CHAPTER - II

ANIMAL HUSBANDRY IN SOLAPUR DISTRICT

Section - A

Distribution and Animal Association Regions in Solapur District

2.1 Introduction

2.2 Animal husbandry in Maharashtra

2.3 Animal husbandry in Solapur district

2.4 Breeding of milch animals

2.5 Animal association regions

2.6 Changes in animal association regions (1968-88)

Section - B

Milch Animals : A spatio-temporal analysis

2.7 Spatio-temporal patterns of milch animals

2.8 Spatio pattern of milch animals (1988-89)

2.9 Changing pattern (1968-88)

2.10 Concentration of milch animals (1968-88)

=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=0=

SECTION - A

DISTRIBUTION AND ANIMAL ASSOCIATION REGION IN SOLAPUR DISTRICT

2.1 INTRODUCTION :

The previous chapter deals with the nature of problem and an attempt has been made to introduce the work. In the present chapter the assessment of animal husbandry in the state as well as in the region is made so as to find out the proportion of milch animals to animal husbandry of the region. Although the development of dairy industry depends upon milch animals i.e. cows and buffaloes, the study of their relationship with total animals is necessary. In view of this animal association regions have been attempted here.

The chapter has been divided into two sections. The former is concerned with the distributional pattern and animal association zones in Solapur district whereas later includes the spatio-temporal patterns and concentration zones of milch animals, especially of cows and buffaloes within the region.

Animal husbandry has been closely associated with agriculture. In the early stages, the agriculture and animal husbandry were confined to the centres of origin of agriculture (Sauer,1952). In the beginning domistication was made for milk purpose and later with the development of agriculture. Animals

were also used for agricultural operations. Milk has been obtained from cows, buffaloes, camels, sheep, goats and others. There is, however, major contribution of cows and buffaloes in milk production of the world. India has the largest cattle and buffalo population for any single country in the world (Mirdha,1974). Cows and buffaloes contribute, to a considerable extent, to the rural economy; because it provides milk and bullocks for various agricultural operations and transportation. The sheep and goats, with their multifaceted utility (meat, milk, wool, skins, manure etc.) play an important role in Indian economy. These are the most suitable animals for marginal farmers and landless labourers too. They contribute to farmers income, food, clothing and enrich the soil with their manures.

2.2 ANIMAL HUSBANDRY IN MAHARASHTRA :

Livestock is an integral part of agriculture in Maharashtra state. It consists of cattle, buffaloes, sheep, goats, bullocks, poultry etc. Together they contribute to a considerable extent to the rural economy of the state. Animal husbandry includes the feeding, management and breeding of domisticated animals (Gopalkrishnan,1986). The inter-dependency of crop enterprises and livestock production is an age-old practice in the state.

In view of small holdings, old but traditional methods of cultivation, insignificant use of machinery and use of bullock carts for rural transportation, the cattles are indispensable. The cows in rural areas, have been domesticated by farmers mainly for two purposes viz. to get bullocks for agricultural operations and for milk.

Table 2.1 reveals the fact that how there is increasing trend in the number of total animals from 26,360,760 in 1968 to 34,228,424 in 1988 in the state. Bullock is second ranking animal, after the goats, which is major source of traction power and most of the tilling is made with the help of bullocks. Bullock population was 6,205,941 (23.48%) in 1988 which is reached to 6,687,785 (19.59%) in 1988, showing increase in absolute number and decline in its relative share to total animal husbandry.

Cows and buffaloes in milk are the two important sources for milk in the state. However, in 1968, the state recorded 1,673,495 (6.44%) cows which further rose to 2,490,831 (7.31%) in 1988. Similarly, buffaloes, a traditional milch animal, has been domisticated largely in the state recording increase in the total number from 954,884 (3.41%) in 1968 to 15,939,868 (4.68%) in 1988. High fat content, more total solids and cohesion property buffalo milk has become more popular than cow milk. 'Pandharpuri' or 'Govlaw' breed is found in South Maharashtra (Gopalkrishnan,1986). Together cows and buffaloes in milk comprises 11.99 percent of the total animals in 1988. Besides

Table 2.1 : Animal husbandry in Maharashtra (1968 to 1988).

Year	Bullocks	Cows in milk	Buffaloes in milk	Sheep	Goats	Others	Total livestock
1968	6,205,941 (23.48)	1,673,495 (6.44)	954,884 (3.41)	2,128,036 (7.95)	5,910,554 (22.35)	257,990 (1.14)	26,360,760 (100.00)
1978	6,328,889 (21.28)	1,857,802 (6.42)	1,275,310 (4.39)	2,636,001 (8.78)	7,562,925 (25.68)	277,560 (1.01)	29,641,878 (100.00)
1988	6,687,785 (19.59)	2,490,831 (7.31)	1,593,868 (4.68)	2,871,929 (4.48)	9,189,481 (26.90)	401,238 (1.17)	342,284,424 (100.00)

Note : Figures in brackets indicate percentages.

SOURCE : Compiled by the author from Statistical Office, Kolhapur.

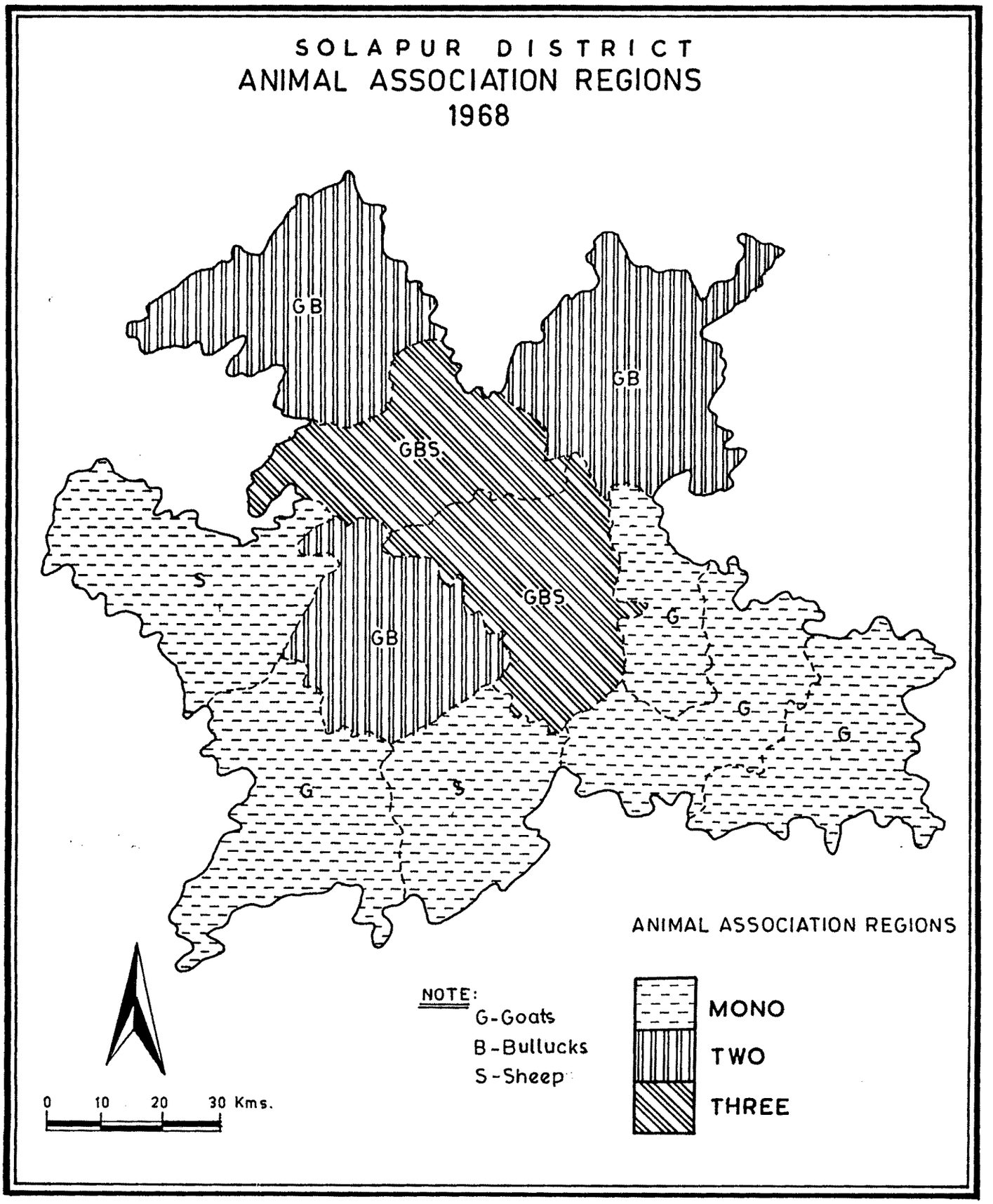

SOLAPUR DISTRICT
ANIMAL ASSOCIATION REGIONS
1968
GB
GB
GBS
GBS
GB
S
S
G
G
G
G
S
ANIMAL ASSOCIATION REGIONS
NOTE:
G-Goats
B-Bullucks
S-Sheep
MONO
TWO
THREE
0 10 20 30 Kms.

Fig. 2·1

Sr. No.	Tahsi	en-e	Others	Percen-tage	Total population of the Tahsil
1	Karmal	07	2,545	3.07	82,906
2	Barshi	59	3,068	3.44	89,243
3	Madha	99	1,458	1.61	90,523
4	Malshi	07	3,098	2.13	145,413
5	Pandha	41	1,248	1.64	76,126
6	Mohol	10	1,298	1.79	72,315
7	North	66	767	1.96	39,110
8	South	51	454	0.84	54,202
9	Sangol	26	942	1.22	77,173
10	Mangal	61	6,270	7.02	89,265
11	Akkalk	38	2,522	3.30	74,424
	Distri Tota	77	23,670	2.66	890,702

SOURCE

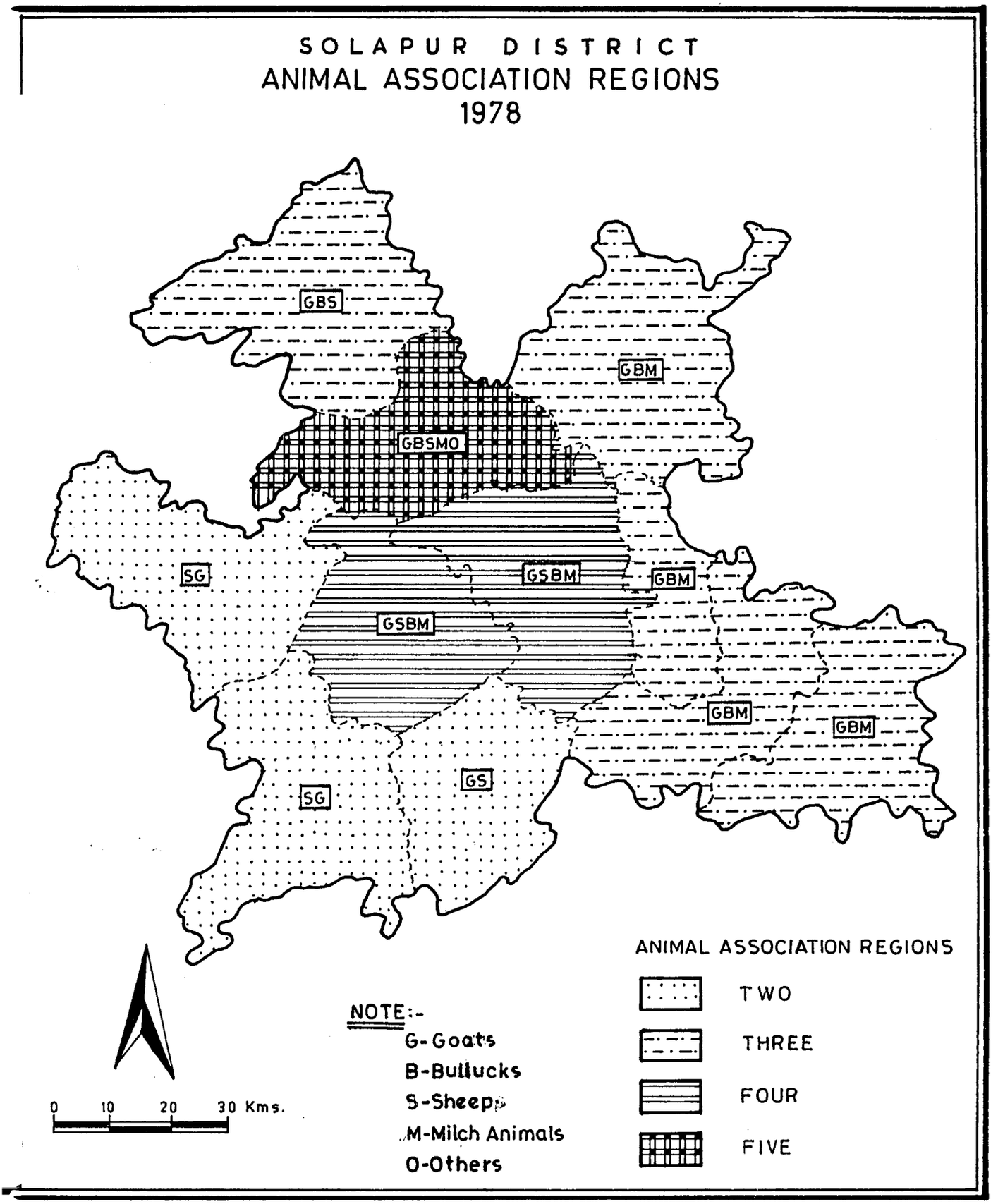

SOLAPUR DISTRICT
ANIMAL ASSOCIATION REGIONS
1978
GBS
GBM
GBSMO
SG
GSBM
GBM
GSBM
GBM
GBM
GS
SG
ANIMAL ASSOCIATION REGIONS
TWO
THREE
FOUR
FIVE
NOTE:-
G-Goats
B-Bullucks
S-Sheep
M-Milch Animals
O-Others
0 10 20 30 Kms.

Fig. 2·2

this, the state has substantial number of sheep and goats due to semiarid conditions in most of central and eastern parts and the availability of fodder. Table 2.1 also shows, an upward trend in the number of sheep and goats in the state. Goat, being the first ranking animal during the last three decades, has remained to be an integral part of rural economy. It has been used for multipurposes such as milk, meat, skin, manures etc.

2.3 ANIMAL HUSBANDRY IN SOLAPUR DISTRICT :

In Solapur district, cows and buffaloes play important role in milk production. They contribute, to a considerable extent, to the rural economy. Besides this, for many years to come the bullock and he buffaloes will contribute to the main stay of agricultural operations and transportation. Buffaloes are equally, important in providing milk and farm yard manures (Mirdha,1974). The sheep and goats serve the people for meat. These animals are also used for leather and wool purposes. Alike the entire state, the region has substantial number of animal resources which is closely linked with agricultural activity.

Table 2.2 and 2.3, reveals tahsilwise distribution of animals for the animal census year of 1968 and 1988. The region recorded nearly 890,802 livestock in 1968 and 1,202,835 in 1968 which accounts for 3.38 percent and 4.56 percent of the total

Sr. No.	Tahsils	en-e	Others	Percen-tage	Total population of the tahsil
1	Karmala	25	2,687	2.49	107,802
2	Barshi	57	363	0.34	107,091
3	Madha	94	1,592	1.46	109,065
4	Malshiras	23	2,014	0.97	206,798
5	Pandharpur	54	3,923	3.80	103,177
6	Mohol	98	1,306	1.14	115,030
7	North Solap	74	590	1.30	45,477
8	South Solap	46	433	0.66	65,645
9	Sangola	15	1,191	0.76	155,977
10	Mangalwedha	87	486	0.50	95,159
11	Akkalkot	52	2,422	2.64	91,614
	District Total	40	17,007	1.40	1,202,835

SOURCE :

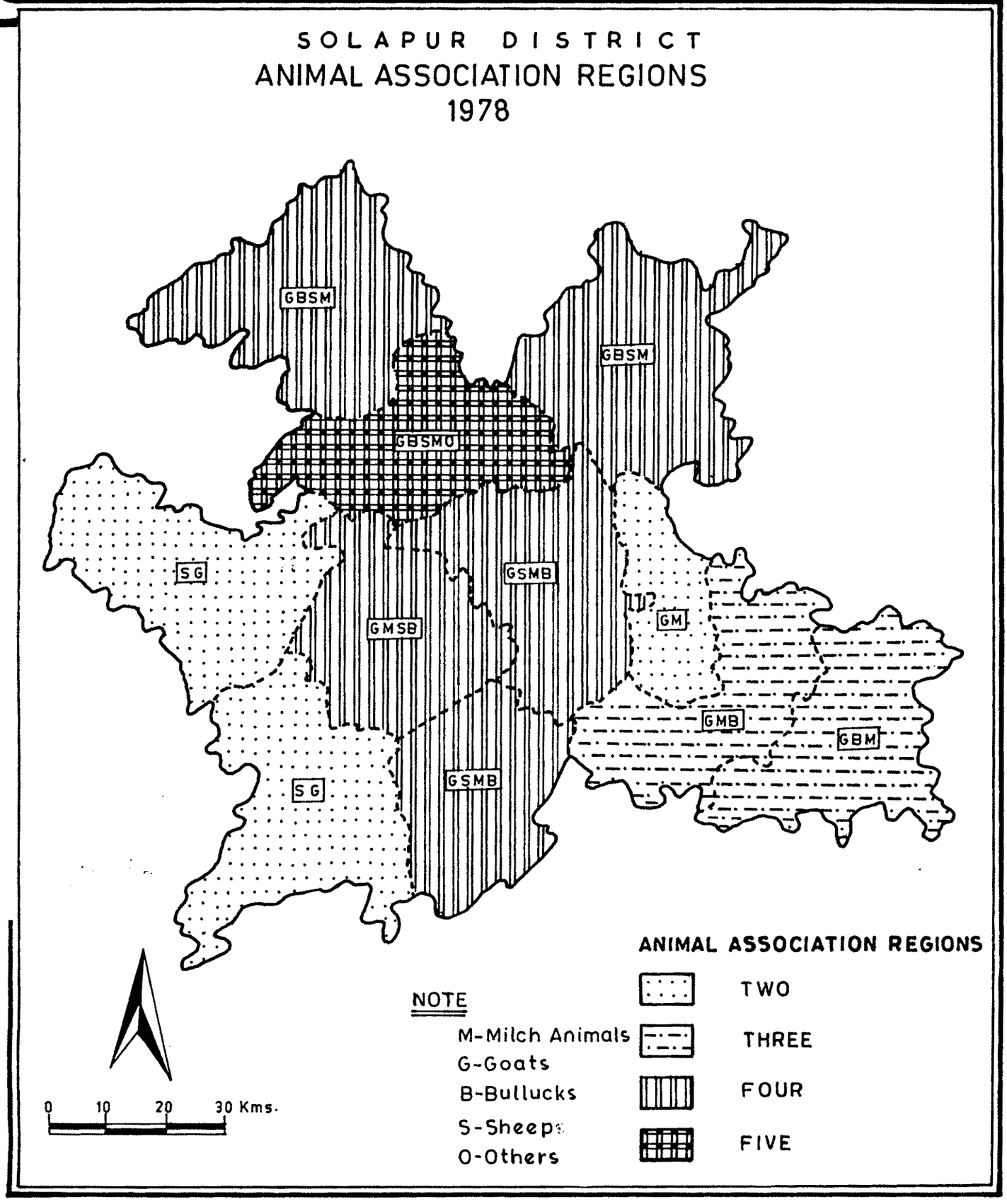

SOLAPUR DISTRICT
ANIMAL ASSOCIATION REGIONS
1978
GBSM
GBSM
GBSMO
SG
GSMB
GMSB
GM
GMB
GBM
SG
GSMB
0 10 20 30 Kms.
NOTE
M-Milch Animals
G-Goats
B-Bullucks
S-Sheep
O-Others
ANIMAL ASSOCIATION REGIONS
TWO
THREE
FOUR
FIVE

Fig. 2·3

livestock of the state respectively. Thus, the last two decades have shown the net increase of 313,000. The number of milch cows has increased from 78,000 in 1968 to 84,000 in 1988, with net increase of 6,000.

Comparing to traditional cows, the breeded cows have proved to be more useful offering substantial milk. According to 1968 animal census total number of buffaloes in milk was 43,000, which has increased to 69,000 in 1988 recording absolute increase of 26,000. This could be attributed to the increase in irrigated area which may provide green fodder from sugarcane tops. Such green fodder is useful to increase milk production. Beside this, milk collection facilities have been introduced by the Government Co-operative Dairy Federation availing transport and chilling facilities associated with regular (weekly) payments to milk producers.

Bullocks :

As per 1968 census, about 235,081 bullocks were recorded and 159,290 in 1988 showing decrease of 8,000. This has been resulted from increasing use of modern implements for different agricultural operations. Tractor has become popular in rural areas performing various functions.

Sheep :

The region recorded 197,268 sheep in 1968 which rose to 280,930 in 1988. Thus, these two decades has witnessed absolute increase of 83,672 in sheep population.

Goats :

This is another important animal with 336,462 in 1968 and 594,253 in 1988. Nearly 257,791 goats were increased in number during 1968 to 1988. The steady increase in the number of goats has occurred despite the fact that no special goat development programmes are being pursued and about 30 percent of total population of goat is being slaughtered every year.

The dry farming requires less number of working bullocks and farmers income is supplemented by the animal rearing for milk. Hence, the female cattle population is more than male cattle.

2.4 BREEDING OF MILCH ANIMALS :

Increasing population has led for more demand for milk. In order to obtain more milk the programme of cattle breeding has been introduced in the region. Khillari, Nimari, Gaolao breeds are included in cattle breed. Surti, Nagpuri, Pandharpuri breeds are also included in buffaloes in milk. Pandharpuri breed of buffaloes, Jersey breed of cows are found in Solapur district. Today, breeded cows and buffaloes in milk are concentrated in the region. A comparative study of milch cows and buffaloes indicates that the number of milch cows are more than buffaloes in the district. Jersey cows give 2 to 3 times more milk than buffaloes. For the daily source of income, the farmers are keeping breeded cows in the region. This has resulted into considerable increase in milk production.

2.5 ANIMAL ASSOCIATION REGIONS :

2.5.1 Introduction :

The district can be divided into different animal association regions to show relative positions and strengths of livestock in different enumeration units. This can be better comprehended with combination analysis. The study of livestock combinations is essential for an adequate understanding of Geography of Livestock. The combination of livestock is composite realities that guide distributional analysis.

2.5.2 Methodology :

Many animals are domesticated in combination and not in isolation. The least square technique may be regarded as an important algorithm for establishing combinations of livestock. The simple formula evolved by Weaver (1954) has been used here.

$$d = \sqrt{\frac{\leq d^2}{n}}$$

Where, d = deviation from the theoretical curve

n = number of animal category

2.5.3 Analysis :

With the help of Weaver's method five animal association regions have emerged out.

1) Mono-Association Region -

This is confined to Sangola (52.74), South Solapur (54.34), and Akkalkot (60.62) tahsils of the district in 1968 (Fig.2.1). The goats were dominant because goat rearing was a major occupation of many landless ruralites in Solapur district. The goat has been regarded as the most economically valuable as compared to other milk producing animals.

2) Two Animal Association Region -

These are observed in Karmala (12.85), Barshi (14.17) and Pandharpur (18.28) tahsils in 1968 mainly of goats and bullocks (Fig.2.1). However, in 1978, the region had two animal associations consisting of sheep and goats in Malshiras (14.49), Sangola (15.08) and Mangalwedha (13.53) tahsils (Fig.2.2). Further, in 1988, two animal association region of sheep and goat is recorded in Malshiras (11.22) and Sangola (11.49) (Fig.2.3). Such dominance can be attributed to the fact that both are useful to landless labourers, poor farmers which make milk within their reach at low cost. Dry, climate with less rainfall, are helpful in maintaining healthy sheep stock in these tahsils (Fig.2.1).

3) Three Animal Association Region -

It consists of goats, bullocks and sheep are found in the tahsils of Madha (15.60), Mohol (13.95) in 1968. In 1978, goat, bullocks and sheep association regions are observed in Karmala (17.17) and goat, bullocks and milch animals association regions (Fig.2.2) are confined to Barshi (17.98), North Solapur (15.92), South Solapur (17.93) and Akkalkot (17.82) tahsils due to favourable physical socio-economic environment.

4) Four Animal Association Region -

It includes mainly of goat, sheep, milch animals and bullocks found in Karmala (21.07), Barshi (18.78), Pandharpur (17.19), Mohol (16.29) and Mangalwedha (16.51) tahsil in the year 1978.

5) Five Animal Association Region -

In 1988, the five animal association regions, mainly of goat, bullocks, sheep, milch animals and other livestocks, are found in Madha (21.41) tahsil in the district (Fig.2.3).

2.6 CHANGES IN ANIMAL ASSOCIATION REGIONS (1968-1988) :

Livestock combination analysis is one of the most vital methods of studying agricultural patterns (Singh J.,1984). It is valuable in providing a comprehensive basis for basic regional planning for rural area. Animal association regions are not

remained constant as they have been influenced by climate, irrigation facilities and other organisational factors.

In 1968, an extensive zone covering the area of Malshiras, Sangola, Mangalwedha, North Solapur, South Solapur and Akkalkot has been covered with mono association of animals with sheep and goats (Fig.2.1). Because sheep and goat raising is best suited to dry climate. From the food consuming point of view, the goat is most economically valuable of all milk producing animals providing meat and milk. But in 1988, no mono association region has been emerged out in the district.

The animal association regions cover the area of Karmala, Barshi and Pandharpur tahsils with goat and sheep. Mainly bullocks and goats are associated in Karmala and Barshi. Bullocks are mainly used for agricultural operations in the region. Goats are kept for domestic purposes by the poor and landless farmers. In 1968, three animal association regions with goat, bullocks, sheep were confined to Madha and Mohol tahsils. During the last thirty years, the tahsils of South Solapur, Akkalkot have experienced the dominance of goat, milch animals and bullocks.

Four animal association regions were absent in the year 1988. But in 1988, Karmala, Barshi, Pandharpur, Mohol, Mangalwedha recorded four animal association regions with goat, sheep, milch stock, buffaloes in the region.

In 1968, there were no five animal association regions. But in 1988, the five animal association regions are observed in Madha tahsil only with goat, bullocks, sheep, milch and other animals in the district. The above analysis shows that considerable changes can be observed in three, four and five animal association regions during the last three decades. Besides this, the milch animals are associated with other animals in three, four and five animal association regions. They have not dominated any tahsil. However, milch animals are important in promoting dairy industry in the region.

SECTION - B

MILCH ANIMALS : A SPATIO-TEMPORAL ANALYSIS

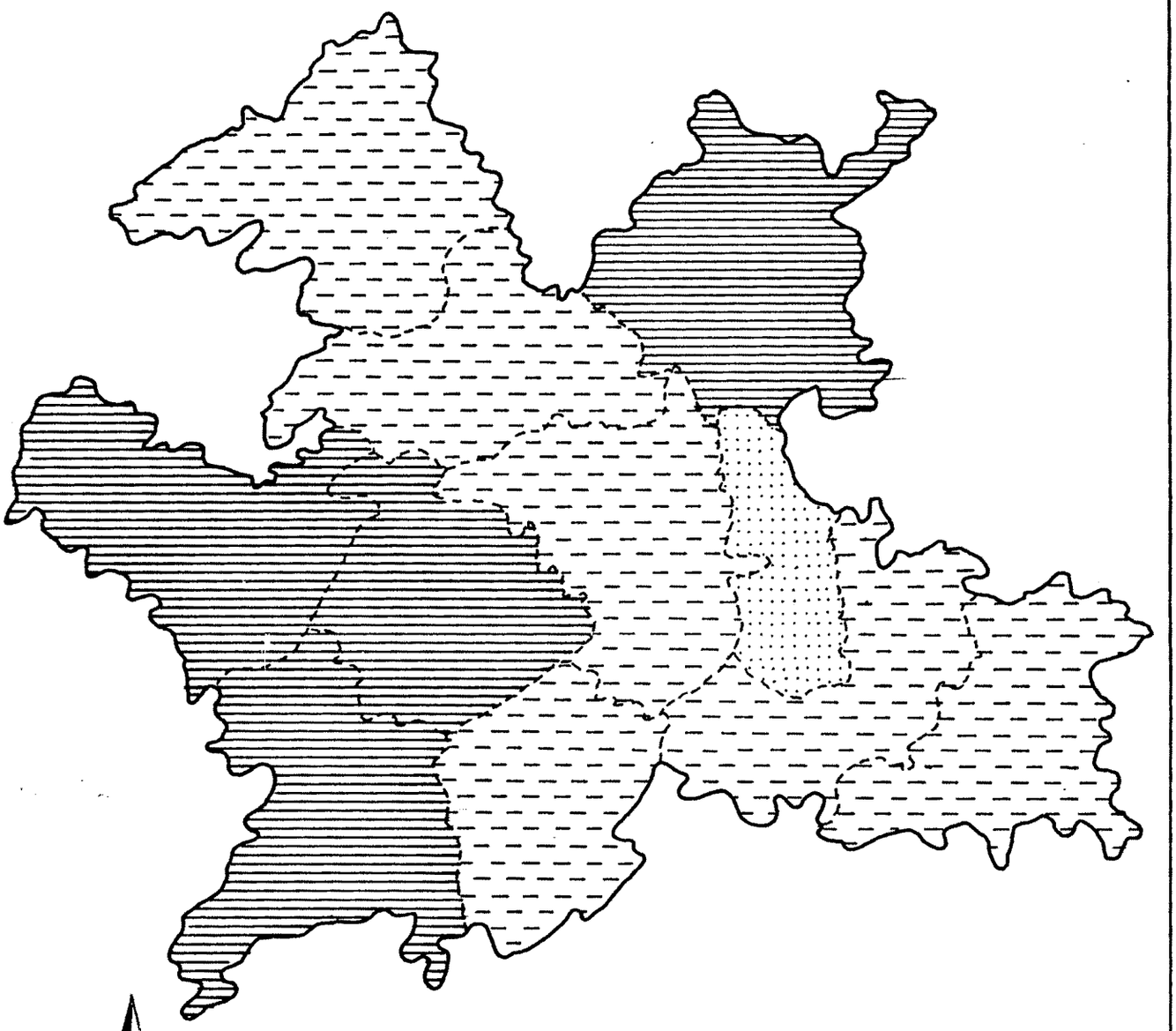
2.7 SPATIO-TEMPORAL PATTERNS OF MILCH ANIMALS :

i) Introduction :

The rural population in the region is mostly vegetarian and milk has been traditionally used in their diet. Although no other food can take the place of milk, per head consumption has been decreased considerably with the development of dairy. Perhaps, this may be due to the increase in population number and with the development of dairy, the farmers supply milk to dairy whatever is available as the prices are attractive and from the growing income they are able to meet their daily needs. Buffaloes and cows are mainly domesticated for the supply of milk. Presently most of the farmers keep milch animals. However, in view of vital importance of agriculture and predominance of the use of animal power, the farmers were keeping cows to obtain drought animals. But recently this trend has been changed and farmers have turned towards this remunerative business. The she-buffaloes are the major source of milk. Because they give substantial milk. The most important breed are 'Haryana' and 'Murrah'. Cows are also regarded one of the most efficient milk producers in India (Singh,J.1984). After 1975, the crossbreeding production of milch animals came into existance. Today, milk production from cows is more than buffaloes in the region and in the state too.

SOLAPUR DISTRICT

MILCH ANIMALS (Cows) 1988-89



CATEGORY PERCENTAGE

HIGH 10

MEDIUM 5

LOW

0 10 20 30 Kms.

Fig.2·4

2.8 SPATIAL PATTERN OF MILCH ANIMALS (1988-89) :

Fig.2.4 exibit the distributional pattern of cows as well as buffaloes in Solapur district. As per 1988 livestock census, there are 153,335 total milch stock. Out of this 84,138 (54.36%) are cows and 69,217 (45.14%) buffaloes in milk. Fig.2.4 shows spatial pattern of breeded cows in the district during 1988-89 which indicates regional variations. Tahsils of Malshiras, Sangola, Pandharpur, Barshi have recorded more than ten percent concentration. This may be attributed to the favourable socio-economic and physical conditions. Besides this, farmers are encouraged by the social workers to undertake such enterprise. This zone has 67,840 milch animals during 1988-89. The second zone comprises the parts of Karmala, Madha, Mohol, Mangalwedha, South Solapur and Akkalkot tahsils which has 76,513 total number of milch animals. North Solapur tahsil has recorded low concentration (less than five percent) having 9,002 milch animals.

The spatial pattern of buffaloes is depicted in Fig.2.5 for the year 1988. The zone of high proportion (above ten per cent) is confined to South Solapur, Akkalkot, Sangola, Pandharpur, and Malshiras tahsils. This may be due to the availability of fodder both from irrigated and unirrigated tracts. Besides, Akkalkot and Pandharpur tahsils have the tradition of keeping buffaloes. An enhancement in irrigated area, devoted mainly to sugarcane, provides green fodder have attracted farmers to go for

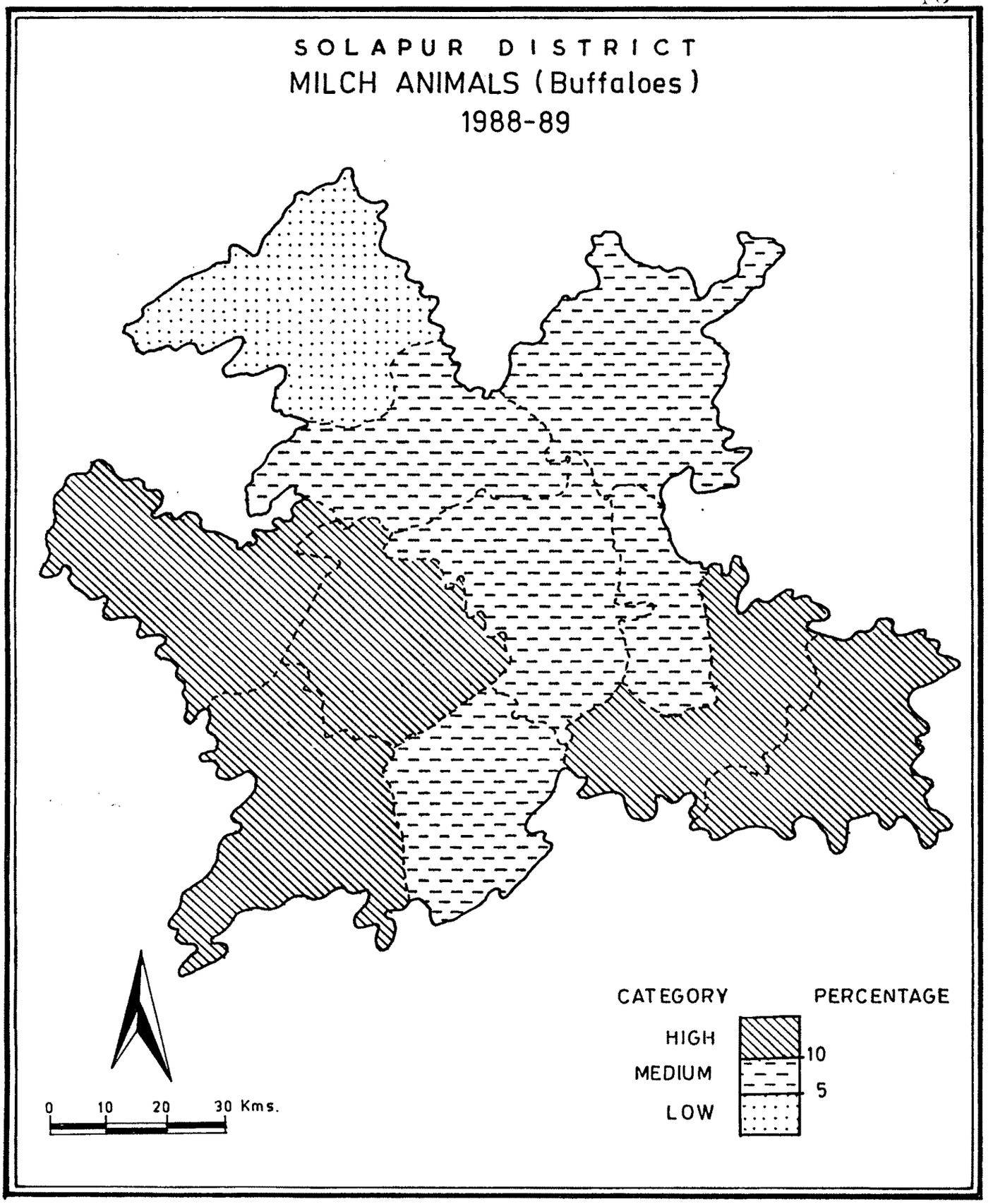

SOLAPUR DISTRICT
MILCH ANIMALS (Buffaloes)
1988-89
CATEGORY
PERCENTAGE
HIGH
MEDIUM
LOW
10
5
0 10 20 30 Kms.

Fig. 2·5

Table 2.4 : Number of milch animals in Solapur district, 1968-88.

Sr. No.	Tahsils	Total cows in milk		Percentage		Total buffaloes in milk		Percentage	
		1968	1988	1968	1988	1968	1988	1968	1988
1	Karmala	6301	6666	7.60	6.18	1618	1819	1.95	1.69
2	Barshi	8743	8703	9.98	8.13	4624	6904	5.18	5.51
3	Madha	7090	6567	7.84	6.02	2476	4032	2.74	3.70
4	Malshiras	8763	10697	6.03	5.17	3339	7781	2.30	3.76
5	Pandharpur	7170	8625	9.42	8.36	3831	9411	5.03	9.12
6	Mohol	5623	7803	7.88	6.78	2916	6664	4.03	5.79
7	North Solapur	4474	3526	11.44	7.75	4710	5476	12.04	12.04
8	South Solapur	5724	7388	10.62	11.25	4517	7542	8.33	11.49
9	Sangola	8772	9749	11.37	6.25	4597	6970	5.96	4.77
10	Mangalwedha	7496	7026	8.40	7.23	2686	5515	3.01	5.68
11	Akkalkot	7386	7388	9.60	8.06	7368	8103	9.64	8.84
	District Total	77501	84138	8.70	6.99	42682	69217	4.79	5.75

SOURCE : Compiled by the author, 1991.

buffaloes and cows. The central tahsils have moderate concentrations of buffaloes (5 to 10%). This zone has been followed by low concentration which is confined to Karmala tahsil due to poor availability of fodder or unfavourable physico-socio-economic conditions.

2.9 CHANGING PATTERN (1968-88) :

During 1968-88, the region has witnessed variations in the number of milch animals. As per 1988 livestock census, there were 12,030,000 total animals recorded. Thus, in 1988 livestock population has increased by 312,000 over to 1968. The region has also experienced the increase of 6,637 in the number of cows. In 1978, there were 77,501 cows in milk. In 1988, the total number of cows accounted for 84,138. Of this highest strength of cows in milk (10,697) has been recorded by Malshiras tahsil alone. This was followed by Sangola (9,749) and Barshi tahsils (8,703) in the region (Table 2.4).

As per 1968 livestock census, there were 42,682 buffaloes in milk in the district. Akkalkot tahsil has recorded first position (7,368) followed by North Solapur (4,710) and Barshi (4,624) tahsils. During 1988, the region has 69,217 buffaloes in milk as compared to 1968. Thus, the number of buffaloes in milk is increased by 26,535. In case of buffaloes, Pandharpur tahsil has attained first position (9,411) followed by South Solapur (7,542) and Sangola (6,970) tahsils in the region during 1988.

2.10 CONCENTRATION OF MILCH ANIMALS :

i) Introduction :

Livestock patterns are mostly based on the qualitative approach which are usually not very useful as they concealed the degree of concentration in an area (Hussain,1979). General concentration of livestock enterprise can be quantified with the help of location quotient or coefficient of localization. For measuring the concentration of milch animals in Solapur district, it is enough to focus attention only on the milch animals i.e. cows and buffaloes in milk. In view of the importance of cows and buffaloes in promoting dairy farming, their concentration has been examined by adopting following methodology.

ii) Methodology :

Location Quotient Technique evolved by Singh (1976) has been employed here to mark concentration zones of milch animals i.e. cows and buffaloes in the region. The index values of each tahsil were classified in decending order to delineate the concentration zones. The equation is -

$$Ci = \frac{Pme}{Pmr} \times 100$$

Where, Ci = Index of concentration

Pme = Percentage of milch animals to total number of animals in an enumeration unit

SOLAPUR DISTRICT

CONCENTRATION OF MILCH ANIMALS (Cows)
1968

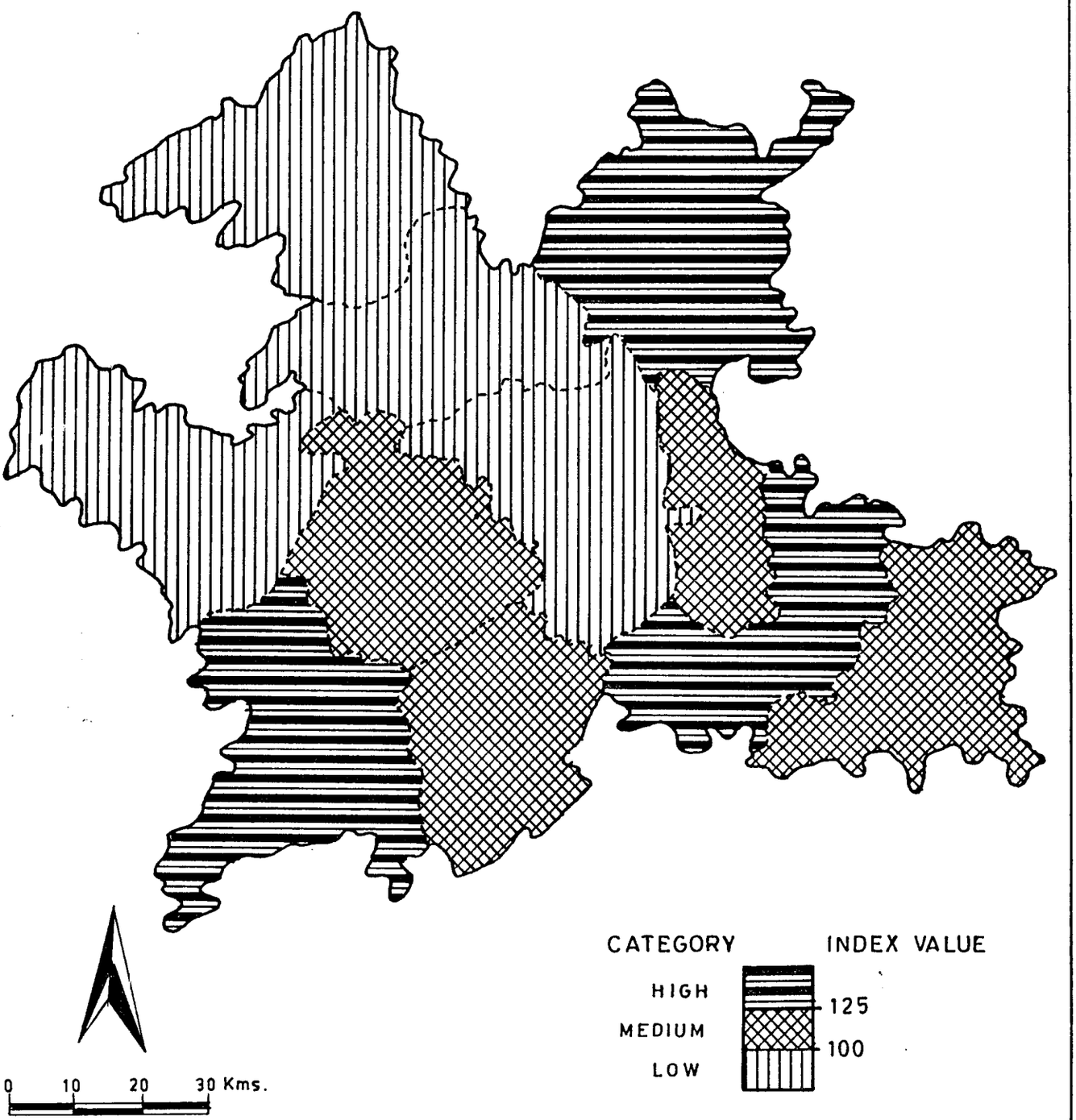


Fig. 2·6

Pmr = Percentage of milch animals to total number of animals in the entire region.

iii) Analysis :

(A) Concentration of cows :

Fig.2.6 and Fig.2.7 show the concentration of cows in milk which may be categorised into three major zones. They are -

(a) High concentration zone (Above 125) -

In 1968, the zone of high concentration is mainly confined to Barshi, South Solapur, and Sangola tahsils. In 1988, South Solapur has attained first position. This could be attributed to an increasing demand for milk from urban markets. The urban population of Solapur city depends for milk supplied from surrounding rural areas.

(b) Moderate concentration zone (100 to 125) -

In 1968, moderate concentration is observed in Mangalwedha, Pandharpur, North Solapur and Akkalkot (100 to 125) tahsils (Fig.2.6). Whereas such pattern of concentration is found in Pandharpur, Mangalwedha, North Solapur and Akkalkot (100 to 125) tahsils in 1988.

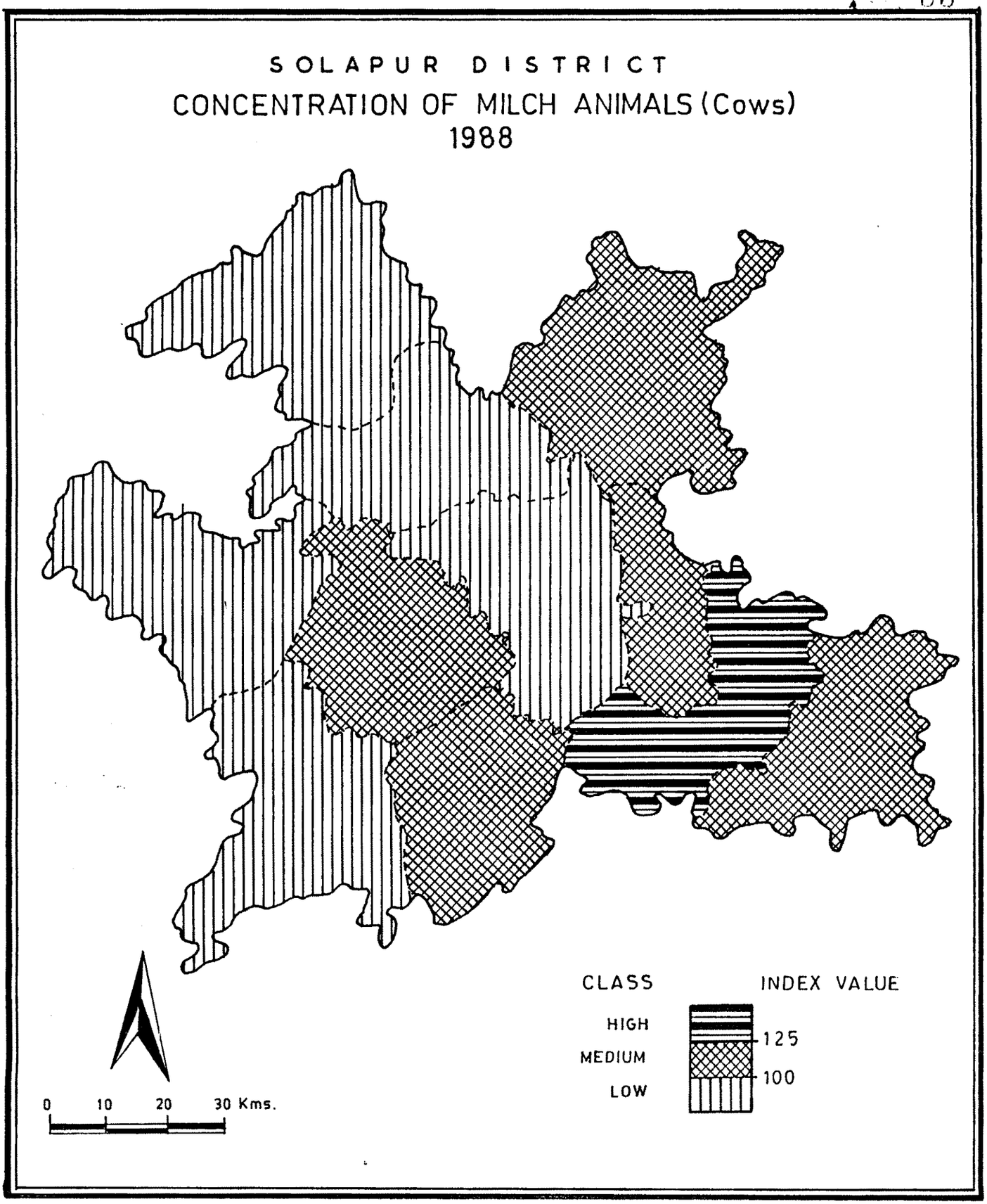

SOLAPUR DISTRICT
CONCENTRATION OF MILCH ANIMALS (Cows)
1988
CLASS
INDEX VALUE
HIGH
MEDIUM
LOW
125
100
0
10
20
30 Kms.

Fig. 2·7

(c) Low concentration zone (less than 100) -

In 1968, low concentration zone of milch cows is confined to Malshiras, Mohol, Madha and Karmala (less than 100) tahsils and in 1988, the tahsils of Sangola, Malshiras, Karmala, Madha and Mohol have occupied low concentration.

The above spatio-temporal variations in the concentration of milch cows has been resulted from the changing socio-economic conditions. Moreover, the recent developments in dairy industry has encouraged the farmers through co-operatives.

(B) Concentration of Buffaloes :

(a) High concentration zone (above 125) -

In 1968, Sangola, Akkalkot, tahsils (above 125) have recorded high concentration. However, tahsils of South Solapur, Pandharpur, North Solapur and Akkalkot have shown high concentration. Growing demand for buffalo milk from urban centres of Bombay, Pune, Solapur and Pandharpur might have encouraged high concentration. This may also be related to traditions of keeping buffaloes.

(b) Moderate concentration zone (110 to 125) -

In 1968, moderate concentration (110 to 125) of buffaloes in milk is found in Pandharpur and Karmala (Fig.2.6). In 1988, Mohol tahsil has recorded moderate position.

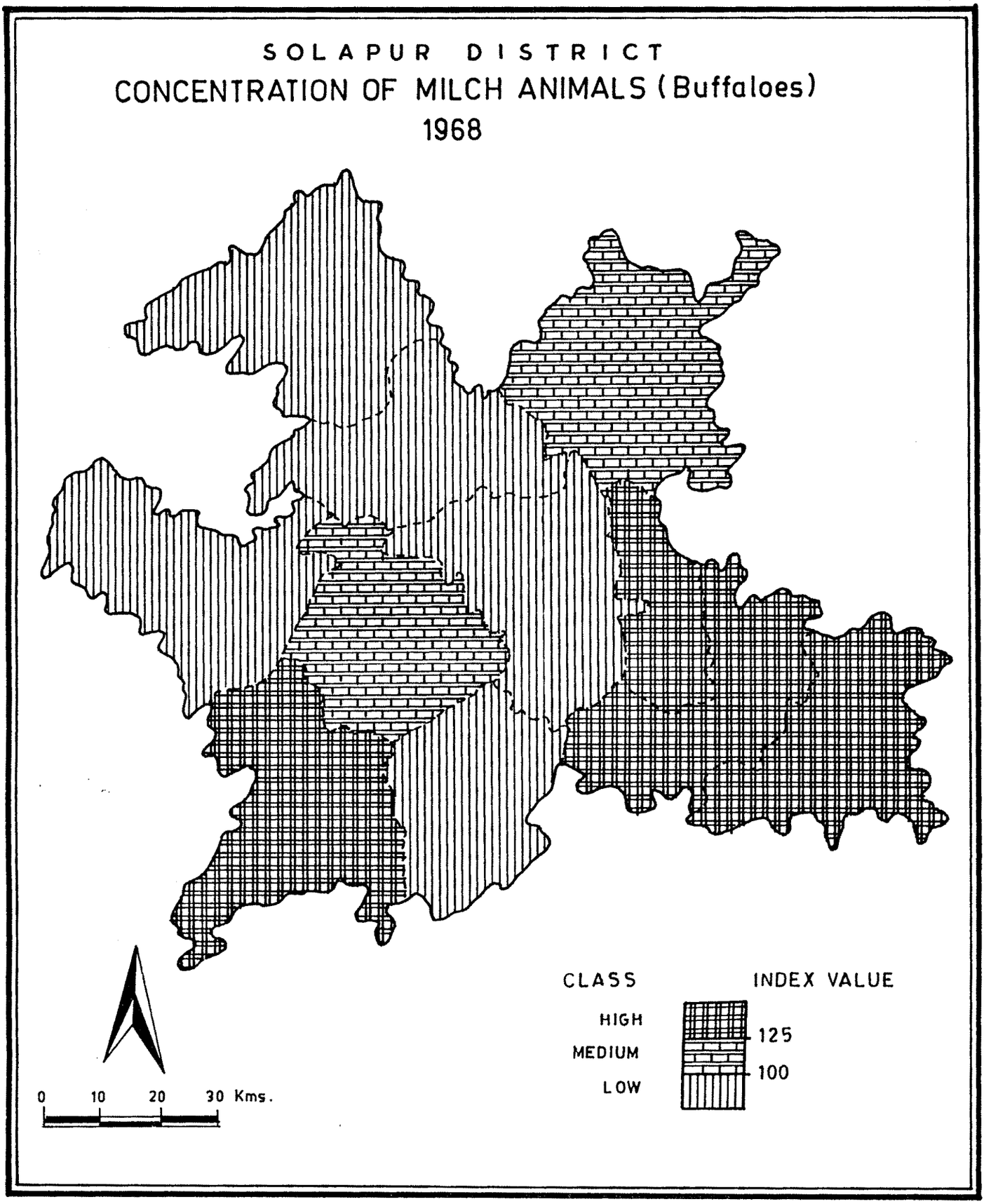

SOLAPUR DISTRICT
CONCENTRATION OF MILCH ANIMALS (Buffaloes)
1968
CLASS
INDEX VALUE
HIGH
MEDIUM
LOW
125
100
0 10 20 30 Kms.

Fig. 2·8

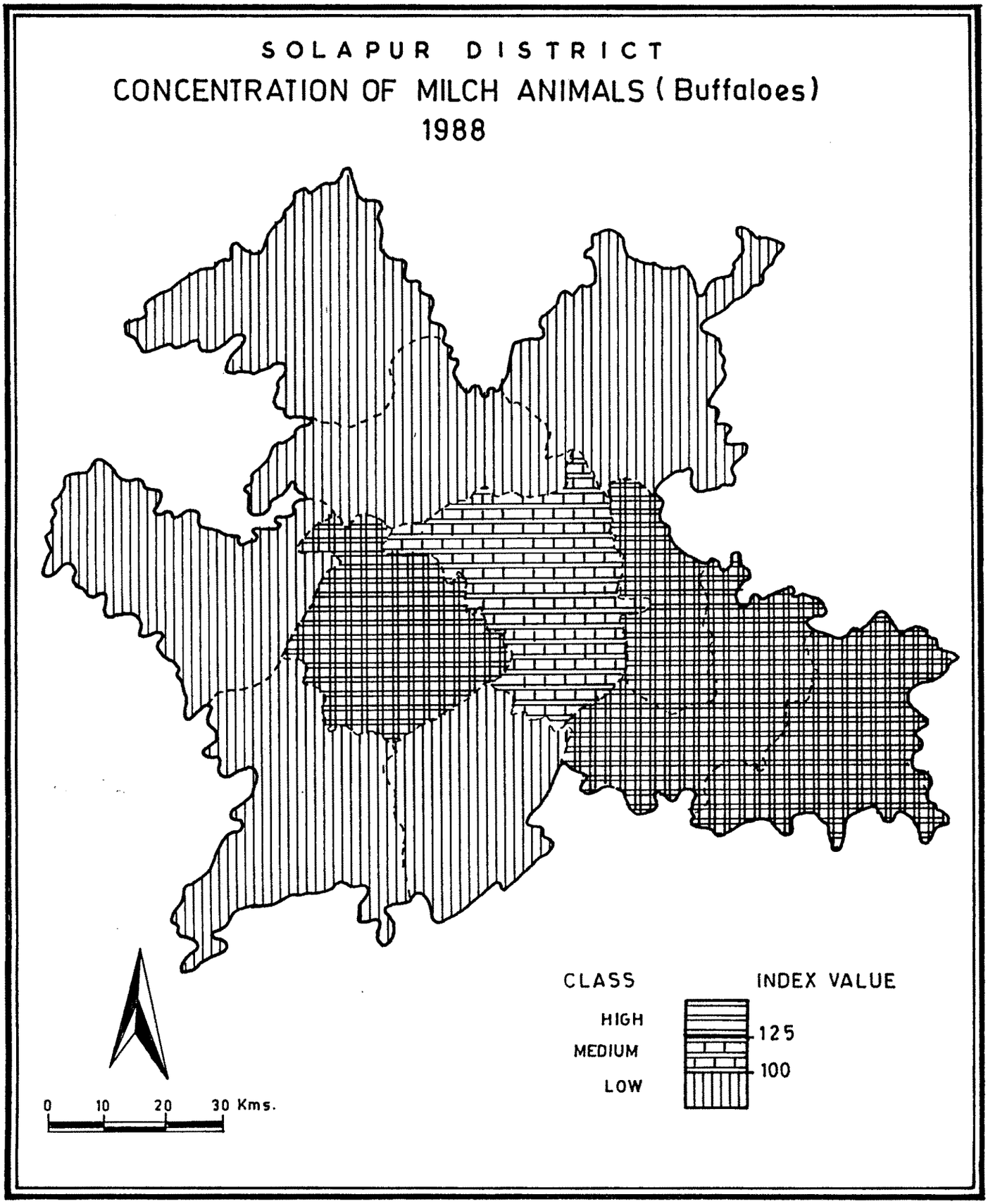

SOLAPUR DISTRICT
CONCENTRATION OF MILCH ANIMALS (Buffaloes)
1988
CLASS
INDEX VALUE
HIGH
MEDIUM
LOW
125
100
0
10
20
30 Kms.

Fig.2·9

(c) Low concentration zone (less than 100) :

Low concentration (less than 100) of buffaloes in milk is found in Malshiras, Karmala, Madha, Mohol and Mangalwedha tahsils in 1968. Karmala, Madha, Barshi, Sangola, Malshiras, Mangalwedha tahsils have recorded same position (less than 100) in 1988.

R E F E R E N C E S

1. Gopalkrishan, C.A.,Lal, G.M. (1986) : Breeds of Indian Buffaloes; Livestock and poultry enterprises for rural development; Vikas Publishing House, New Delhi, pp.328-336.

2. Majid, Hussain (1979) : Agricultural Geography. Inter India Publications, Delhi, pp.120-121.

3. Mirdha, N.R. (1974) : Livestock in India, Yojana, Vol. XVIII, No.9, pp.6-15.

4. Sauer, Carl (1952) : Agricultural origins and dispersals. Bowman Memorial Lectures. American Geographical Society, pp.379-381.

5. Singh, J. and Dhillon, S.S. (1984) : Methods of Agricultural regionalization. Agricultural Geography, Tata McGraw Hill Publishing Company Limited, New Delhi, pp.210-220.

6. Weaver, J.C. (1954) : Crop combination regions in Middle West, Geographical Review, 44, pp.175-200.
