Indian Journal of Animal Sciences **95** (4): 354–359, April 2025/Article
https://doi.org/10.56093/ijans.v95i4.156995

Study on population distribution of Mahakaushali goat and socio-economic status of goat farmers in Seoni, Chhindwara and Balaghat districts of Madhya Pradesh

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Received: 23 September 2024; Accepted: 17 June 2025

ABSTRACT

The study of the socio-economic status of farmers and distribution of the Mahakaushali goat population was conducted in Seoni, Chhindwara and Balaghat districts of Mahakaushal region of Madhya Pradesh, located in central India. It lies in the Narmada River valley at the upper or eastern reaches of Madhya Pradesh. The standard questionnaires recommended by NBAGR were used for the data collection. The data were collected through personal interviews with 625 goat farmers in the targeted districts. In the present study, farmers were interviewed for the demographic evaluation. The present study revealed that goat farmers of the targeted districts were economically poor, and they mainly depended upon the livestock for their livelihood (especially goat). The study specified that the Mahakaushali goat population was distributed across the Seoni, Chhindwara, and Balaghat districts of the Mahakaushal region in Madhya Pradesh. Based on the present study, the estimated local goat populations (Mahakaushali goat) were found 47370, 41070, and 59520, respectively, in Seoni, Balaghat, and Chhindwara districts. This survey was the first attempt to study the demographic and geographical distribution of the Mahakaushali goat in Seoni, Chhindwara and Balaghat districts of the Mahakaushal region of Madhya Pradesh.

Keywords: Demographic, Geographic, Mahakaushali goat, Population, Survey

The goat is known as a poor man's cow as it plays an important role in supporting the livelihood system of the rural poor. The goat species is reared all over India due to its ability to adapt to diverse agroclimatic zones. In the rural agricultural economy, goat rearing provides additional financial support to poor people. India is home to a diverse population of goat species with a range of ecosystems, production methods, and social structures. The goat species is the predominant small ruminant species in India and occupies the second largest population in the overall livestock population. Goat milk is popular in many parts of the country and it stands in 3rd position in terms of milk production after cattle and buffalo milk (Sodhi 2016). There are 39 registered goat breeds in India as per the National Bureau of Animal Genetic Resources Karnal (http://www.nbagr.res.in), and a number of population variants of goats in India are yet to be recognized, documented, or categorized as breeds. There are 148.88 million goats as per the results of the 20th Livestock Census (Livestock Census 2019 Government of India), of which nearly 60% have not yet been characterized and documented. There are large goat populations spread throughout various zones in Madhya Pradesh (home to 11.06 million goats), which require systematic classification, assessment, and recording to know their potential for conservation and propagation.

Mahakaushal, a region of central India, lies in the upper or eastern reaches of the Narmada River valley in the Indian state of Madhya Pradesh. Jabalpur, Dindori, Mandla, Narsingpur, Seoni, Chhindwara, Katni and Bhalaghat districts are included in Mahakaushal region.

The present investigation specifically targeted the native goat population distributed in the Seoni, Chhindwara and Balaghat districts of the Madhya Pradesh. The study focused on the demographical and geographical survey of the goat in Seoni, Chhindwara and Balaghat district regions of Madhya Pradesh. The natural breeding tract of the Mahakaushali goat population was identified with the help of the State Animal Husbandry Department of Madhya Pradesh in the relevant regions, of investigation. The presence of these goat populations in Madhya Pradesh was not studied earlier. The present study targeted goats from one of the lesser-known populations which is present in a good number in surveyed areas. The local goat population in targeted area is known by its local names. The name Mahakaushali goat of this population is derived from the

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region 'Mahakaushali' where they exist. The purest form of Mahakaushali goat is found in the Seoni, Chhindwara and Balaghat districts of Madhya Pradesh. The present study covers demographics, management practices, farmer's socioeconomic study, etc. Survey and identification study is required in the breeding tract of the local goat population of Seoni, Chhindwara and Balaghat districts to record the data on the biometry. In the view of the above, the present study was undertaken with the objective of demographical and geographical survey of the goat in Seoni, Chhindwara and Balaghat district regions of Madhya Pradesh.

MATERIALS AND METHODS

The present research work was done under the project entitled "Study on phenotypic characterization, biometry and management of local goat population in the Madhya Pradesh districts of Seoni, Chhindwara, and Balaghat" (Project file no. EEQ/2021/000486) at the Department of Animal Genetics and Breeding, funded by agency Science and Engineering Research Board, Department of Science and technology, New Delhi. Survey, identification of population and phenotypic characterization of goats at Seoni, Chhindwara and Balaghat districts at Mahakaushal region of Madhya Pradesh was carried out as per the guidelines of NBAGR, Karnal.

The Mahakaushal area of central India is located in the Indian state of Madhya Pradesh in the upper or eastern parts of the Narmada River valley. The latitude and longitude of Mahakaushal region are 23°08'60.00" N and 79°55' 58.80"E. A unique and distinct goat population is found in Seoni, Chhindwara and Balaghat region of Madhya Pradesh. The present study targeted Seoni, Chhindwara and Balaghat districts of Mahakaushal region of Madhya Pradesh for the characterization of non-descript goat population.

On the assumption that the breeding tract of the native goat are spread over adjoining/ continuous districts in one or more places, a stratified two-stage sampling design was adopted to minimize sampling error and cover the maximum area in the survey tract. Different zones within a district were identified, which constituted the different strata. A village within a stratum constituted the first unit and a house within the village, second unit. A total of 3 districts and within each district, 4 strata were randomly selected. The survey of the goat population was conducted on suitable formats and questionnaires recommended by NBAGR for collecting all possible relevant information for a particular goat population inhabiting in a defined geographical zone. Recording of information like demographical and geographical distribution, native environment, and enumeration of goats in terms of age and sex in a population was ensured through the survey of the population.

RESULTS AND DISCUSSION

The native goat population in the surveyed area was known as the Mahakaushali goat. The background for such a name is that the native track of the goat was at Mahakaushal's region of districts Seoni, Chhindwara and Balaghat in Madhya Pradesh. The synonyms of the Mahakaushali goat population were *Atty, Desi, Gorani, Cabri, Seveni,* etc. This population has existed for a long time. There were no other strains within the breed types. When we compare the Mahakaushali goat with other documented breeds, it was observed that there were no other breeds close to the appearance of Mahakaushali goats. The Mahakaushali goat population is classified according to size as medium size. The Mahakaushali goat is used for mutton and milk in the targeted area of research work. The flock of the targeted goat population is shown in fig. 1.

(A)

(B)

(C)

Fig. 1. Flock of the Mahakaushali goat population in (A) Seoni, (B) Chhindwara and (C) Balaghat districts of Madhya Pradesh

The breeding tract of the goat population under the present study was depicted in the Fig. 2. The goat population was distributed in entire Mahakaushal region of Madhya Pradesh, particularly in Seoni, Chhindwara and Balaghat districts and in adjoining parts of the targeted districts. The goat population under the present study was mainly present in the interior areas of districts and villages which were close to the forest area. The targeted goat population was distributed in the entire Seoni, Chhindwara and Balaghat district of Madhya Pradesh. Under the present study, an extensive tour of the above districts was made with the help of functionaries of the State Veterinary Department to decide the survey tract as per the availability of the goat population (Table 1). During the survey, it was found that the goat population was in the pure form because the mating of animals was mainly based on natural service and A.I. was rarely preferred by the farmers. A large number of uniform goat population was observed in the area under survey.

The climate of the breeding tract is humid subtropical. The average temperature of the native tract is 45°C (113°F) in summer. The yearly precipitation averages is roughly 1,386 mm (54.6 in). The average daily temperature is about 15°C (59°F) in winter months. The average humidity of breeding tract is 49.38 to 50.67%. The total geographical area (sq. km.) of native tract is approximately 29818. The geography and climatic description of native tract districts of the breeding tracts is presented in Table 2.

Soil property in the Seoni district was observed sandy loam soil in barghat area, kurai and southern part of the district was covered by loamy soil, while the morand soils was found in central part of the district. It was observed medium-black soil and mixed red and sandy soil in

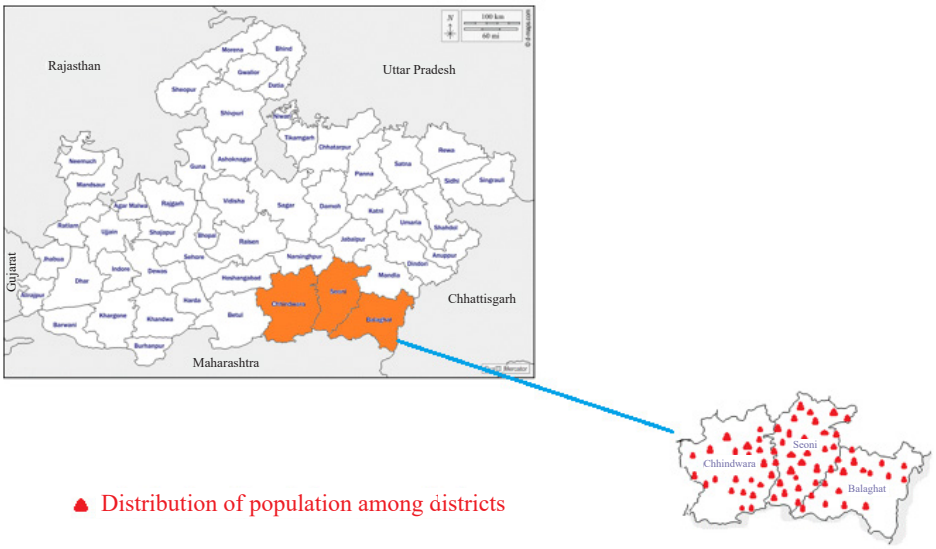

Fig. 2. Mahakaushali Goat Population distribution in Seoni, Chhindwara and Balaghat districts at Madhya Pradesh

Table 1. Details of breeding tract of goat covered under survey

Places	State	District
Barghat, Chapara, Dhanora, Ghansor, Keolari, Kurai, Lakhnadon, Seoni tehsils	Madhya Pradesh	Seoni
Amarwara, Harrai, Chourai, Parasia, Chhindwara town, Bichhua, Chand tehsils	Madhya Pradesh	Chhindwara
Balaghat, Baihar, Waraseoni, Katangi, Lalbarra, Lanji, Khairlanji, Kirnapur, Birsa, Paraswada, Tirodi	Madhya Pradesh	Balaghat

Table 2. Geographical and climatic description of the breeding tract of goat

Particular	District		
	Seoni	Chhindwara	Balaghat
	Topography		
Latitude (N)	22.0869° N	22.0574° N	22.0574° N
Longitude (E)	79.5435° E	78.9382° E	78.9382° E
Height from mean sea level	612 m	675 m	288 m
Geographical area (Sq. Km.)	8758 sq. km.	11815 sq. km.	9245 sq. km.
	Climatic condition		
Mean temp. (Highest)	32.32ºC	31.19ºC	33.9ºC
Mean temp. (Lowest)	21.38ºC	21.04ºC	21.79ºC
Average annual precipitation (mm)	178.8mm	143.72 mm	137.85mm
Humidity	50.06%	49.38%	50.67 %

Chhindwara district. Sandy loam & light black type was observed in Balaghat district.

The different feeding practices were observed in the studied area *i.e.* 2% stall feeding (raw 97% and soaked 3%), 6% Semi-stall feeding, 90% grazing alone and 2% grazing with supplementation of cultivated fodder. Extensively grazing with natural grasses/shrubs/trees-cultivated, semi-cultivated was observed in targeted districts.

In the present study, it was observed that farmers in Mahakaushal region used as major fodder trees such as mango (*Magnifera indica*), pipal (*Ficus religiosa*), ber (*Ziziphus mauritiana*), subabul (*Leuccanea leucocephala*), sahjan (*Moringa oleifera*), mahua (*Madhuca longifolia*), Omaar (*Fiscus rancemosa*), koha (*Terminalia Arjuna*), koa (*Acacia Koa*) etc. Babool (*Vachellia nilotica*), laltain (*Lantana Camara*), akona (*Calotropus gingantea*) etc. were used as major fodder shrubs. Guniea grasses, hybrid napier grass, blue buffalo grass, fodder grass, false oat grass, chaaru chara, gajar ghass (*Parthenium hysterophorus*), satyanashi (*Argemone mexicana*), doob grass (*Cynodon dactylon*) etc. were used as major native fodder grasses. Legume fodders are cowpea (*Vigna unguiculata*), lucerne (*Medicago sativa*), stylo (*stylosanthes guianencis*) *etc.* and monocot grasses are alfalfa (*Medicago sativa*), bahiagrass (*Paspalum notatum*), bromegrass (*Bromus madritensis*) and millets (*Panicum miliaceum*) etc. were used as cultivated legume fodder and monocot grass. Wheat straw, moong straw, rice straw, dry leaves of forest plants, babul, maize, umar etc*.,* were used as the source of dry fodder by the goat farmers in the study areas. Maize, wheat, sorghum, mustard, barley, etc. were used as seed and grain feed. It was found that no supplements (cakes and other concentrates, mineral mixture etc.) were added to the feed. The analysis of the water of the locality revealed that there is no deficiency of minerals and no presence of harmful minerals in the water. 100% suckling plus grazing was provided as the kid fed in the studied area. The only mating method was natural service (100%) and farmers didn't prefer artificial insemination (A.I.).

It was observed that in the whole breeding tract farmers were maintaining a good number of goats. However, survey revealed that the population of goat was mainly concentrated in Seoni, Chhindwara and Balaghat districts. Based on the present study, the estimated local goat populations (Mahakaushali goat) in Seoni, Balaghat, and Chhindwara were 47370, 41070, and 59520, respectively. Tribes, scheduled castes and OBC. communities were responsible for developing and conserving the breed.

A total of 625 farmers were interviewed under the demographic survey in the present study. The animals of the targeted goat population were 1357 (453 males and 904 females), 1078 (309 males and 769 females) and 1009 (341 males and 668 females) were estimated in Seoni, Chhindwara and Balaghat districts, respectively. A total of 3444 goats were estimated during farmers interview among all three districts.

Among a total of 1073 and 2371 males and females goats, at the birth males and females made up 1.40 and 0.84% of the goat population, respectively. Weaning/ 3 months males and females made up 14.07 and 7.30%, respectively, 6 months males and females made up 38.12 and 15.31%, respectively, 1 year males and females made up 15.75 and 12.57%, respectively, 1-3 year old males and females made up 23.21 and 29.40, respectively and adult (6 teeth) males and females made up 7.41 and 34.58%, respectively. The age and sex-wise population distribution

Table 3. Age and Sex of goat animal estimated during the farmer's interview

Age	Male (N)	Percentage (%)	Female (N)	Percentage (%)	Percentage (%)
At Birth	15	1.40	20	0.84	1.02
Weaning/ 3 month	151	14.07	173	7.30	9.41
6 months	409	38.12	363	15.31	22.42
1 year	169	15.75	298	12.57	13.56
First Kidding	249	23.21	697	29.40	27.47
6 Teeth (Adult)	80	7.46	820	34.58	26.13
Total	1073	100.00	2371	100.00	1.02
Total (Male + Female)		3444			100

Table 4. Agricultural status of farmers of survey area

Attribute	Seoni	Chhindwara	Balaghat
Agriculture holding (Acre)	0.29±0.06	1.30±0.21	0.76±0.08
Irrigated land (Acre)	0.24±0.05	0.97±0.18	0.74±0.07
Unirrigated land (Acre)	0.09±0.03	0.31±0.07	0.05±0.01
Annual Income (Rs.)	29679.61± 604.18	29213.41± 670.38	31664.03± 386.43
No. of family members (No.)	5.31±0.17	5.21±0.17	5.08±0.12
Male family members (No.)	2.60±0.09	2.70±0.10	2.52±0.07
Female family members (No.)	2.67±0.11	2.50±0.11	2.57±0.07
No. of literate members (No.)	1.91±0.10	1.79±0.10	2.04±0.07
No. of houses covered (No.)	206	164	253

Table 5. Housing and feeding practices of goat population in Seoni, Chhindwara and Balaghat districts at Mahakaushal region of Madhya Pradesh

Attribute		Percentage (%)	Attribute		Percentage (%)
Animal tide	Only night	95	Fodder	Fodder grown	0
	Day & Night	05		Pasture feeding	100
Types of animal house	Open	40	Feeding method	Soaked	1
	Close	60		Raw	99
Types of construction	Kachcha	98	Concentrate feeding		1
	Paucca	2			
Location of animal house	Part of residence	90	Feeding at milking time		100
	Separate	10	Cleaning milk utensils		100
Type of flooring	Kachcha	99	Washing of udders before milking		100
	Paucca	1	Grazing	Distance	3-4 km
Construction of wall	Complete	60		Time	4 to 6 hr
	Half	40			
Hygiene of animal houses	Clean	40			
	Not clean	60	Water adequacy		95
Provision for drainage	Yes	2			
	No	98			
Types of drainage	Kachcha	100			

of goat population surveyed in Seoni, Chhindwara and Balaghat district regions is presented in Table 3.

The information regarding the socioeconomic status of farmers in the Seoni, Chhindwara and Balaghat districts was obtained by random survey using NBAGR standard questionaries. The average agricultural status of farmers of these districts was comparable. The overall socioeconomic status of farmers was poor in all the districts. The annual income of farmers of Seoni, Chhindwara and Balaghat was estimated 29679.61 ± 604.18, 29213.41 ± 670.38 and 31664.03 ± 386.43, respectively. The average agriculture holding (acre) in Seoni, Chhindwara and Balaghat was stimated 0.29 ± 0.06, 1.30 ± 0.21 and 0.76 ± 0.08, respectively. Irrigated land (Acer) was estimated higher in Chhindwara than Seoni and Balaghat districts. The number of houses covered in Seoni, Chhindwara and Balaghat were 206, 164 and 253, respectively. The agricultural status of farmers of the surveyed area is presented in Table 4.

The results of random survey regarding housing, feeding and management practices are presented in Table 5. It was revealed that on average 95% of farmers housed their animals only at night while 5% of farmers housed them both in day and night. This was more or less a general practice prevailing in all districts. Generally, the closed housing system (60%) was followed in comparison to the open (40%) system. The *kachcha* houses type of construction was about 98%. About 90% of animals house were besides the resident of farmers and 10% farmers had separate animal's houses. In 99% of animal houses, floor was *kachcha* type and the wall was having full height. In about 98%, animal house had no drainage system and 100% animal house had *kachcha* type of drainage. The hygiene and sanitary conditions of the animal houses was very poor. In accordance with the present study Singh *et al.* (2018) reported that the majority of the goat owners were observed illiterate in the study conducted for socio-economic profile and existing flock structure of goat farmers in villages of Jabalpur District. The findings are in line with findings of Kumar *et al.* (2015) and Sabapara (2016).

It was observed that no farmers in the study areas grow fodder to feed their goats in the breeding tract. The animals were mainly dependent upon pasture/grazing feeding (100%). The feeding with chaffed green fodder was less common (1-2%) in the surveyed districts. Raw feeding was practiced by 99% of farmers whereas soaked feeding was practiced by only one percent of the farmers in the targeted districts. As revealed by the survey, cooked feeding was not practiced at all. Feeding at milking was practiced by the most of the farmers (100%). It was observed that almost all the farmers were conscious about hygiene and therefore, cleaning of milking utensils and washing of udders before milking was common managemental practices (Table 5). The source of water for goat animals was river, nala, canals, well, ponds and tank etc. Water availability for animals was adequate except during the summer season. The overall adequacy of water was about 95%. Sometimes problems are aggravated at times of poor rainfall.

In general, grazing was preferred by the farmers for their animals starting from as early as in life. The goat in the region were commonly released for grazing in the morning and returned home in the evening from grazing land/ forest. Few farmers take their goats for grazing in the morning and evening for 3-4 hours. The animals practically depend upon grazing the whole day in the forest area with nominal feeding in animal houses.

A sizeable uniform population of Mahakaushali goat was distributed in entire the Mahakaushal region of

Madhya Pradesh particularly Seoni, Chhindwara and Balaghat districts and in adjoining parts of these districts. The local name of goat in area are Mahakaushali, *Atty, Cabri, Gorani, Desi, and Sevni.* The present study was the first attempt to examine the goat population in this region. The goat population is used for mutton and milk. The size of goats in the studied population was medium size. There is an urgent requirement to recognize the studied Mahakaushali goat population as a breed for their further improvement and conservation.

ACKNOWLEDGEMENTS

Authors acknowledge the Science and Engineering Research Board (SERB), Department of Science and Technology, New Delhi, for providing the financial assistance for the project. The authors express their sincere gratitude to Hon'ble Vice Chancellor, NDVSU, Jabalpur, for providing necessary support and guidance. The authors are thankful to the Dean, College of Veterinary Science & Animal Husbandry, Rewa for providing the necessary facilities to carry out the study.

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