
The impact of climatic factors on animal health (Missan Governorate as a model)

By

Prof. Dr. kadhim Ebadi Hammadi Al Jassim

University of Missan

Doi:10.21608/asajs.2019.52888

قبول النشر: ٢٠ / ٩ / ٢٠١٩

استلام البحث: ٣١ / ٨ / ٢٠١٩

introduction

The environment affects the health of the animal through its external factors and its effects on the health and life of the animal and its growth and development and the amount of production and the effect is directly or indirectly, and sometimes this effect through the interaction of environmental factors with each other.

And climate factors one of these effects on animal health, so many scientists interested in studying these effects, especially climatologists and the environment and veterinarians and scientists of life and livestock and others in the study of climatic factors because of their great importance in the development of animal production, and to reduce the climatic conditions facing the development of And raising livestock and reducing their effects through the establishment of climatic conditions suitable for animal husbandry within the barns ⁽¹⁾.

The problem of research is limited to the following question:

Is the health of the gypsum in the Governorate of Missan impact of climate factors?

Search Hypothesis

¹) Kamel Abdel - Alim - cattle breeding and production and transfer - the Egyptian Knowledge House, Edition 2 , 1977 – p . 11

The health of animal resources represented by animal and poultry animals is affected mainly by the effects of climate elements such as solar radiation, temperature, rainfall, relative humidity, wind speed and therefore indirect impact on animal productivity.

Objective of this research

The objective of this study is to analyze the geographical factors, especially the climatic factors, through their direct impact on animal husbandry and the extent of clarity of the negative effects on animal health.

Structure of research

The study focused on the study of the main climatic factors affecting animal health, which were the study of solar radiation, temperature, rainfall, relative humidity and wind speed, as well as some factors related to the effects of climatic elements on animal health. Have an impact on determining the type of climate prevailing in any geographical area.

To study these climatic factors and their environmental effects on animal health, they must be defined, which is the set of elements that express the state of the atmosphere over a variable period of time in their impact on animal health, which varies from place to place depending on the factors indicated above.

In this study, we will focus on the most important climatic factors that have the greatest impact on animal health (sun radiation, temperature, relative humidity, wind movement), and the effects of these factors are summarized separately.

In our study, we focused on Missan Governorate as a model for studying the impact of climate factors on animal health.

The Governorate of Maysan is located in the south-eastern part of Iraq bordered to the north by Wasit province, from the west by Dhi Qar province, from the south by the province of Basra and from the east by the Islamic Republic of Iran. Its

astronomical location is located between the galleries of 15, 46, 30 and 47 North and longitude 30, 46 - 30, 47 East. (Map 1).

The Governorate of Missan has a large animal wealth represented by livestock animals in the main class (sheep, cows, goats and buffalo) in addition to large numbers of poultry table (1), map (2)

Table (1)

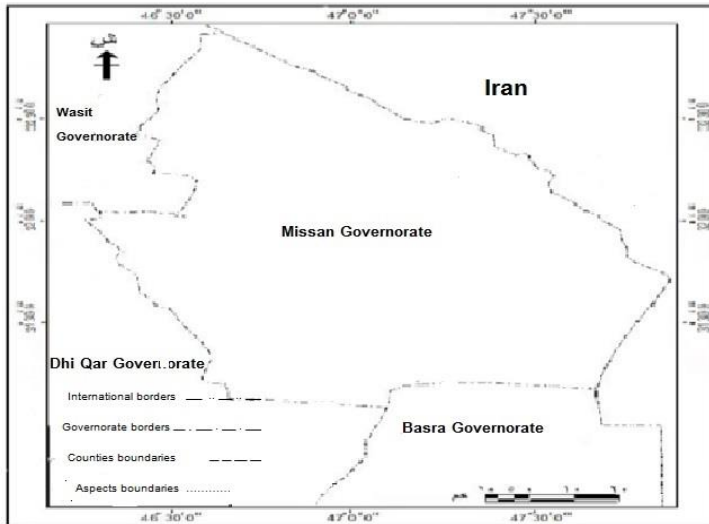
Preparing the livestock resources in Missan Governorate for the year 2016 (number 1000)

Type of animal	Sheep	Cowws	goats	buffalo	Poultry
NO.	429.2	150.8	28.3	27.4	325.7

Source: Directorate of Agriculture Missan - Planning and follow-up, agricultural statistics - unpublished data.

Map (1)

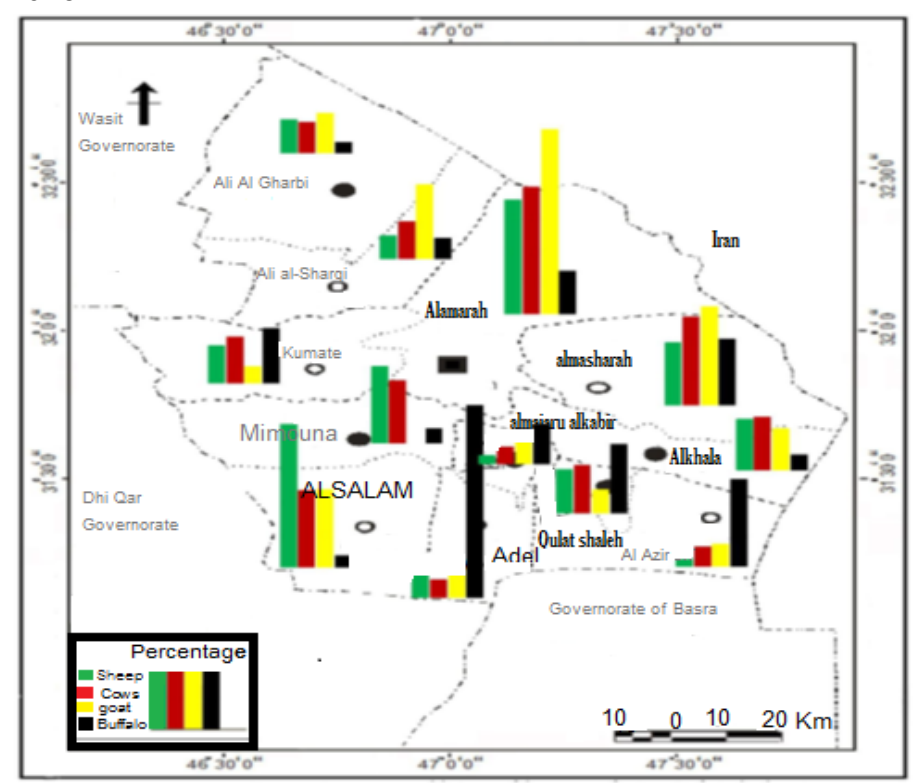
Geographical location of Missan Governorate



Source : Map of the General Authority for Survey - Map of Missan Governorate.

Map (2)

Geographical distribution of livestock in Missan Governorate for 2016



Source: From the work of the researcher relying on :

a - data of the Directorate of Agriculture Missan province - Planning and follow-up

b - Map of the General Authority for Survey - Map of Missan Governorate.

The climatic elements can be studied in terms of the degree of impact on animal health as follows:

First : Solar Radiation

Solar radiation is one of the most climatic elements affecting the health of the animal and its effect is directly and indirectly. The direct effect is the arrival of the sun's rays to the earth after passing through a group of effects that reflect, absorb and disperse part of the solar radiation, and the section that reaches the surface of the earth and after reflection becomes a factor Directly affecting animal health.

Radiation begins with the radiation of objects that are above 100% Celsius. These objects are the bodies of animal resources that vary in color and hair.

Radiation is exposed to the body's radiation during the daytime, sometimes losing part of it to the air medium that touches the animal's body. Temperature compared to the temperature of the surrounding air.

The acquisition of animal bodies varies from one place to another and from one animal to another according to the environment in which they live, in addition to the difference in the color of their skin and hair and the duration of their exposure to sunlight. The difference in the astronomical location in which the animal lives varies, The type of long-distance, short-wave, ultraviolet and infrared radiation is the same as the first wave length (0.01 microns) and the second (1 micron), respectively. The effects of ultraviolet radiation on animal bodies I The effect of short waves on the bodies of the dermis and below.

Solar radiation has a clear role in the direct impact on animal health, especially when it increases its quantity. It affects the skin of animals and the mucous membranes, causing the animals to suffer sunburn, and more to the diseases of photosynthesis. The effect increases when increased radiation increases

temperature, The burden of heat (*). on the body of the animal and this is reflected on the performance of the animal physiologically and thus decrease the production of milk, meat and eggs because of lack of appetite to eat fodder in addition to accompanying idle and laziness and desire to sleep and stagnation for poultry

The animal can adapt to this climate factor affecting its health through the thickness of the skin and hair color and density (scalp), as this is very necessary adaptation to animals living in the cold and warm, it was found that the scalp body of great importance affecting the health of animals where it is acquired Animal temperature, especially during the winter in the cold areas and during the summer in the warm areas, where the white color and the most transparent of the colors reflect the radiation of the sun, In warm areas, it reduces solar radiation reaching the body of the animal, while black and dark color are more suitable for animals of the cold zone as a color that absorbs the solar radiation, which helps the body of the animal to provide warmth and raise the temperature of the body. (*)

*) It is the environmental conditions, such as temperature, wind and air humidity, which affect our bodies and our general sense, including livestock, and vary from one environment to another and from one animal to another depending on the degree of tolerance of the animal to climatic conditions in the open and places of production, and measured through the following equation: -.

It is possible to determine the exposure of agricultural animals to thermal stress and the equation is:

$THi = db - (0.55-0.55RH)$ or the modified equation $(db-0.33-0.31RH)$ (db-14.4 where db = dry heat temperature) (RH = humidity ratio) For equation analysis See our book (Geography of Agriculture - Oman, 2015 - p. 279) or the article published on the website (www.forum.stop55.com)

*) The white color of animal skin and bird feathers reflected most visible solar rays with wavelengths ranging from 0.3 to 0.8 microns, while less than short-wave ultraviolet rays (wavelengths of 0.8 to 2.5

The pale yellow color of the body's cornea is very much related to the absorption and reflection of solar radiation. Africander and Zebo cows absorb about 45% of the radiation and reflect 15% of the body, while the Aberdeen cows absorb 89% Of the radiation and reflect only about 5% of the radiation and this is due to the hair color and degree of brightness and density in addition to the spread of melanin in the skin.

The increase in solar radiation affects the spread of many animal diseases that reduce the production of the animal and affect his health. These diseases are congenital swelling. The spread of this disease in the cows of the warm zone, especially Friesian cows, which caused a shortage of milk and therefore reflected on the amount of production.

By observing the number of hours of solar radiation in Missan Governorate, as shown in Table 2, the overall average is 8.8 hours per day. Therefore, the governorate climate is suitable for animal husbandry and has little impact on animal health except for some days of the year ‘ Daily To 11.3 hours during June and July.

The effect of this climate element can be avoided or reduced to animal health by setting up tree-shaded sheds and providing shade for animals affected by increasing its quantity. Animal pens or shelters may be set up, especially at noon, covered with aluminum and reflective materials to reduce solar radiation. And can be followed by new methods of grazing times were to be in the early morning or evening or night of the moon. In both cases,

microns) Otherwise the color is black or dark . To see the following exporters :-

a - Mohammed Yahya Darwish - Meat Production - Cairo, 1962 - p. 91-92.

B – Makhlaf shallal Mari - Geography of Agriculture - Mosul, 1996 - pp 363-364

the solar radiation is few and makes up for the lack of grazing period by giving animals concentrates.

Table (2)

Monthly and annual averages of climate elements in Missan Governorate for 2016

months of the year	Solar radiation (H/d)	temperature (° M)	rainfall (mm)	Relative humidity (%)	Wind speed (M / s)
January	6,5	11,5	35,6	70,6	2,9
February	7,4	13,7	23	63,5	3,1
March	7,9	18	33	59	3,7
April	8,5	24,2	15,4	44,4	4
May	7,9	30,2	4	33	4,2
June	11,3	34,3	0	28,3	6
July	11,3	36,5	0	26,2	5,7
August	11,1	35,6	0	28,1	5,2
September	10,2	32,1	0	30	4
October	9,6	26,2	6,5	42,3	3,4
November	7,4	16,9	22,2	55	3
December	6,9	12,9	33	70,2	2,8
Total	106	292,1	172,7	550,6	48
General Average	8,8	24,34		45,88	4

Source : Ministry of Transport and Communications - General Authority for Meteorology - unpublished data.

The relationship between sunlight and animal health

Sunlight plays a large and important role in many animal life and encourages reproduction and mating especially during a limited period of the year. This period varies from one animal to another and from one region to another. Some studies and scientific experiments have shown that sexual desire and period of euphoria in the cold and distant animals of the region (Long day) and short winter are suitable for mating, while in the

vicinity of the equator during the spring and autumn of moderate light, and in the Governorate of Missan, the number of light hours during the summer to 11, 3 hours a day During the month of June and July and less during the winter season, the lowest in the month of January and 6.5 hours a day.

The effect of light on the reproductive processes in sheep is more than the cows, where it affects the pituitary gland in sheep and the lack of influence in cows, where the correlation of cattle reproduction with light period. ⁽²⁾

The light also affects the activity and vitality of poultry, as it helps in the rapid consumption of food as well as its contribution to the formation of vitamin (D) cholesterol in the fats located under the skin of the animal, which helps to build the skeletons of all animals and birds, and helps light on the disinfection of bodies Many animal skins and bird feathers from pathogens and microbes die and some die by exposing the animal to sunlight during the daytime, where ultraviolet radiation helps destroy microbes. ⁽³⁾

Sunlight helps the poultry to activate the eye's nerve and stimulate the frontal lobe of the pituitary gland, which develops its reproductive system, so that the light is important to it, especially at the beginning of growth, which requires during this period to 24 hours daily light. This is why poultry breeders put light lamps in their pens during the days The first period of her life to get enough light and continuous during the day and night for the permanence of growth and then decrease this period

²) Abdullah Noh - Effect of environmental changes on production and reproductive performance in cattle - Research published on the website: www.gcsar.gov.sy.

³) Jassim Mohammed Jandel - Effect of Solar Radiation on Animals - Journal of Cows and Sheep Middle East, Issue 32, 2001 – p. ٤٥.

gradually by 20 minutes every day starting from the first week of age to up to 12 hours a day during the first 20 weeks of life ^(*).

The light is dim in order to reduce the phenomenon of predation and feather feathers in poultry (Feather Picking) as well as increased consumption of food in young poultry and chicks.

One of the researchers said that light is one of the factors affecting animal health, which helps in the migration of animals in general, such as aquatic turtles, crustaceans and wild birds and long distances, which has a clear relationship in the process of mating between wild birds and was one of the causes of migration of birds across continents, Long light (the length of the day) stimulates the sexual glands that increase throughout the day. ⁽⁴⁾

Second: Temperature

Which is the heat resulting from solar radiation reflected from the surface of the earth, which surrounds the body of the animal and affects the health and growth, negatively or positively, including quantities of production of milk, meat, eggs and other animal products, animal farm animals of all types of livestock (Homotherms) Which has the ability to maintain physiological temperature and physiological adjustment in the case of high or

*) The number of hours a bird is exposed to between 12 and 14 hours per day is very important in its life, especially for poultry, where the period of light helps in the process of producing eggs, and the period of more than 14 hours is not important and effective.

Interview conducted by the researcher with the agricultural engineer (Karim Juma) owner of a hatchery for poultry in Missan province on 16/9/2018.

⁴) Charlene Potter - The impact of climate on animals and ecosystems - Research published on the website: www.llpdigital.usembassy.gov.

low temperature of the surrounding atmosphere, which is known as environmental thermal balance (Thermal balance).

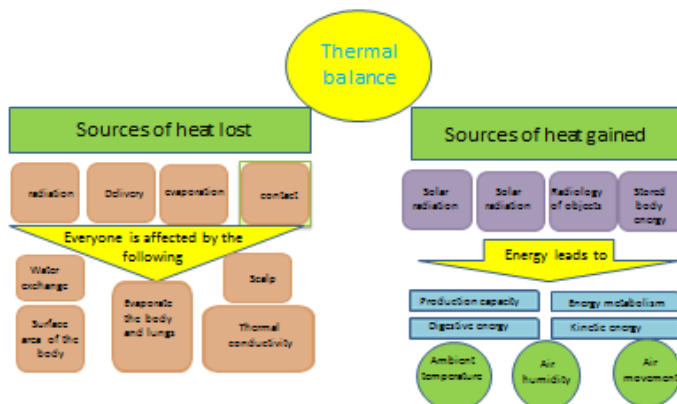
This effect is direct in the case of heat exchange between the animal's body and the surrounding thermal environment. The effect is indirect if the animal's body is affected only by the surrounding thermal environment. The energy lost by the animal's body is known to occur from several main exits, In addition to radiation sweating, evaporation, contact, contact, etc., as shown in Figure (1), which we will clarify as follows: -

1- Radiation Solar

The body of the animal loses its temperature to the surrounding medium by radiation. This process occurs when the body temperature of the animal is higher than the temperature of the surrounding environment in which it lives. This is the case in cold areas where temperatures are low Which reach less than 30 m and diminish this situation whenever the temperature is more than 35 m This is what happens in the hot seasons, and depends on the loss of temperature on the following factors:

- a - The surface area of the animal's body.
- b - Self-capacity in thermal radiation.
- c- the position and behavior of the animal and depends on the number of animals inside the barn where it is inversely proportional to the less radiation when increasing the number and increase when reduced.

Figure (1) Heat balance of temperature sources



Source: From the work of the researcher

2 - Convection

This is the process of transferring temperatures through the moving medium from warm objects to the less warm body medium. This also depends on the number of animals inside the dwelling, the temperature separation, the ambient temperature of the animal, and the movement of air inside the barn, which affects the degree of thermal loss of the animal's body, (Poultry) and lead to the occurrence of many animal diseases, especially Chilling diseases.

3- Conduction

The animal loses the temperature of its body to the surrounding medium by direct contact with the cold surfaces and the loss is great during the cold season. Therefore, the animal breeders have to put a thick straw mattress in the barn floor to reduce the soil moisture and keep the body temperature from loss.

4. Evaporation

The temperature of the animal's body is lost through the process of evaporation of body fluids through the lungs and the animal. This method of loss of temperature, especially during the hot summer, through the process of sweating is lost temperature, where zoologists estimated that more than 80% The water is lost from the body of the senses through sweating, and the animals of horses in the forefront of animal wealth and the activity of the thyroid glands in the body, and then followed by animals for the pores spread on the skin, followed by animals and camels cows and sheep and the least sweating cats animals, and lack of pores in the skin August and poultry^(*) So get rid of the temperature process hyperventilating process (Panting) where the thermal equilibrium process.

The number of thyroid glands in the animal's body varies from one animal to another and within the animal species as well. For example, cows and buffaloes. European cows living in cold areas have fewer thyroid glands in their bodies compared to those in warm regions that have a high number of thyroid glands Zippo for continuous exposure to sweating, reaching the thyroid glands in the bodies of European cows to $(40 \text{ cm}^2 / \text{m}^2)$ The cows in the tropical region to $(480 \text{ cm}^2 / \text{m}^2)$ and less than these glands in buffalo animals, which made them live near Water resources Such as rivers and the marshes where a long period of her life is immersed in water especially during the hot summer.

Relationship between temperature and animal health

Temperature is one of the most climatic factors affecting animal health, especially in tropical and subtropical hot lands.

^{*)} In dogs, the rate of vomiting is 30 times per minute and beyond that in poultry , because of poultry they have no thyroid glands.

The effect is limited when the heat burden has limited effect on animal productivity. The process of heat balance and regulating the temperature of the body with the temperature of the medium in which the animal lives is appropriate, Where the temperature of the thermocouple is close to the temperature of the body of the animal, this does not represent heat on the animal's body and called this situation Comfort, and determine this degree in the warm areas between (16 – 27 m') and in the cold areas between (1-16 m') If the temperature exceeds the rate mentioned, the effect is negative on the health of the animal and sometimes leads to many things on the nature of the animal, including:

a- The height of the body of the animal from the thermal medium.

b - lack of animal appetite for food.

c- Increasing water consumption.

d- Low growth rate.

e- Decrease the amount of milk, meat and eggs production.

f- The weakness of the animal and disorder of behavior, so that it becomes lazy, inactive, avoids sunlight, and increases sleep for livestock and poultry for poultry. These characteristics can be observed when moving animals from temperate to cold areas where the temperature between the two regions varies.

This is the case before adaptation to the animal habitat, and this changes after adaptation.

These characteristics can be observed when moving animals from temperate to cold areas where the temperature between the two regions varies. This is the case before adaptation to the animal habitat, and this changes after adaptation. Some field studies have shown that The thermal environment in which animals live at the temperature of their bodies, they affect their health through a change in physiological processes such as fertility, sexual desire, length of pregnancy and survival of the fetus in the uterus of the female, in addition to increasing the

problem of childbirth to cows, Z decomposition in the male sperm of sheep and lambs special class merino and injuring some of them temporary infertility, especially if the temperature rose 35 ° m long and Gesture ⁽⁵⁾

In poultry, the high temperature affects the lives of chick chicks, especially in small ages. If the temperature rises above 27m⁰, it is affected by the lack of egg production, size, color and thickness of the shell. If it reaches more than 29 m⁰, poultry are subject to lack of growth, The optimal temperature for poultry is 25m⁰ and for one day and decreases to less than that when the age increases to 16 0 m at the age of 6 weeks, and the temperature in the chicken breeds differ in the production of eggs ⁽⁶⁾, as shown in Table (3).

Table (3)

The relationship between the temperature (m⁰) and the age of the poultry in the incubation period

Age (week)	The first	second	third	fourth	Fifth	Sixth	Seventh
begging week	34	33	29	27	25	23	21
weekend	32	30	28	26	24	22	22

Sours : kadhim Abadi Al-Jasim - Geography of Agriculture - Amman, 2015 – p 330

In order to preserve animal health from high temperatures, many animal breeders

follow the sound scientific methods of prevention:-

a - Follow the good housing systems for animals inside the barns. The smaller the number of animals in the barn, the better the habitat will be and the good health to take care of the numbers of small quantities compared to the large numbers in

⁵)Abdel Moez Ahmed Ismail, and his colleague - Animal Health - Mosul, 1982 – p٢١.

⁶)kadhim Abadi Al-Jasim - Geography of Agriculture - Amman, 2015 – p 330

terms of providing feed, water and good bedding and veterinary care and this is reflected in the quantity and quality of production.

b- Sufficient ventilation of the barn in terms of the large number of outlets that help to renew the air and movement continued during the times of the day, the distribution of ports, including the section to enter the air and sunlight and another to get out of the air and the entry of sunlight during the day according to the movement of the sun daily.

C - Use of desert coolers or large air vents that help to move the air and switch inside the barn and this helps to accommodate a larger number of animals inside the barn, and the role of the suction is important in the process of lowering the temperature and temper the atmosphere inside the pens and change the humidity inside (*).

In many countries of the world, hot water sprayers are used through special pipes to reduce the temperature through the water evaporation process. High air pressure in the barns can be avoided using air vents to cool the atmosphere and reduce pressure inside the barns.

d- Use of shading inside exposed barns, especially in rural areas devoted to raising livestock.

*) The lower the humidity in the air, the more refrigerant the desert will be able to reduce the temperature inside the hatch so that it reaches the reading of the wet thermometer, which is illustrated by the following formula: -

(cooling efficiency = difference between reading dry and wet thermometers \times humidity in the atmosphere)

For example, wet humidifiers read 23m, dry 35m and humidity 82%, cooling efficiency becomes 9.8 through the result of equation = $(35-23) \times (82 \div 100)$.

e- Use washing and spraying of animal bodies in order to reduce the temperature of their surface bodies and clean the pores spread over their skins, which helps to accelerate the process of sweating and evaporation and get rid of excess high temperatures and The environment surrounding the environment, and these things make the animal live healthy and free of animal diseases, which is the animal production in larger quantities and good quality. One of the veterinary studies of cows in the hot areas where the washing process of animals that the production of milk up to 2.5 times compared to cows did not use the process of washing, especially during the summer heat.

F- Cutting the hair scalp spread over the surface area of the body of an animal, which helps in the process of eliminating the temperature processes sweating and evaporation and reduce the degree of heat burden of the body of the animal.

After showing the most important general variations in temperature, we note that the Governorate of Missan is suitable for breeding livestock in terms of availability of appropriate temperature grades in the Governorate, as shown in Table (2) where the average temperature of 24.3 m^0 and the highest in the summer months in June, (35.5 m^0). It is suitable for raising livestock and poultry, especially during the first few weeks of the growth of chicks, as shown in Table (3), which requires special care such as shaded barns and ventilation or air cooling using air vents.

Third: Relative Humidity

Which is the amount of water vapor diffused in the air and measured by introducing a quantity of water in a special test tube in which the amount of mercury to measure the atmospheric pressure in the water is pushing the mercury down as much as the pressure of the pressure has reached the maximum point of saturation, It is used in the measurement of moisture relative to

the law of Boyle based on the pressure of saturated water vapor at the dew point and normal air temperature, and is used for measuring special devices such as dry and wet hystrometer, dizziness, hair and hicograph.

The impact of relative humidity on animal health is related to the high proportion of air, especially hot air, which hinders the process of elimination of high temperatures affecting the body of the animal and the harassment of movement and the demand for food, and one biological and climatic studies indicated that the low humidity in the atmosphere, 20-80% have little effect on animal health whether the air is cold or hot as long as the animal has the ability to adapt and adapt to the optimum temperature. The high humidity in the air is less than the animal cannot withstand the process of heat stress, which affects the health by increasing the burden of heat, which leads to a reduction in the proportion of production to 30% as in the fattening of cattle in addition to the disease of heat stroke or heat (Heat stroke. If the ratio rises between 80 - 90% and air temperature of 45m⁰ will lead to the cessation of most of the functions of the body of the animal and may reach the situation of loss, especially at the drop of the heart, and cause high humidity and high temperature up to 30m⁰ to low proportion Milk in Cows ⁽⁷⁾ .

The increase in relative humidity in the air to affect the fetus inside the eggs in artificial insulators, especially during the early stages of growth, so control of the rate of the main factors in the process of hatching where the decrease in the effect of the withdrawal of liquids in the inside of the egg, Feathers have negative effects on poultry health in their resistance to external stimuli in the environment ⁽⁸⁾ .

⁷⁾ Ahmed al-Hajj Taha Saleh, et al. - Milk cattle - Mosul, 1989 - p. 166.

⁸⁾ Makhlaf shallal Marali - Op.Cit – p . 410

Through these environmental effects of relative humidity, which is affected by the temperature of wet and dry air, the humidity in Missan governorate is suitable for animal husbandry and health maintenance, where we indicated beforehand that if the humidity ranged between 20-80%, it does not harm the health of the animal, As shown in Table (2) between 26.2 - 70.6% are suitable for animal husbandry and do not need a lot of material costs in the case of height of Hungary ventilation space and air movement, which helps to reduce the humidity in the places of barns and haters.

As a result of the effects of rising temperatures and relative humidity in the air and in animal housing, livestock breeders should maintain their numbers within the barns and take into consideration the weather changes that affect their health, especially when transported from one place to another or the marketing process when selling, In the case of accumulation of waste in the floor of the dwelling and in many quantities, this disease may lead to colds and diseases when exposed to cold air during the winter, which is less resistant to animal diseases and called these cases of discomfort to the animal (Discomfort Index) ^(*)

This term is compatible with humans and animals, and is spread in hot humid days, as is the case in most parts of southern Iraq, especially Basra Governorate, which is close to the Arabian Gulf region, the source of moisture in the air.

*) The evidence of the rest of the human and animal is extracted according to the following equation: -

$$(d.I = 0.55 Tdb + 0.2 Tdp \div 17.5)$$

Where : (d.I = discomfort index) (Tdb = dry temperature in Fahrenheit) (Tdp = dew point in Fahrenheit).

There are also special tables to know the **dew point** by knowing the relative humidity and the average temperature in place.

Some people point out that the animal's comfortable zone is the area where the animal does not need any orderly processes of body temperature. This area differs from one place to another and from one animal to another depending on the type, age, size, skin thickness and amount of hair covered.

The result of the above equation is that the comfort index of 70% means that 10% of the animal feels comfortable and if it reaches 80%, all animals and humans feel comfortable, but the 75% comfort index affects some animals, such as cows with less milk. At this level, cow breeders are able to build housing and comfortable barns to accommodate the animal's production of milk⁽⁹⁾.

After studying the characteristics of relative humidity and its relation to animal health, some of the effects can be summarized, which lead to many complications, the most important of which are:-

a- Low production of milk, meat and eggs.

b- The spread of many animal diseases that help the relative humidity to provide an environmental environment for its spread.

c - The increase in the number of germicidal vectors and insects affecting the health of animals such as flies, mosquitoes and others.

d. Moisturizing the skin of the animal and the scalp of the body, which are suitable environments for many insects and pathogenic bacteria such as ticks and lice, especially on the bodies of livestock.

These include the increase in the number of animals in the sheds. This leads to the rapid movement of infections among animals. Breathing leads to high humidity and the sorting of animals through water vapor. The process of exhaling, which

⁹) Abdel Moez Ahmed Ismail - op.cit p.31.

varies from one place to another and beyond the difference in the temperature and size of the animal as shown in Table (4) and to maintain the health of the animal from the large increase in air humidity can be the following :

Table (4)

The relationship between the weight of the animal and the amount of moisture distributed

Type of animal	Weight (kg)	Relative humidity (g / h)
Calves	135	200
Adult cattle	4500	400
Chicken meat	1.5	2.5
Eggs Chicen	3	2.5

Source : Abdel al- Moez Ahmed Ismail, and his colleague - Animal Health - Mosul, 1982 - p. 32

a - Construction of housing in high places and far from groundwater to prevent the phenomena of leaching and gurgling from the ground.

b- Building the side walls of the concrete to reduce the leakage of water to the barns, especially in the coastal areas and the sites of the barns near the rivers.

c - Reduce the number of animals inside the barns to reduce animal congestion, which leads to reduce the amount of exhalation outside during the breathing process.

d- Continuous maintenance and cleaning of sheds to reduce the accumulation of waste, which cause many diseases and a safe haven for many pathogens and carriers such as insects and worms.

e- Good and continuous ventilation and increase the number of air openings of the barns and helps to increase the movement of air inside them rather than allowing the light and sunlight to enter into the barns and a break during the day.

f- Increasing the number of air hoods and coolers that help to rotate, purify, move and change air in animal housing, thus reducing relative humidity.

Fourth: The Wind

Air movement is important factors affecting animal health and sustainability and continuity in animal production from the dairy, meat and egg process so is the study of this important climate component as one of the factors that provide a healthy atmosphere for the animal inside the barns and in the forefront of change in temperature, relative humidity and ventilation Housing, and through which the safety of the animal inside the barn is maintained in terms of health free from many diseases affecting livestock.

The size of the moving air inside the house varies according to the size of the area occupied by the barn, which varies from one animal to another depending on the surface area and the size and weight of the animal. It is natural for poultry accommodation to be different from that of cows, buffaloes, etc.

Therefore, the size of the dwelling is highly related to the movement of wind and internal inputs for ventilation, To calculate the number of ventilation times inside the barns, the equation results can be followed and applied to estimate the amount of carbon dioxide inside the dwelling. (*)

*) CO₂ is estimated by the following equation: - $K = 4 + (10000(X) / a)$

Where :

K = CO₂ concentration in the atmosphere is estimated for each (4 part per 10,000) .
a = the volume of air needed for each head of animals (m³)

X = the volume of CO₂ externally from the animal exhalation is estimated (m³ / h).

The ventilation has a clear role in influencing the health of the animal through which the temperature is adjusted, especially when it drops outside the animal's equilibrium point. The wind speed, especially during the winter, will lead to thermal insulation of the body and raise the temperature of the minimum temperature, The cold air speed does not reduce the temperature of the animal's body by evaporation, unlike the movement of hot air during the summer, which does the opposite. It increases heat stress through the air heat transfer process The external to the body of the animal by the contact process and lead sometimes the effect of the movement of air cold facilities to lower the temperature to the destruction of some animal wealth, including small poultry where growth stops at such thermal situations that occur during the winter and lead to considerable material losses for poultry farmers

The rapid air movement (storms) associated with dust, sand and dust lead to the injury of a number of animals bruises and fractures and loss of their feathers and feathers as a result of crowding and lead to some animals falling from the top and death, in addition to shortness of breath, some of which lead to suffocation and lack of breathing and death.

In order to study the effect of air movement and wind speed, Missan governorate is exposed to the phenomenon of dust and sand storms, which leads to the destruction of a number of animal resources during the stages of movement between the pastures and natural habitats where the wind speed in the months of May and June to 6 m / s, Affect animal health, especially livestock.

For more information see the source : (Abdel Moez Ahmed Ismail-Op. Cit - p. 34)

Research results

After identifying the most important effects of climatic elements and their relation to animal health, directly or indirectly, a series of results can be found that illustrate this relationship to animal health, a- The climatic elements combined have a direct and indirect effect on animal health by influencing the availability of feed stocks and artificial feed stocks. The situation may be rare due to climatic fluctuations and lack of rainfall, For the cultivation of fodder crops and crops dependent on their waste, such as grain crops mainly, and this is reflected in the destruction of large numbers of livestock, especially cattle and sheep in cases of scarcity of rain and the lack of natural pastures and shrinking areas planted with feed crops.

b- high temperatures from the natural limit leads to the destruction of a large number of animal resources and lack of production due to thermal stress, which sometimes lead to the destruction of livestock and mortality of poultry, and affects the reproductive capacity of many animals for lack of sexual desire and lack of sperm for males, causing the lack of reproduction This is reflected in the quantities of production of a small number and the Governorate of Missan temperature is suitable for raising animals and have little impact on their health.

c- Relative humidity reduces the quantities of animal production and indirectly within the barns by creating an environmental environment for the incubation of some animals, pathogens, insects and parasites that afflict livestock, many of the diseases leading to their destruction.

d - The wind speed in some seasons of the hot and cold animal health, so you need to process your accommodation through the construction of barns that protect them from the heat of the sun in the first degree.

e - The climatic fluctuations in animal resources will inevitably lead to a state of discomfort and stability within the houses and

some animal breeds are vulnerable to diseases because of their weakness and lack of resistance to these bitter climatic changes, which makes their productive capacity less compared to the veterinary services and feeds so that they are economical On their breeders.

Research sources

First: Books

- 1- Abdel-Aleem, Kamel - cattle breeding and production and transfer – the Egyptian Knowledge House - 1977.
- 2 - Darwish, Mohammed Yahya - Meat Production - Cairo, 1962.
- 3- Ismail, Abdel Moez Ahmed, and another - Animal Health - Mosul, 1982
- 4- Al-Jasim, kadhim Abadi - Geography of Agriculture - Amman, 2015
- 5- Mari , Makhlaf shallal - Geography of Agriculture - Mosul, 1996
- 6 -Saleh, Ahmed Haj Taha, and others - milk cattle - Mosul, 1989

Second: The Researches

- 1-Noah, Abdullah - the impact of environmental changes on the production and reproductive performance in cattle - research published on the website. www.gcsar.gov.sy.
- 2- Jandel, Jasem Mohammed - Effect of solar radiation on animals - Journal of cows and sheep Middle East, number 32 - 2001.
- 3- Potter, Charlene - The impact of climate on animals and ecosystems - Manchu's research on www.llpdigital.usembassy.gov.

Third : The personal Interview

1- Interview conducted by the researcher with the agricultural engineer (Karim Juma) owner of a hatchery for poultry in Missan Governorate on 16/9/2015.