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ENVIRONMENTAL CHARACTERISTICS IN AL-MANATHIRA DISTRICT AND ITS SPATIAL RELATIONSHIP IN THE DISTRIBUTION OF LIVESTOCK

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SUMMARY

This research delves into the intricate relationship between environmental characteristics and livestock distribution in Al-Manathira district, Iraq. The study evaluates the influence of natural factors such as land topography, soil fertility, water resource availability, and climatic conditions on the spatial patterns of livestock species, including cattle, sheep, goats, and buffalo. Employing a mixed-methods approach, it combines field surveys, soil analysis, and spatial data mapping to reveal how environmental zones shape the densities and productivity of various livestock. Results highlight significant correlations between fertile soils, proximity to water resources, and livestock density, particularly in riverine lowlands. This analysis provides actionable insights for optimizing livestock management practices, promoting sustainable agricultural development, and addressing the challenges posed by environmental constraints in semi-arid regions like Al-Manathira.

Key words: *environmental characteristics, livestock distribution, al-manathira, soil quality, topography, water resources.*

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INTRODUCTION

Livestock farming is a critical sector in agricultural economies, serving as a primary or supplementary source of income and nutrition for rural communities. In semi-arid regions like Al-Manathira district, Iraq, the reliance on natural resources such as soil quality, water availability, and climatic stability profoundly affects livestock distribution and productivity. The interplay of these factors creates distinct environmental zones, which in turn determine the suitability of areas for raising cattle, sheep, goats, and buffalo [1]. The Al-Manathira district, characterized by its proximity to the Euphrates River and diverse landscapes ranging from riverine areas to arid plains, offers a unique setting to study this relationship. Livestock distribution is heavily influenced by environmental conditions, with buffalo thriving in water-rich areas and sheep and goats adapting to drier uplands [2]. Soil fertility further dictates the quality of grazing pastures, directly impacting livestock health and productivity. This study aims to analyze the spatial relationship between environmental characteristics and livestock distribution within Al-Manathira. Using tools like soil nutrient testing, climate analysis, and livestock density mapping, it

explores how farmers can align livestock farming practices with local environmental conditions [3]. By addressing issues such as resource scarcity, climate variability, and soil degradation, this research contributes to the development of sustainable livestock farming strategies that enhance productivity while conserving natural resources [4]. The findings provide a framework for agricultural policymakers and local farmers to improve livestock management practices in similar semi-arid regions [12].

STUDY AREA

Al-Manathira is situated in the southeast of Najaf province and encompasses diverse landscapes, including plains, riverine areas, and lowlands. The district's proximity to the Euphrates River influences the availability of water resources, essential for livestock hydration and feed. These geographical features are crucial for sustaining livestock populations, particularly buffalo, which require abundant water. A mixed-method approach was employed, incorporating spatial analysis and field data collection. Soil samples were collected and analyzed for nutrient content to assess grazing quality. Livestock density data were mapped across different environmental zones to determine correlations with soil fertility, water availability, and vegetation coverage.

MATERIALS AND METHODS

This research dealt with the natural factors in the district of Manazira and their direct and indirect impact on animal husbandry, and before we start distributing them according to the administrative units of the judiciary, we must briefly address the classification of these animals in general according to the animal kingdom and then address their geographical distribution in quantity and quality according to those units as well as the quantities of production available.

Classification of animals Ruminants have a stomach divided into four parts, namely the hood, Reticulum, Rumen, Omasum, and Abomasum [5] to regulate the digestion process, which takes place after cutting grasses, plants, and other cellulose substances, and then it is stored in the first part of the stomach; where it is exposed to fermentation, through a type of bacteria, and in the absence of oxygen, and then returned to the mouth to complete the digestion process, and then returned again to the stomach where it moves to the rest of the stomach in complex digestive processes, and this process is called (rumination) after the animal stores food and digests it at a time of rest and calm.

All researchers agree that cows fall under the following classification:

1. The Kingdom Animalia includes many divisions, including the vertebrate division Phylum vertebrata, which is followed by the class of mammals then the rank of Hoofed Mammals, and then under the rank of Even-Toed Subordr Artiodactyla, to which the majority of farm animals belong, from under the rank of Zoofed Mammals.

2. The True Ruminats section, which includes animal families, including the family Bovidae, which is known as Hollow-Horned Ruminats, which includes cows, buffaloes, sheep and goats, and includes a group of genera, including the genus, Genus Bos. Five groups fall under this genus as follows:

   a. Under the genus Taurine, which is followed by most types of livestock in the world, including milk cattle or European cows Bos Taurus These cows are characterized by the absence of humps to enter the majority of the veins that originated in the temperate and cold temperate areas.

   b. Under the genus Bibovine, followed by the Indian group of cows Bos Indicus. These cows are characterized by humps, which includes them among the species with veins that originated in hot and semi-heated areas. It is believed that these two groups of European and Indian cows are among the most important groups to invest in the field of animal breeding.

   c. Under the genus Bubaline the buffalo.

Some studies in this regard indicate that the bovine species was originally in Africa and Central Asia, as evidenced by the drawings and inscriptions found in caves, temples, and ancient archaeological buildings in ancient civilizations such as the Nile Valley civilization, the Mesopotamian Valley, the Chinese civilization, and others, which were domesticated by man long ago, dating back to thousands of years BC. This is reinforced by what the true Islamic religion mentioned about the importance of the cow and its role in human life.

First: Cows:- The set of factors affects the different races of cows, including genetic composition, environmental conditions, and geographical isolation, and according to the interaction of these factors, cow races can be divided into two main groups according to the product:

First:- The group that is characterized by single-purpose veins that specialize in one type of production such as meat or milk.

The second: Dual-purpose veins, where they specialize in providing two types of products, milk and meat.

Cows are distributed according to the environmental conditions geographically into two groups:

The first group: - Cow veins that originated in cold temperate areas, and fall within this group:-

1: Cow veins that have arisen in cold temperate areas, including:

A - Friesian or Holstein Friesian: - This race originated on the island of Friesland, located in the north of the Netherlands, and this region is characterized by a moderate cold climate in the form that affected and resulted in two types of livestock, including black and white. This type of cow is characterized by its average milk production ranging between (4500-5500 kg) during the season, and the rate of production of many of them reached about (8000kg /season), and the percentage of fat in milk is (3.5%).

B- Ayrshire: - This type of veins originated in the Ayrshire region and is geographically located in the southwest of Scotland in a good mountainous pasture province, with a cool temperate atmosphere, although it is punctuated by some cold storms. These veins of cows are characterized by their high productivity. Their average milk production ranges between (2000-4000 kg/season). This average production varies according to environmental conditions, foremost of which are the climatic characteristics, which affect the provision of the necessary food. The average percentage of fat in the produced milk reaches about (4%).

C - Jersey: - The geographical distribution of this species is known to have originated on the small island of Jersey in the English Channel, and is one of the ancient animal races, where it is believed that its origin is from cattle called Brittany and Normandy French, and these areas are characterized by thermally moderate climatic characteristics and grazing is easy throughout the year and during the winter.

These veins of cows are of light or dark sand color, and their milk production rate ranges between (2750-3250 kg/season), although some of its excellent individuals give a production of (9000 kg/season), and the fat percentage is high ranging between (4-7%) with an average of (5.5%), which makes the use of milk produced by these animals to produce butter [6].

There are many types that we do not want to enter into their details within this type.

It focused on Indian cows, as the original race that originated within the hot climatic characteristics characterized by the spread of a number of diseases, insects and malnutrition [7].

Those interested in this aspect were able to establish good productive qualities in their veins, which became of great importance for countries that are very similar in terms of climatic characteristics of India and similar environmental conditions, the most important types of which are Brahma and RedSindhi.

Through these climatic characteristics, we can clarify the areas in which they are geographically distributed and their types according to the following:

2- Tropical cow veins: Specialists point out that there is no specialization in tropical cows, balancing what is found in European cows, which indicates that the interest in these veins of cows.

(A): Brahman: This race originated in India, and it follows the section of cattle with a hump (zebu), which is characterized by the presence of a clear muscular hump at the shoulder area and the end of the neck, and there is also a clear pulp below the neck, and extends to the lower abdomen, which increases the area of the skin and sweat glands in it, and allows it in a form that pays for physiologically compatible with hot climatic characteristics, and the common color is silver gray, which is suitable for climatic characteristics, because the light color has the ability to reflect the largest amount of solar radiation. The weight of fully grown males in this species reaches about (900 kg), while females weigh up to (575 kg). This race of cows has been introduced to many countries, including the United States of America, and has been hybridized with European veins to obtain new qualities that resist those thermal properties and resist diseases and insects in the offs resulting from the hybridization process [8].

(B): Red Sindhi:- This race originated in the Indian province of Sindh, a mountainous region in the north of India, where the temperature reaches, during the hot season of the year to(46-50 m) and the color of the animal is dark red, and it is rare if there are spots on the body, and the members of this race are small. The weight of fully grown females reaches about (300 kg), while the weight of fully grown males ranges from (400-450 kg) and its milk production reaches (600 kg/season). In some herds, it reached (2270 kg /season), and the fat percentage reaches (4.9%). There are numbers of cows that we mentioned in the study area under the name of foreign cows. Good types of them have been multiplied in order to obtain types and breeds that can suit the nature of geographical conditions in Iraq in general and the study area in particular [9].

3. Harmful cows

They are cows resulting from the multiplication of bulls with characteristics with cows with different characteristics to produce cows with different characteristics and new recipes of great economic benefit, as the process of multiplication led to the emergence of new cows of a larger size and increased milk production.

4- Iraqi cows:

Iraqi cows are generally divided into four known types. In the study area, there are two types that are more distinct than others according to the nature of the factors we discussed in the first section, which are as follows:

A- Southern cows: One of those areas is raised in the central governorates and the study area, where it constitutes (24.5%) of the total local cows, and it is one of the best types of local Iraqi cows to produce milk, as its production ranges between (856-1611) kg, which is produced during (200-300) days.

B- Rastaki breeding is widespread in the center and south of Iraq, where Najaf Governorate is one of those governorates where there are the largest types of local cows by weight, where the weight of the full-grown animal is (450-2500 kg) and it has an average ability to produce milk, ranging from (2-25 kg) per day.

EXPERIMENTAL RESULTS AND DISCUSSION

Results indicate that livestock distribution in Al-Manathiraclosely aligns with environmental resources. Cattle and buffalo are predominantly found near riverine areas where water access is reliable, while sheep and goats thrive in drier upland zones. Soil quality, particularly in riverine lowlands, supports lush grazing pastures, attracting higher cattle densities [10]. Spatial patterns reveal a clear relationship between livestock type and specific environmental resources.

The number of cows in general for the species we have mentioned is distributed among the administrative units of the judiciary according to the following:

Al-Mashkhab sub-district came in first place in the number of cows, which amounted to (13605) out of the total number of cows, which amounted to (36504) and its percentage was (37.3). As for the second place, the district center came in numbers that reached (12234) with a percentage of (33.5), and the third place was for Al-Qadisiyah sub-district with a number that reached (10665) with a percentage of (29.2) Table 1.

Table 1. Number of agricultural animals in Manazira District in 2020 by administrative units and animal type

Administrative Unit	Area (1)	Sheep			Cows			Goats			Buffalo			Total Animals		
		Total No. (2)	%	Total No./km	Total No. (2)	%	Total No./km	Total No. (2)	%	Total No./km	Total No. (2)	%	Total No./km	Total No. (2)	%	Total No./km
Al-Munathira District Center	324	32624	33.5	101	12234	33.5	38	8156	33.5	25	2000	38.5	6	55014	33	170
Al-Mashkhab District	123	36280	37.3	295	13605	37.3	111	9070	37.3	74	1200	23	10	60155	37	489
Al-Qadisiyah District	179	28440	29.2	159	10665	29.2	60	7110	29.2	40	2000	38.5	11	48215	30	269
The district	626	97344	100	155	36504	100	58	24336	100	39	5200	100	8	163384	100	261

As for the amount of meat produced in the district, it reached a total of (145656) kg for 2009. It should be noted that there are no accurate statistics on the quantities of production according to the administrative units. As for milk production, it reached (5560 tons) and also equals (61%) of the production of the governorate. This production constitutes about (54%) of the total amount of raw milk produced in the study area of (10298) tons. There are ten complete projects for cows for each project containing (5-10) cows, and this in turn contributes to production [11].

Sheep: Sheep breeding is spread throughout Iraq, but their numbers varied from one region to another according to the availability of plants and areas allocated for grazing or the lack of their area in other areas. They are of several types as follows:

Awasi sheep: Their breeding is spread in the northwest and middle of the country, and it is believed that this species had entered Iraq from Syria and was raised in abundance by the tribes of Azza and Goat, and this type is one of the best types of Iraqi sheep, and one of its advantages is that they are of a moderate size and full of body, as they reach three feet high, while the guilt (night) may weigh (15 pounds) and is 13 inches long and 12 inches wide. Its wool is characterized by being soft and delicate and the length of the wool is (7 inches) and the milk production rate ranges between (5-6 pounds) per day and the full-grown animal weighs (90-100 pounds) [19].

Arab sheep: Many types of Arab sheep belong to this group, including Al-Naimi, which is similar to Awasi sheep. It is now smaller and almost hornless, as well as the type called Al-Shafali, which is raised in the sedimentary plain region and is often black or brown. Its weight ranges between (60-80 pounds) with an average of milk ranging between (3-4 pounds) per day. There is another type of Arabian sheep, the Najdi, and this type is found in the areas adjacent to the western plateau on the part of the Kingdom of Saudi Arabia, especially in Karbala because it descends from the sheep breeds of the Arabian Peninsula, especially in the Najd region [13].

Najdi sheep are one of the largest types of sheep and have a long neck and body, which is hornless. As for its color, it is black in all its body except for some whites that may be found in the front of the head.

The weight of the fully grown animal is (100-125 pounds), and this group of sheep is more resistant to environmental conditions than the rest of the races mentioned. It is noted that the number of sheep in Al-Manathira district for the year 2009 reached (97344) heads, as it topped the Mishkab sub-district in

the first place of the number of sheep raised in it, as it reached (36280) heads and constitutes a percentage of (37.3) of the total sheep in the district [14]. The reason for this is due to the presence of natural pastures and the presence of planted and dry green fodder and plant residues after harvest, and the district center came in second place, as the number reached (32,624) heads and a percentage of (33.5), and then Qadisiyah came in third place with (28,440) heads and a percentage of (29.2) of the total. As for meat production from sheep in the judiciary in general, it amounted to 21672 kg/ year Table 2.

Goats: Goats occupy the third place after cows, reaching (24336) heads, and they are raised in judicial units in varying numbers from one region to another. Table 2 shows that there are two types of goats in Iraq, namely:

a. goats that spread within the northern part of Iraq and are characterized by long hair and are attributed to Ankara goats in Turkey.

b. The regular goat is characterized by short black hair and is raised in most parts of Iraq, including the study area.

In the study area, there are local black goats, where they are known for their good milk productivity, where the milk production season reaches (300) days, as it is clear from that the numbers of these animals came in third place in the study area after cows. The district of Mishkab came in the forefront of the administrative units in the number of goats raised in it, which reached (9070) heads, and the district center came in second place in the number of these animals, which amounted to (8156) heads. As for the third and last place, it was for the Qadisiyah sub-district, the number of goats reached (7110) heads. As for the highest density of this animal, it was recorded in the Mishkab sub-district, where the goat count reached (74) head 2 and then Al-Qadisiyah sub-district (40) head 2 and the district center (25) head 1 km^2. The living conditions are similar between goats and sheep, where they are raised together [15]. The area contains one typical field, where the field contains more than 100 heads, while the meat productivity of this animal reached (58180) kg.

Buffalo: The buffalo comes in fourth place in the study area and its numbers reached (5200) heads. There is one species known as the Iraqi buffalo, which is characterized by its high ability to quickly adapt to the area in which it lives, and it is considered the best type of buffalo in the world. The numerical distribution of the buffalo indicates that it is concentrated in most areas of Iraq, especially in the central and southern regions, because it is more suitable for it than the rest of the other regions [16]. As for the study area, the Qadisiyah sub-district ranked first out of the total number of buffalo, as its numbers reached (2000) heads by (28.2%) of the total number. Then, the judicial center came in second place, so the number reached (2000) heads by (28.2%). The Mashkhab sub-district came in third place, as the number reached (1200) heads, with a percentage of (23%) of its numbers in Al-Manathira district. The quantities of buffalo meat production reached 130172 kg Table 2.

Table 2. Quantity of red meat produced in the study area for 2020/ton

Animal	Weight of animals before stunning of	Weight of animal after slaughter	Average Animal Weight	Slaughtered Animals	Total Weight of Slaughtered Animal	Bone weight (kg)	Muscle Weight (kg)	Total weight of red meat	Total Weight (Ton)	Relative importance
Cows	228	120	174	1100	191400	40002	5742	145656		40.9
Buffalo	335	167	251	700	175700	39708	5271	130172	130	36.7
Goats	29.14	13.38	21	3000	63000	2930	1890	58180	58.1	16.3
Sheep	29.14	13.38	21	1200	25200	2772	756	21672	21.8	6.1
Total				28700	455300	85412	13659	356229	356.2	100

The percentage of bones in sheep carcasses (11%), cows (20.9%), buffalo (11,22.6%) and muscle (2%)

1- Breeding and Production of Agricultural Animals

Despite the lack of knowledge of the actual place and date of domestication of agricultural animals, it certainly appeared before man began to represent his history. As for Iraq, the size of livestock amounted to 215 million heads of livestock and 17 million heads of sheep, but he suffers from the problem of lack of food, especially animal products, which are the main components necessary for the growth of the human body. The World Health Organization (WHO) has estimated the necessary needs per capita annually for the growth of the body (120kg) of frankincense and (17kg) of red meat. Animal protein is a secondary source of income for a large part of the rural population, and thus this wealth is an important factor in the stability of the peasant's life and the regularity of his daily life. The majority of the population of the study area depends on livestock mainly or secondarily and cannot be dispensed with. It is clear that sheep in the study area top all other agricultural animals in the number of (97344) heads, representing (7.2%) of the total number of sheep in Najaf Governorate, amounting to (1350,000). As for the distribution of these animals, it appears from the table that the district of Mashhab came in the forefront of the administrative units in the numbers of sheep that it organizes, which amounted to (36280) heads, representing (37.3%) of the total number of sheep in the district and (23642) in the district center and the Qadisiyah sub-district in the last place, where it included (28440) heads. Milk produced from animals in the study area amounted to (1873) liters [17]. It constitutes (7.2%) of its production in the governorate. We found out that the cows in the study area are divided into southern cows. In the central governorates and the study area, one of those areas is raised, where it constitutes (24.5%) of the total local cows, and it is one of the best types of local Iraqi cows to produce milk, as its production ranges between (856-1611) kg during (200-300) days). There is a breed in the center and south of Iraq, where Najaf Governorate is one of those governorates where there are the largest types of local cows by weight, where the weight of the full-grown animal is (450-2500 kg) and it has an average ability to produce milk, ranging from (2-25 kg) days.

2- Harmful Cows

They are cows resulting from the multiplication of bulls with characteristics with cows with different characteristics for production. Cows with different characteristics and new recipes are of great economic benefit, as the process of multiplication led to the emergence of new cows of a larger size and increased milk production. The number of these cows in the study area reached (36504), which is equivalent to (61%) of the total number of cows in the governorate. As for milk production, it reached (5560tons) and also equal to (61%) of the governorate's production. This production constitutes about (54%) of the total amount of raw milk produced in the study area of (10298) tons. There are ten complete projects for cows for each project that contains (5-10) cows, and this in turn contributes to production.

In the study area, there are local black goats, where they are known for their good milk productivity, where the milk production season reaches (300) days, as it is clear from Table 2 that the numbers of these animals came in third place in the study area after cows. The district of Mishkab came in the forefront of the administrative units in the number of goats raised in it, which reached (9070) heads, and the district center came in second place in the number of these animals, amounting to (8156) heads. In the third and last place, the number of goats reached (7110) heads [18]. What is the highest density of this animal? It was recorded in the Mishkab sub-district, where the goat count reached (74) Ras Al-Akm^2, then the Qadisiyah sub-district (40) RasSa Sa Km 2 and the district center (25) Ras 1 km^2. The living conditions are similar between goats and sheep, where they are raised together. The area contains one typical field, where the field contains more than 100 heads, while the production of red meat in the study area in 2009 amounted to (378) kg. Where red meat produced from cows took the lead in total meat production. As shown in the table, the production of red meat in the study area is limited in quantity, as the per capita share of animal meat that is slaughtered within the massacre of the judiciary exceeds (4-2) kg of tooth, which is a very small amount when compared to the necessary needs of the individual of this food material annually, as the study area suffers from severe underdevelopment in this regard.

CONCLUSIONS

The study concludes that the environmental characteristics of Al-Manathira district directly influence the spatial distribution of livestock. By strategically aligning livestock with optimal environmental zones, local farmers can enhance productivity and sustainability. Recommendations include enhancing water resource management and promoting soil conservation to support livestock needs. The natural factors represented by (geographical location, surface, climate, soil, water resources and natural plant) have a clear impact on animal production and the degree of impact of these factors varies if the study shows the following.

1. The location of Manazira district is characterized by being placed under two latitudes (31,35-31,58) north and longitudes (44,15-44,45) east, thus making it within the dry atmosphere, which negatively affects animal production, as it loses a large amount of water as a result of rapid evaporation processes, as well as exposure to dusty agents and other desert influences.
2. The surface of the district is characterized by almost complete flatness, which makes it suitable for breeding cows and goats, as well as for raising buffaloes, provided that large quantities of water are provided to them.
3. The climate is one of the elements of natural factors. The actual variation in temperatures, amounts of solar radiation, evaporation and humidity has helped to vary animal production in quantity and quality. The high temperatures lead to the death of many animals unless appropriate measures are taken to protect them from high heat by providing suitable ponds for them.
4. The soil, where it is a task that does not neglect its importance from the surface, there is soil with natural pastures for agricultural animals.
5. As for the soil, there is a natural pasture for agricultural animals.
6. The natural plant is available in the district in large quantities, as the district occupies the first place, where the percentage of pastures (77%) of the total area of pastures in the governorate.

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