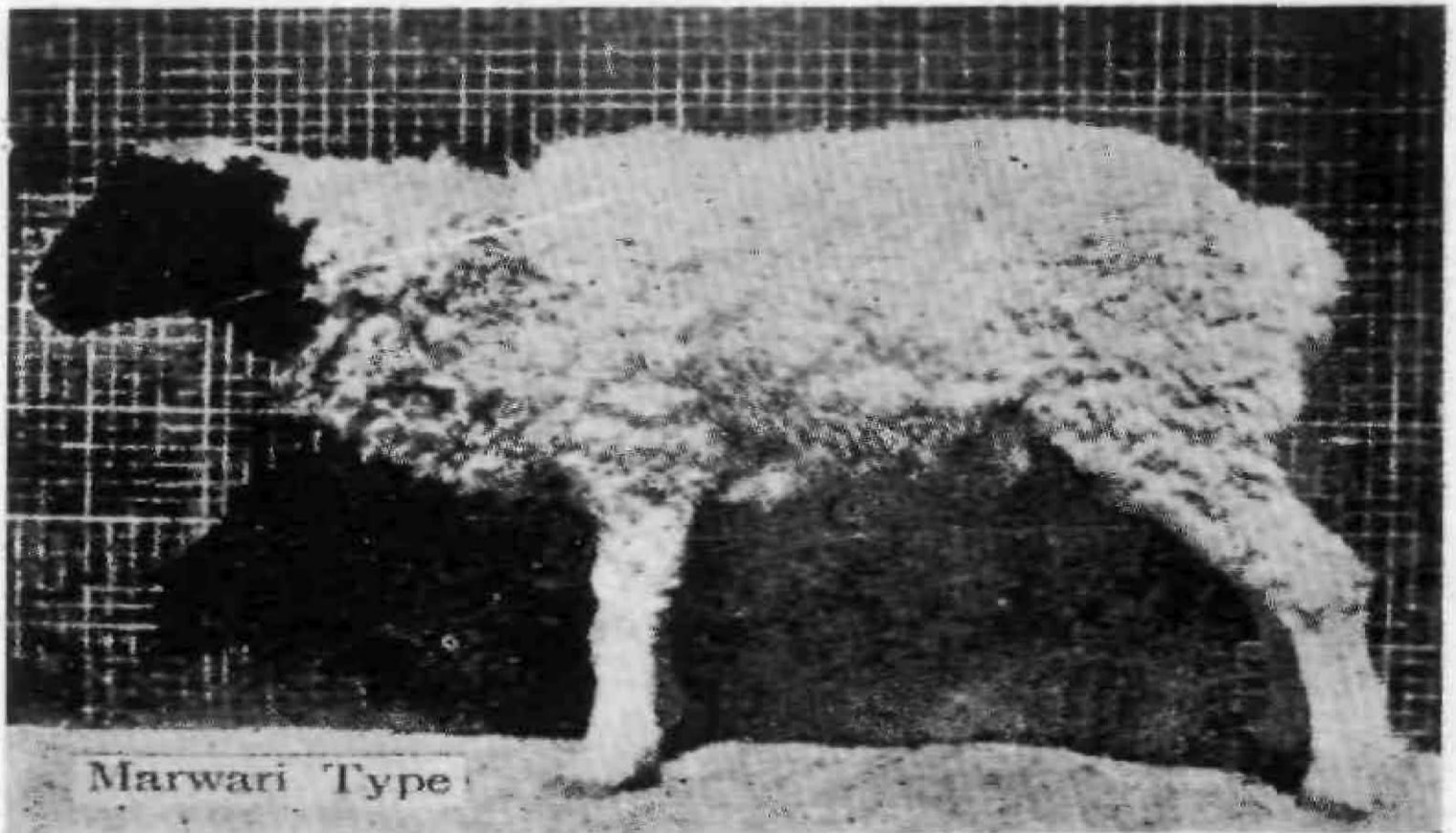
CAZRI MONOGRAPH SERIES

- No. 1 Desert Ecosystem and its Improvement, pp. 1-387 (1974). Edited by H. S. Mann
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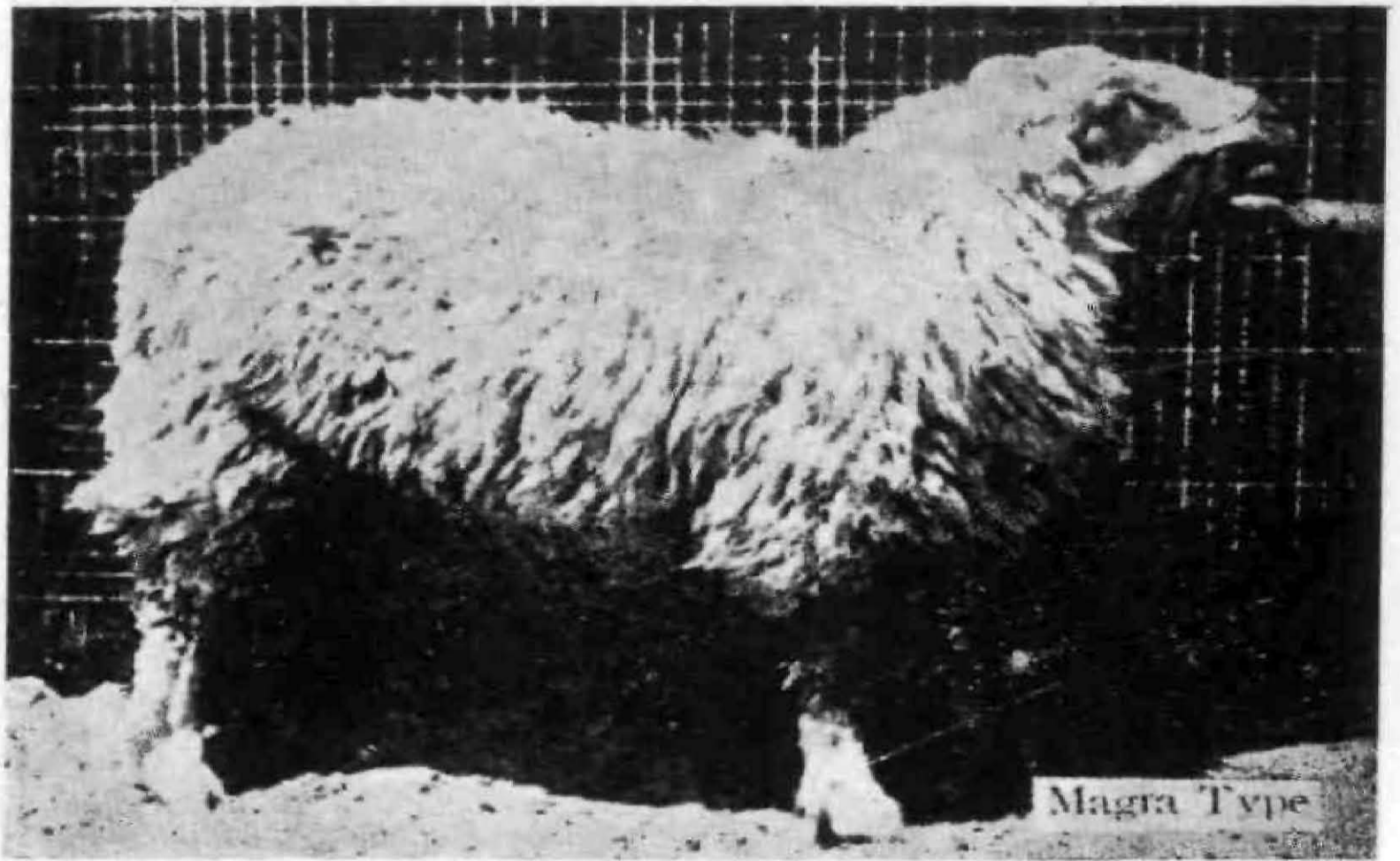


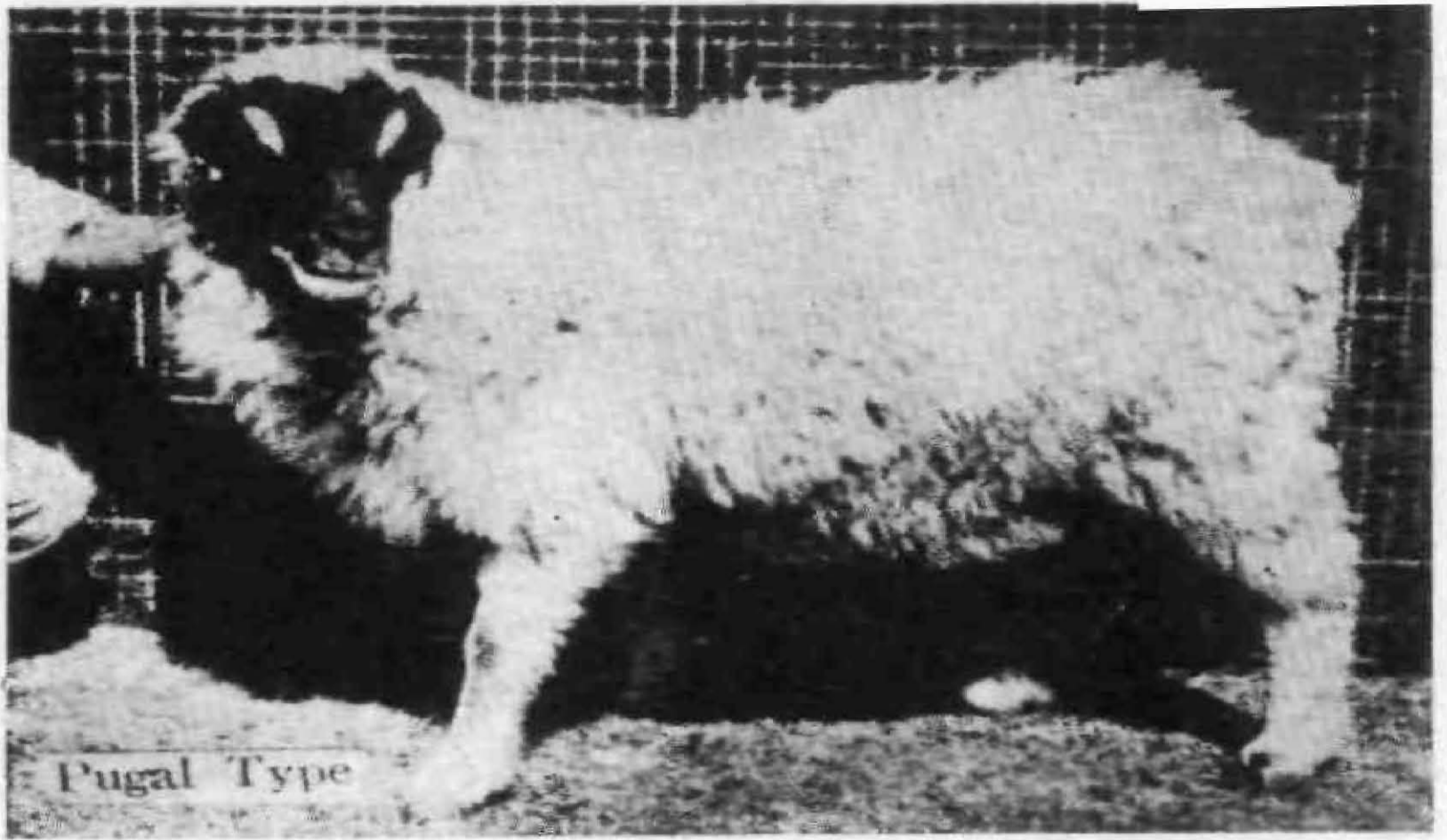


Sonadi Type

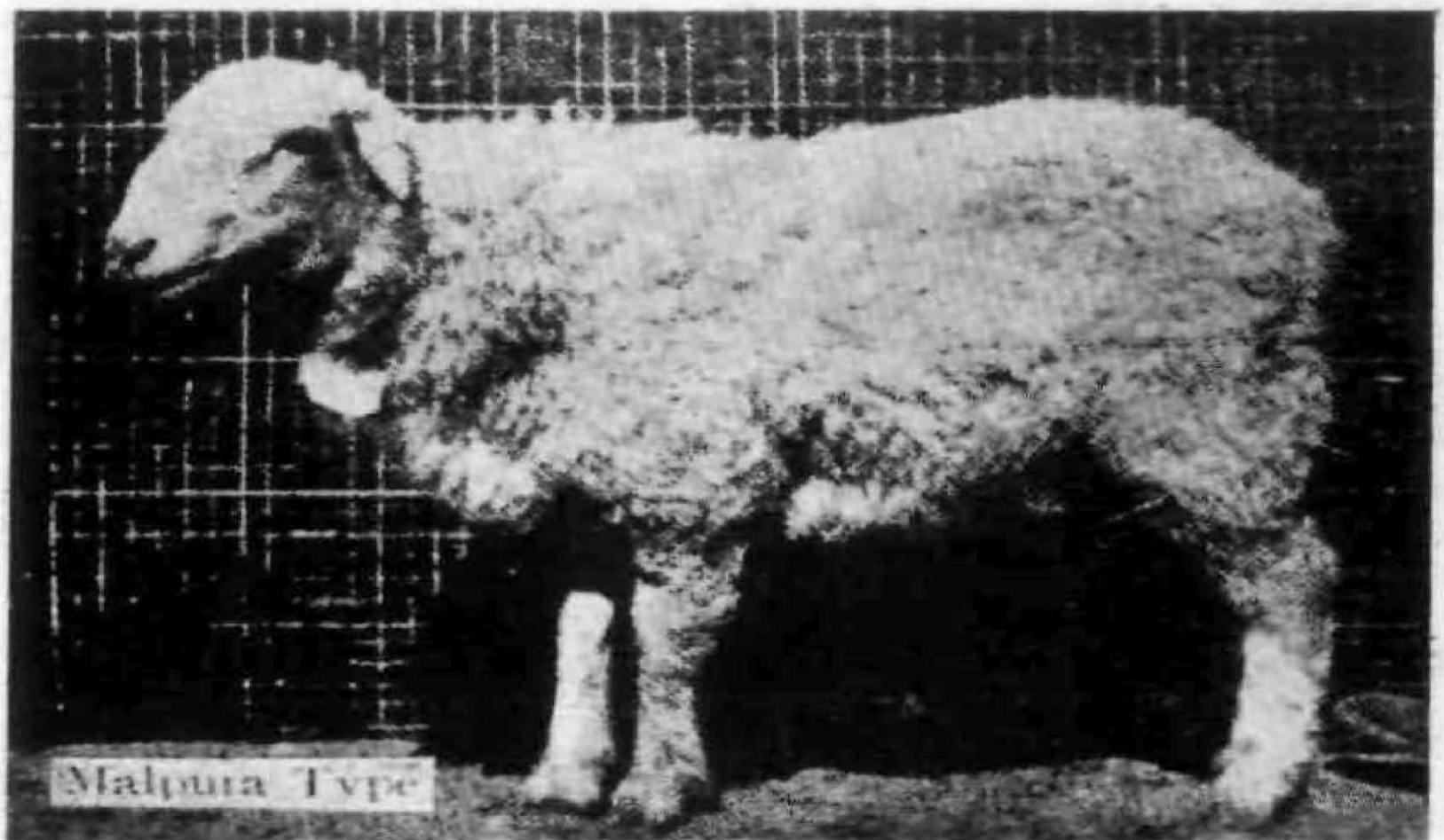


Marwari Type





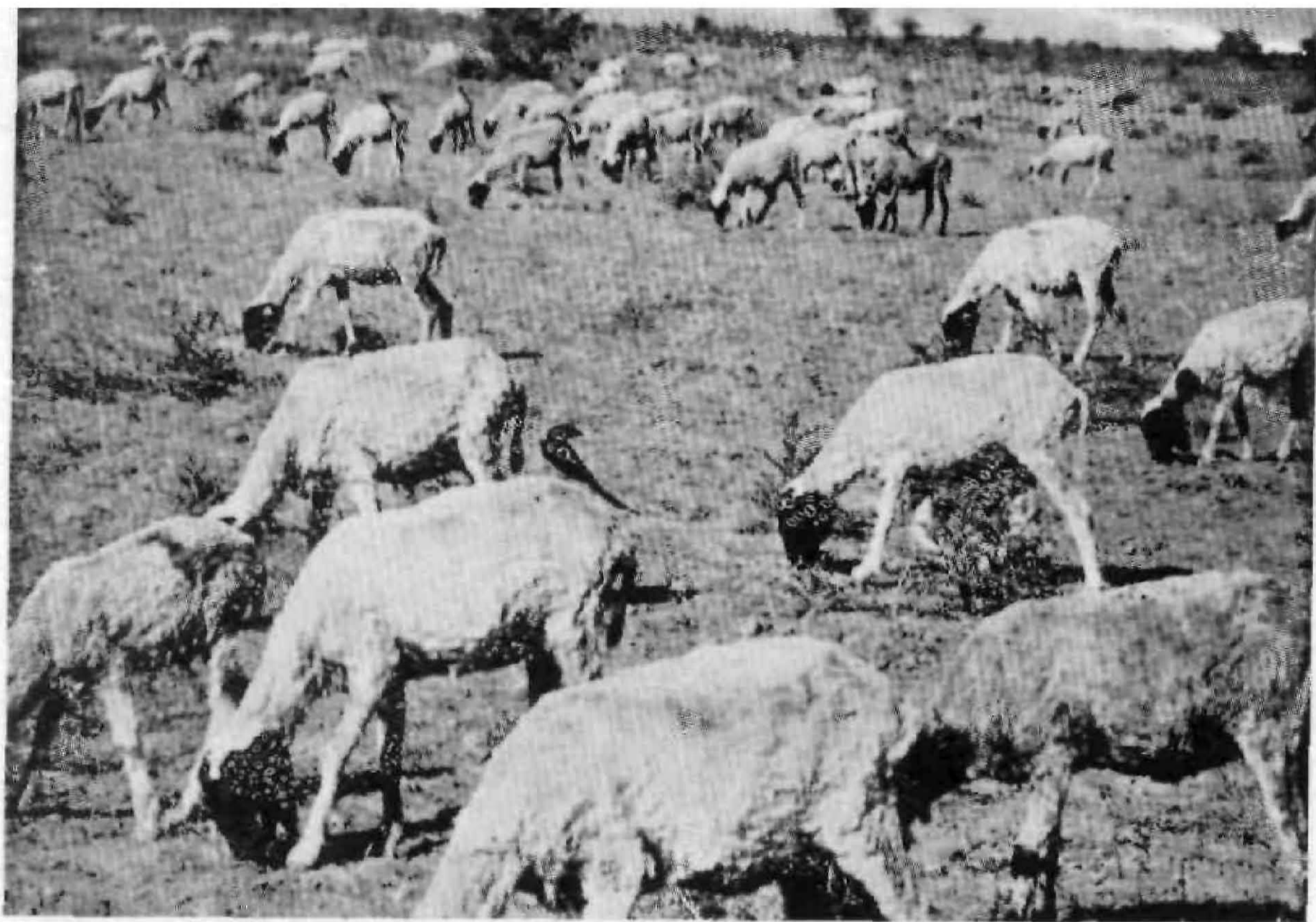
Pugal Type



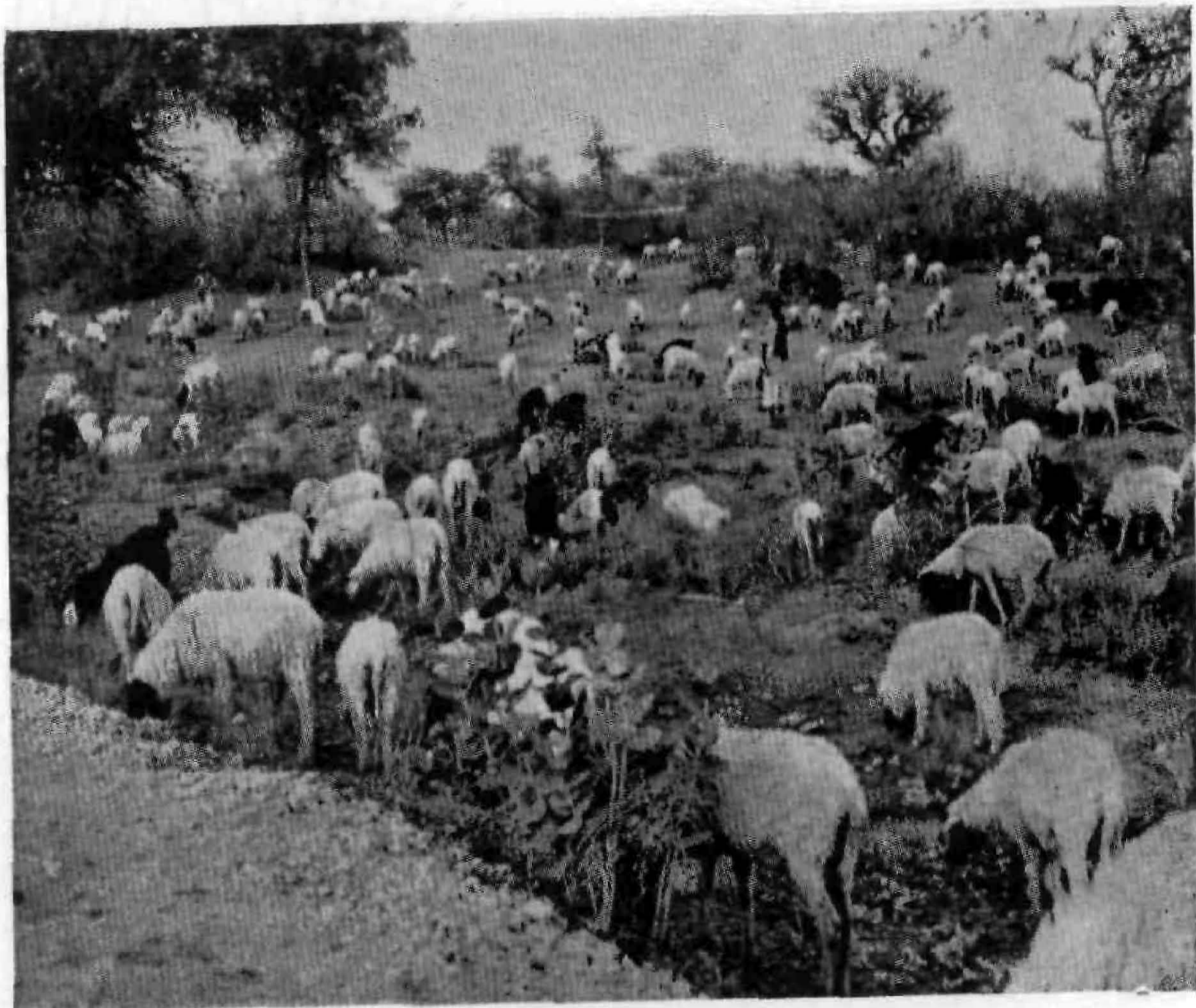
Malpura Type



Sheep grazing a sown pasture in western Rajasthan.



Shorn Marwari sheep on a depleted range.



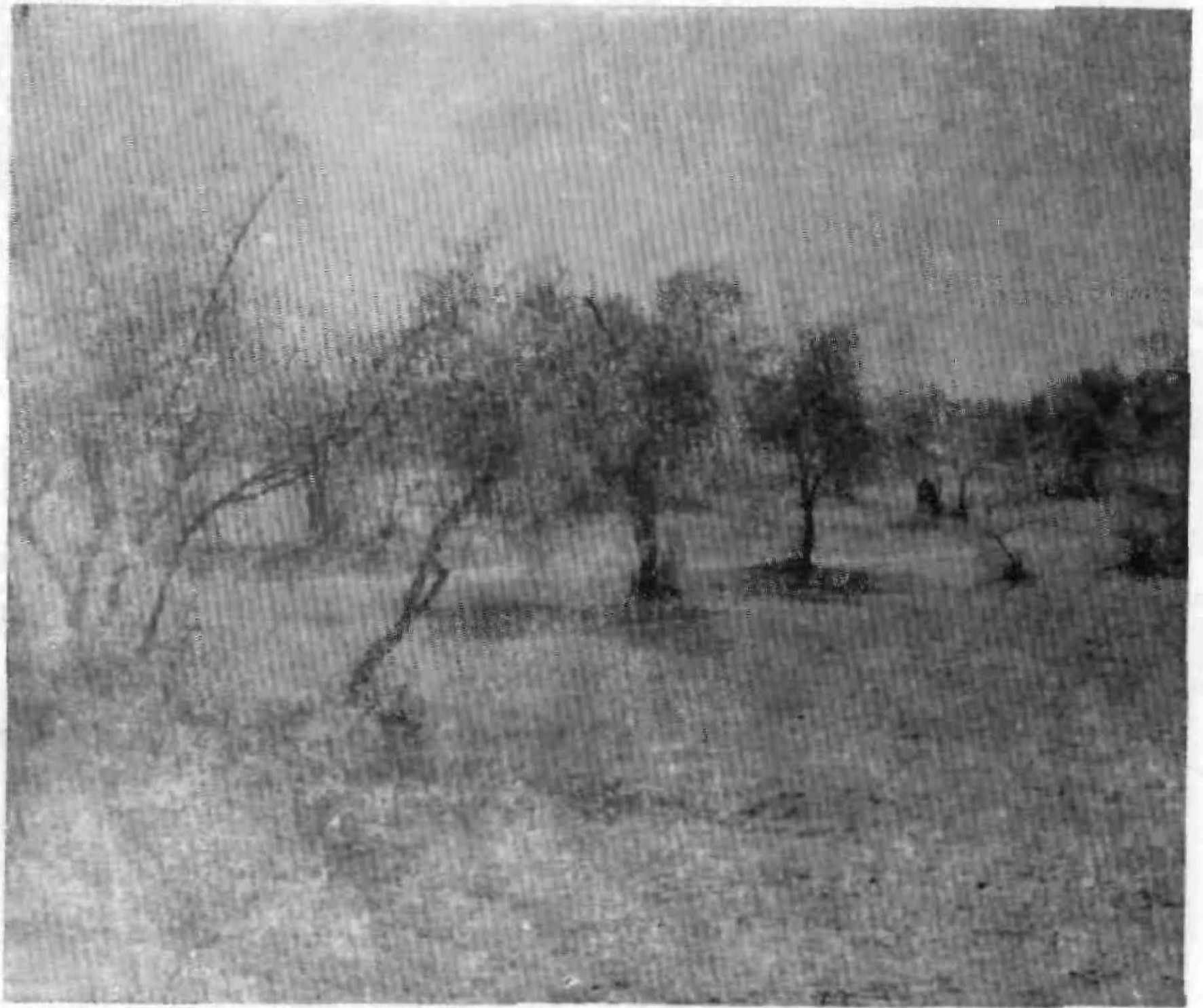
In search of a grub that is not there. An overstocked village grazing land.



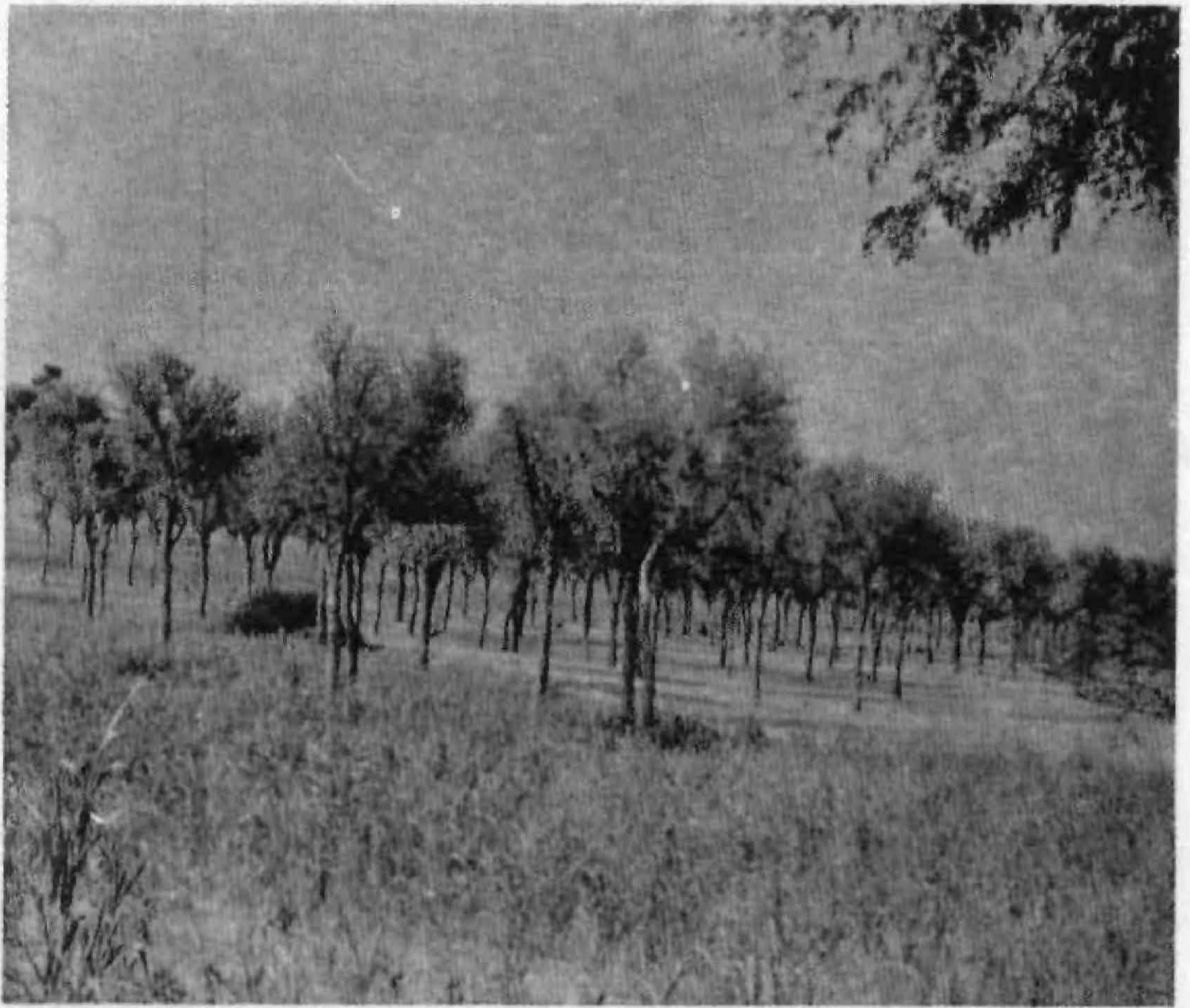
A water hole in a desert village — meeting ground for man and his animals.



Desert sheep on the canal bank.



A common village grazing land or the Oran.



Khejri — the king of desert trees — provides the choicest top feed for all livestock.