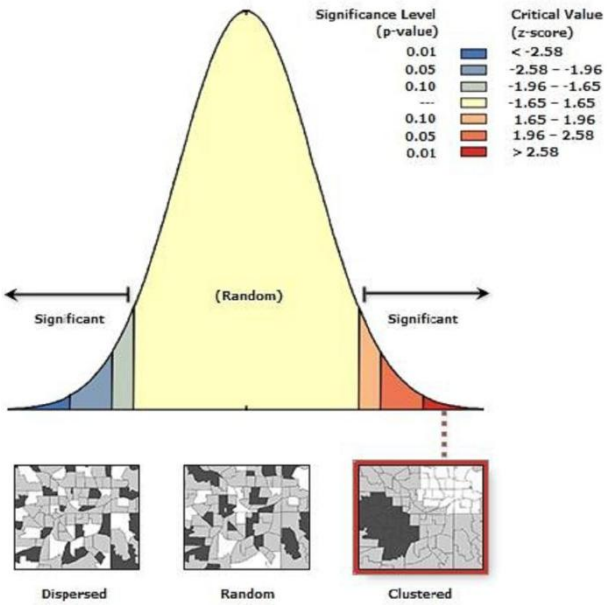

Figure 3

Spatial Autocorrelation Report of Camel Density
Moran's Index: 0.535123
z-score: 6.200147
p-value: 0

High (2.2-4.6) density lies only three agro-ecological zones and only three Crop based agro-ecosystem zones; Rugged hilly terrain of Aravali range, hot and semiarid, little to moderate available moisture and its 90-120 days growing season, second one is Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period and third is Aeolian plain, hot and dry, insignificant available moisture, < 60 days growing period. Crop based agro-ecosystem zones are Cotton-Wheat, Bajra/Jawar/Guwar/Fallow-Wheat/Others and Bajra/Fallow-Mustard Show in table1. High density of camel lies nine tehsil: Rania, Sirsa (Sirsa district), Fatehabad (Fatehabad district), Siwani, Tosham, Loharu and Dadri, (Bhiwani district) and Mahendergarh and Narnaul (Mahendergarh district).

Medium density of camel lies in only five tehsils show in table1 .Its lie in three agro-ecological zones and three Crops based agro-ecosystem zones. Medium density lies in southern and western part of Haryana state.

Low (0.-0.5) density of camel lies above half state. Its lie in seven agro-ecological zones and four Crop based agro-ecosystem zone shows in figure4 and table1.

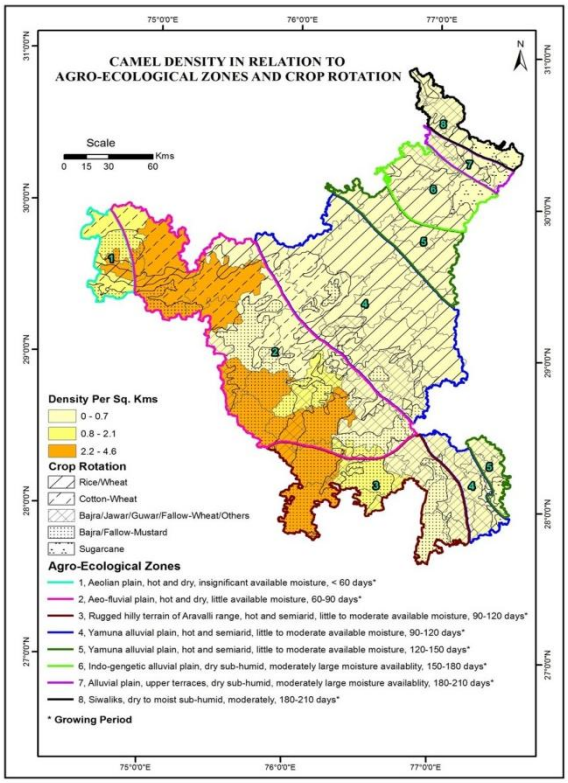

Figure 4

Table 2: Camel density in relation to agro-ecological zones and Crop based agro-ecosystem

Camel Density (Per sq. Kms)	Tehsil	Agro-ecological zones	Crop based agro-ecosystem
High (2.2-4.6)	Rania, Sirsa, Fatehabad, Siwani, Tosham, Loharu, Dadri, Mahendergarh, Narnaul	Aeolian plain, hot and dry, insignificant available moisture, < 60 days growing period. Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. 3. Rugged hilly terrain of Aravali range, hot and semiarid, little to moderate available moisture, 90-120 days growing period.	1.Cotton-Wheat 2.Bajra/Jawar/Guwar/Fallow-Wheat/Others 3.Bajra/Fallow-Mustard
Medium (0.8-2.1)	Ellenabad, Dabwali, Bhiwani, Loh, Rewari, Bawal	1. Aeolian plain, hot and dry, insignificant available moisture, < 60 days growing period. 2. Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. 3. Rugged hilly terrain of Aravali range, hot and semiarid, little to moderate available moisture, 90-120 days growing period	1.Cotton-Wheat 2.Bajra/Jawar/Guwar/Fallow-Wheat/Others 3.Bajra/Fallow-Mustard
Low (0-0.7)	Ambala, Ascmalh, Bahadurgarh, Barara, Barwala Khara, Beri, Chhachhrauli, Faridabad, Farrukhnagar Ganaur, Ghamaroda, Gohana, Gokla, Gurgaon, Hansi, Hathin, Hisar, Jhajjar, Jind, Julana, Jagadhri, Kaithal, Kalanaur, Karnal, Kharkhoda, Kosli, Kurukshetra, Mahm, Mahendragarh, Narnaul, Nilokheri, Nuh, Pataudi, Panchkula, Panipat, Pataudi, Pehowa, Pundraon, Rohtak, Rohtak, Safidon, Samalkha, Shahabad, Sohna, Sonipat, Tauru, Shahbad, Sohna, Sonipat, Tauru, Thanesar, Tohana.	2. Aeo-fluvial plain, hot and dry, little available moisture, 60-90 days growing period. 3. Rugged hilly terrain of Aravali range, hot and semiarid, little to moderate available moisture, 90-120 days growing period. 4. Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 90-120 days growing period. 5. Yamuna alluvial plain, hot and semiarid, little to moderate available moisture, 120-150 days growing period. 6. Indo-gengetic alluvial plain, dry sub-humid, moderately large moisture availability, 150-180 days growing period. 7. Alluvial plain, upper terraces, dry sub-humid, moderately large moisture availability, 180-210 days growing period. 8. Siwaliks, dry to moist sub-humid, moderately, 180-210 days growing period.	1.Cotton-Wheat 2.Bajra/Jawar/Guwar/Fallow-Wheat/Others 3.Bajra/Fallow-Mustard 4.Sugarcane

5. Conclusion

The geographical distribution of livestock resources in Haryana in terms of agro-ecological zones and crop based agro-ecosystems were studied to determine the distribution characteristics of camel in Haryana with regard to the different agro ecological zones. The livestock data from 18th Livestock census of Haryana 2007 (Department of Animal Husbandry & Dairying and Fisheries, Ministry of Agriculture, Govt. India) was used to create Haryana Livestock Geodatabase having Tehsil wise population of Camel. This livestock geodatabase is a ready source of livestock census in relation to the map of Haryana where queries related to livestock populations at district and Tehsil level can be answered. The broad spatial distribution trends of the different livestock species in Haryana using Tehsil as the areal unit were identified and livestock distribution maps for each species were created using Jenk's Natural Breaks method with three classes representing High, Medium and Low densities. Moran's I Statistic investigated if the spatial distribution of various domestic animal species and breeds in

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Haryana, was clustered, random or dispersed. The Global Moran's I statistic was used to measures spatial autocorrelation based on both Tehsil locations and animal density values simultaneously. The z-score and p-value were used to evaluate the significance of Moran's I statistic. The Moran's I statistic revealed that the distribution of all the animal species studied was clustered except indigenous female cattle which were found randomly distributed. Clustered distribution of all animal species was highly significant (p = 0.000019, Z score = 4.281135). Heterogeneity in livestock distribution was analyzed in relation to the five major cropping patterns representing crop based agro-ecosystems and the eight agro-ecological zones of Haryana based on soil, physiography, bio-climate and length of growing period. The five major crop rotations were Rice/Wheat, Cotton-Wheat, Bajra/Jawar/Guwar/Fallow-Wheat/Others, Bajra/Fallow-Mustard and Sugarcane. Camel population is mainly restricted to western parts of Haryana adjoining with Rajasthan. This area is characterized by hot and dry aeo-fluvial plains with mainly Bajra/Mustard and Cotton-Wheat crop rotation.

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