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Awareness of Breeders on Zoonotic Diseases of Humans and Animals

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Abstract | The research aimed to identify the level of awareness of breeders on some of the zoonotic diseases of humans and animals. Specifically, we aim to identify the correlation between the level of awareness of breeders and the independent variables including age, educational attainment, animals raised, years of work in animal husbandry, and previous infection. The research community (n=543) was comprised of officially registered animal breeders in the country. A simple random sample of 50% was selected, resulting in 136 breeders who underwent the research procedures. The results of the study showed that the level of breeders' awareness of zoonotic diseases affecting both humans and animals tends to decline. We identified that there was a lack of knowledge of these diseases among a large segment of breeders, and that only a limited number of breeders showed good awareness. The results of the study also showed that several factors are related to the level of awareness among breeders. We conclude from this that practical experience, such as the number of years of breeding and the diversity of animals they raise, as well as the educational level, has a significant impact on improving awareness. In the light of these findings, we recommend that the Ministry of Agriculture and the Ministry of Health should organize periodic training courses and workshops for breeders on common diseases and methods of preventing these impactful infections.

Keywords | Perception, Breeders, Zoonotic diseases in humans and animals

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INTRODUCTION

Agriculture is considered one of the leading sectors, alongside the industrial and service sectors, in helping individuals achieve their economic and social goals. It can be considered as an effective driver for the success of the economic diversification strategy (Abdullah *et al*., 2025). The agricultural sector is one of the most significant economic activities in most Arab countries, as it employs approximately 30% of the total workforce, making it a significant source of livelihood for a substantial percentage of the population (Hamed and Ahmed, 2024). The agricultural sector in Iraq occupies a distinguished position among the various economic sectors that make up the national economy, as this sector is the primary source of providing food for the population because it is the lifeblood of people, not only because it is a source of food, but also one of the sources of raw materials in many industries. It is not expected to find an alternative to some of them despite the tremendous scientific and technological progress that the world is experiencing today (Shareef *et al*., 2020). Iraq is also interested in the agricultural sector, which helps it build the basic and necessary foundations for the agricultural renaissance. The inability to develop this sector poses numerous potential risks, including the difficulty of providing an adequate amount of food for the population, as well as the exposure of the country's food security (Shada *et al*., 2023; Ali *et al*., 2024; Al-Sailawi *et al*., 2024). Agricultural development plays an important role in developing the economies of developing countries,

especially countries that depend on agriculture for its role The important thing in achieving economic growth and reducing dependence on the outside (Amin and Ali, 2021) and providing food, as agriculture contributed to the launch of industrial wealth and the development of industrial countries, as the launch of industry had preceded a significant increase in agricultural production, as development experiences showed that the industrialization process cannot continue without being accompanied by agricultural growth at a rate commensurate with the rate of industrial growth (Hamed and Abdullah, 2024).

Iraq is considered one of the most important countries that excel in animal husbandry, due to its abundance of natural and human resources, which account for approximately 20% to 60% of the national animal wealth in those countries (Ahmed et al., 2022). Animal husbandry also encompasses all types of domestic animals, such as cows, chickens, sheep, or any other animal used as a source of food and other resources. Animal breeders must provide an appropriate environment to protect animals from diseases or death, including suitable housing, adequate food, and protection from diseases through the administration of necessary vaccinations to prevent infections in both animals and humans (Varela, 2015). Animal-origin or animal-source disease is an infectious disease that spreads naturally among wild or domestic vertebrates and can be transmitted from them to humans. An infected person can be a source of infection for certain diseases, such as the plague. The study of zoonotic diseases in humans and animals is of great importance because they pose a direct threat to public health. These diseases and epidemics can be transmitted from animals to humans in multiple ways, such as through direct contact or the consumption of contaminated animal products. The danger of these diseases increases. Diseases in the light of openness and environmental changes that contribute to the rapid spread of epidemics (Abdullah *et al*., 2025). Understanding the causes of these diseases helps in developing effective prevention and control strategies, which reduce health and economic losses. Therefore, these studies are necessary to enhance health security and address future risks (Gortazar *et al*., 2020). The Al-Alam district was chosen as a study area because it is considered one of the agricultural districts in Salah Al-Din Governorate, renowned for cultivating a variety of crops and raising animals of different types. Due to the danger of zoonotic diseases to humans and animals, the lack of knowledge of breeders on zoonoses and their impacts on the society, this study was designed. Moreover, we aimed to define the role of agricultural extension in identifying problems and finding solutions associated with the zoonoses (Shareef, 2021). Diseases in general and zoonotic diseases to humans and animals in particular are among the most common challenges in the public health. Therefore, humans strive with all their efforts to limit these diseases, determine the symptoms they cause, and seek the best treatments for them. The core of agricultural extension work is to identify every cause that may affect humans before it affects animals, as well as natural resources (Ahaly, 2024; Jawad *et al*., 2024).

Collectively, the present study aims to identify the level of awareness of breeders regarding zoonotic diseases of humans and animals, prioritize the areas in descending order according to their average awareness, and finally to identify the correlation between the level of awareness of breeders regarding zoonoses and the independent variables studied such as age, educational attainment, animals raised, years of work in animal husbandry, and previous infection.

MATERIAL AND METHODS

Defining the research community and sample

The research community comprised all officially registered animal breeders in Al-Alam District, Salah Al-Din Governorate, affiliated with the Al-Alam Agriculture Division, which is part of the Salah Al-Din Agriculture Directorate. The number of breeders totaled 543, distributed throughout the district's various areas. A simple random sample of 50% was selected, resulting in 136 breeders who underwent the research procedures.

Preparing the questionnaire form

The questionnaire form was prepared as a fundamental tool for collecting data related to the research, due to its suitability for the approved methodology. The questionnaire is a practical tool for obtaining objective information and data that accurately reflect reality, thereby contributing to the systematic achievement of research objectives. The questionnaire also allows data to be collected in an organized and analyzable manner, which enhances the accuracy of the extracted results and ensures their reliability in interpreting the phenomenon studied. The questionnaire form consisted of two parts:

- Part One: It includes questions related to all the independent personal variables included in the study.
- Part Two: It represents the dependent variable, which is a three-point scale (Fully aware, Sometimes aware, and Not aware) through which the level of awareness of breeders of some zoonotic diseases to humans and animals in the judiciary of science is estimated.

Measurement of study variables

Measurement of independent variables

Age: The variable was measured by the number of years the breeder was at the time of data collection.

Educational achievement: It was measured by assigning numerical values (7,6,5,4,3,2,1) according to the following

levels: (illiterate, reads and writes, primary, intermediate, preparatory, institute, college, higher degree) respectively.
Animals you raise: This variable was measured by the following levels (I raise, I do not raise), and the following weights were assigned (2, 1), respectively.
Number of years of work in animal husbandry: It was calculated by the number of years the respondent spent in animal husbandry.
Previous injury: This variable was measured according to the following levels (yes, no), and the following weights were assigned (2, 1), respectively.

The dependent variable/ measuring educators awareness of some common diseases

The degree of awareness was measured through 105 paragraphs, each of which reflects information related to one of the diseases within its respective field. The scores were distributed to the specified fields with the presentation of three alternatives for the answer: I fully understand, I sometimes understand, and I do not understand, and they were given weights (3, 2, 1), respectively. Thus, the total score for the answer ranges between 105 and 315 points, as shown in Table 1.

Table 1: The theoretical scope of educators areas of awareness.

The field	Number of paragraphs	Domain degree
rabies	15 paragraphs	15 – 45
cat disease	15 paragraphs	15 – 45
Brucellosis	15 paragraphs	15 – 45
hemorrhagic fever	15 paragraphs	15 – 45
Anthrax	15 paragraphs	15 – 45
Salmonella	15 paragraphs	15 – 45
Water bags	15 paragraphs	15 – 45
Total	105 paragraphs	105 – 315

Data collection

The data collection process was carried out from the research sample using a questionnaire during the period from 1 December 1-12-2024 to 20-1-2025.

Statistical methods

To achieve the study objectives, it is necessary to classify and analyze the data, present the results, and display them in their final form. The following statistical methods were used (class length, range, arithmetic mean, frequency distribution, Pearson correlation, standard deviation, Spearman correlation coefficient, t-test for the significance of the relationship).

RESULTS AND DISCUSSION

The results showed that the level of awareness of breeders regarding selected zoonotic diseases to humans and animals ranged between 124-315 degrees with a general average of 217.95 and a standard deviation of 11.58. The respondents were divided into three categories according to the range law, as shown in Table 2.

Table 2: The distribution of respondents into three categories according to the level of awareness of breeders.

Perception categories	Number	Percentage	Average perception
Low (124-187)	43	20%	163.66
Average (188-251)	80	58.82%	210.5
High (252-315)	20	16.18%	281.36
Total	136	100%	

$\bar{X}$ = (217.95) S.d = (11.58).

The data show that the average level of awareness category reached 58.82% (Table 2). In comparison, the low category reached 25%, and the high category reached 16.18%, indicating that the level of awareness of breeders in general is average and tends to decline. The reason may be due to several scientific factors that contribute to this result, most notably the low levels of education among a segment of breeders, which affects their understanding of public health concepts, and the weakness of awareness campaigns and veterinary extension in the region. This may limit the access of accurate information to breeders. The absence of effective coordination between health and veterinary authorities results in a lack of programs that raise awareness of these diseases and provide guidance on how to deal with them. In addition, economic factors play a significant role in directing breeders attention towards their daily needs rather than focusing on health prevention.

In an attempt to arrange the fields of study in descending order according to the average level of awareness, it was revealed that the maximum score for all fields ranged between 15-45, as shown in Table 3.

Table 3: The order of study fields in descending order.

Domain name	Number of field paragraphs	Maximum degree	Average perception each field	Domain order
Brucellosis	15	45	32.19	1
Water bags	15	45	31.91	2
Rabies	15	45	30.75	3
Salmonella	15	45	28.99	4
Cat disease	15	45	28.16	5
Hemorrhagic fever	15	45	26.11	6
Anthrax	15	45	26.01	7

The descending order of the study areas according to their average perception reflects the influence of multiple factors

on the perception of various zoonotic diseases by humans and animals (Table 3). The fact that the field of brucellosis occupies the first place is attributed to its close association with the daily practices of breeders and livestock breeding, as the disease is known for its wide-ranging health and economic impacts, which increase the interest of breeders. Hydatid disease was observed in second due to its relative prevalence in the research area and its reliance on dogs as an intermediate host, which draws the attention of breeders. Rabies occupied third place due to the danger of its direct transmission to humans and its association with dog bite incidents. At the same time, Salmonella ranked fourth due to its nonspecific symptoms in animals, which reduces breeders awareness. Toxoplasmosis ranked fifth due to its association with a specific source of infection (cats) and the limited knowledge about its details. Hemorrhagic fever ranked sixth due to its limited spread or association with specific seasons, which reduces public awareness of it. Finally, anthrax ranked seventh due to its rarity in the region and the lack of awareness campaigns related to it, which makes it less popular among breeders.

To identify the correlation between the level of awareness of breeders of some zoonotic diseases to humans and animals in Al-Alam District/Salah Al-Din Governorate, the following independent variables were observed in the study.

Age

The results showed that the youngest respondent was 19 years old, and the oldest was 84 years old. The respondents were divided into three categories according to the range law as shown in Table 4.

Table 4: Distribution of respondents according to age groups.

Categories	Number	Percentage ratio	Average skill	Value r	Value t
Young age (19-40)	46	33.83	166.17	0.589	**8.239
Middle aged (41-62)	68	50	200.42		
Old aged (63-84)	22	16.17	288.45		
Total	136	100%			Probability level 0.01

** Indicates that the relationship is significant at the 0.01 probability level.

The analysis showed that 50% of the respondents were in the middle age group, which is the highest percentage, followed by the young age group with a percentage of 33.83%, while the old age group had the lowest number with a percentage of 16.17%. To determine the correlation between the level of awareness of breeders and age, Pearson's correlation coefficient was employed, yielding a value of 0.589. To confirm the significance of the relationship, the (t) test was used, which had a value of 8.239**, which is greater than the tabular t value. This indicates the existence of a significant correlation at a probability level of 0.01. Thus, we reject the null hypothesis that states (there is no correlation between the level of awareness of breeders of some zoonotic diseases to humans and animals in Al-Alam District, Salah al-Din Governorate and age) and accept the alternative hypothesis. The reason may be that life experiences and expertise accumulate with age, so older breeders often have greater knowledge due to their long dealings with animals and their observation of diseases associated with them over the years. Additionally, the diseases or accidents they have witnessed, whether in their animals or the community, contribute to a gradual increase in their awareness. In contrast, young breeders may have less knowledge due to a lack of practical experience and possibly weak health awareness in previous educational stages. Therefore, age becomes a significant factor influencing the level of awareness.

Educational level

The results showed that the smallest number of respondents were from the higher education category, which accounted for 5.88%, while the largest category of respondents was from the intermediate category, accounting for 25%. The respondents were divided into three categories according to the range law, as shown in Table 5.

Table 5: Distribution of respondents according to educational level categories.

Categories	Number	Percentage ratio	Average skill	Value r	Value t
Illuminated	19	13.97	140.12	0.67	**9.044
Reads and writes	10	7.35	183.1		
Elementary	15	11.04	202.4		
Middle	34	25	228.85		
Preparatory	19	13.97	242.78		
Institute	14	10.29	272.35		Probability level 0.01
Bachelor's	17	12.5	288.70		
Higher degree	8	5.88	294.89		
Total	136	100%			

**Indicates that the relationship is significant at the 0.01 probability level.

The data showed that 25% of the respondents had an educational level of intermediate school graduates, and 13.97% of the respondents were illiterate. To determine the correlation between the level of awareness among breeders and their educational level, Spearman's correlation coefficient was employed, yielding a value of 0.67. To ensure the significance of the relationship, the (t) test was used, which had a value of 9.044**, which is greater than the tabular t value. This indicates the existence of a significant correlation at a probability level of 0.01. Thus, we reject the

null hypothesis that states (there is no correlation between the level of awareness of breeders of some zoonotic diseases to humans and animals in Al-Alam District, Salah Al-Din Governorate and the educational level) and accept the alternative hypothesis. The reason may be that education enhances individuals' ability to understand health and veterinary information and respond to it with greater awareness and understanding. Breeders with higher educational levels are more likely to comprehend the concepts of common diseases, including their methods of transmission and the health risks associated with exposure to diverse sources of knowledge. In contrast, breeders with a low educational level may face difficulties in accessing information or understanding, which leads to a lack of awareness of these diseases.

Animals raised

The results showed that the number of animal breeders at the time of data collection was as shown in Table 6 below, noting that these numbers represent the current breeders. Regarding the group of animals mentioned in the questionnaire form, all respondents reported previously raising these animals at a rate of 100%. Moreover, they have detailed information about raising them.

Table 6: Distribution of respondents according to animal husbandry categories.

Animals	Number	Total	Percentage ratio	Value r	Value t
Sheep	112	136	82.35%	0.29	*0.507
Cows	99	136	72.79%		
Chicken	110	136	80.79%		
Dogs	84	136	61.76%		probability level 0.05
Cats	78	136	57.35%		

* Indicates that the relationship is significant at the 0.05 probability level.

The data showed that 82.35% of the respondents owned sheep at the time of data collection, which is the highest percentage, while the cat breeding category had the lowest percentage of 57.35%. To determine the correlation between the level of awareness of breeders and the variable of the animals they raise, Spearman's correlation coefficient was employed, yielding a value of 0.29. To ensure the significance of the relationship, the (t) test was used, which had a value of 3.507*, which is greater than the tabular t value. This indicates the presence of a significant correlation at a p-value of 0.05. Thus, we reject the null hypothesis that states (there is no correlation between the level of awareness of breeders of some zoonotic diseases to humans and animals in Al-Alam District, Salah Al-Din Governorate and animal breeding) and accept the alternative hypothesis. This indicates the impact of direct interaction with these animals on the knowledge associated with the diseases they transmit. Sheep and cow breeding are closely associated with diseases such as brucellosis and hydatid cysts, and contribute to raising awareness of these diseases due to the recurrence of disease cases and the resulting economic risks. Dogs and cats are a significant source of diseases such as rabies and toxoplasmosis, which also affects the awareness of breeders, mainly when symptoms of disease or cases of infection are observed in the environment, as well as in chicken farming.

Years of work in animal husbandry

The results showed that the shortest period of experience in husbandry was 2 years, and the longest was 61 years. The respondents were divided into three categories according to the range law as shown in Table 7.

Table 7: Distribution of respondents according to categories of years of work in animal husbandry.

Categories	Number	Percentage ratio	Average perception	Value r	Value t
2-21 years	92	67.64	186.17	0.523	**7.10
22-41 years	37	27.22	230.32		
42-61 years	7	5.14	288.95		Probability level 0.01
Total	136	100%			

** Indicates that the relationship is significant at the 0.01 probability level.

It was observed that 67.64% of the respondents had their years of upbringing in the first category and 5.14% of the respondents had their years of upbringing in the third category. To determine the correlation between the level of awareness of breeders and the years of animal raising, Pearson's correlation coefficient was employed, yielding a value of 0.523. To confirm the significance of the relationship, the (t) test was used, which had a value of 7.10**, which is greater than the tabular t value. This indicates the existence of a significant correlation at a probability level of 0.01. Thus, we reject the null hypothesis that states (there is no correlation between the level of awareness of the breeders of some zoonotic diseases to humans and animals in Al-Alam District, Salah Al-Din Governorate and the number of years of raising animals) and we accept the alternative hypothesis. With the increase in the number of years of raising animals, breeders are more exposed to situations and events related to common diseases, whether through observing the infection of animals, the infection of family members, or the surrounding community. Long experience enables breeders to recognize the symptoms associated with these diseases and understand how they are transmitted between animals and humans.

Previous infection

The respondents were divided into two categories: previously infected with common diseases and previously

uninfected, as shown in Table 8.

Table 8: Distribution of respondents according to previous injury categories.

Categories	Number	Percentage ratio	Average perception	Value r	Value t
Previously uninfected	74	54.41	228.87	0.423	**5.403
Previously infected	62	45.59	267.14		probability level 0.01
Total	136	100%			

** Indicates that the relationship is significant at the 0.01 probability level.

It was noticed that 45.59% of the respondents had a previous infection with one of the common diseases, either they or their family members, and 54.41% of the respondents did not have a previous infection. To determine the correlation between the level of awareness among breeders and the prevalence of previous infection, Spearman's correlation coefficient was employed, yielding a value of 0.423. To confirm the significance of the relationship, the (t) test was used, which had a value of 5.403**, which is greater than the tabular t value. This indicates the existence of a significant correlation at a probability level of 0.01. Thus, we reject the null hypothesis that states (there is no correlation between the level of awareness of the breeders of some zoonotic diseases to humans and animals in Al-Alam District, Salah al-Din Governorate and the previous infection) and accept the alternative hypothesis. The reason may be that direct experience with the disease enhances awareness and understanding, and the previous infection leaves a profound impact, as the breeders or their relatives notice the symptoms of the disease, its causes, and methods of transmission, which prompts them to search for information and awareness of its danger and ways to prevent it.

CONCLUSIONS

The results of the study showed that the level of awareness among breeders of zoonotic diseases affecting humans and animals is average and tends to decline. We conclude from this that there is a lack of knowledge about these diseases among a large segment of breeders, and that only a limited number have good awareness. The results also showed that the ranking of diseases reflects their importance in terms of impact on human and animal health. We conclude that brucellosis ranked first due to its close association with livestock farming, and anthrax ranked seventh due to its rarity and lack of awareness. The findings showed that several factors are related to the level of awareness among breeders on zoonoses. We conclude from this that practical experience, such as the number of years of breeding and the diversity of animals they raise, as well as the educational level, has a significant impact on improving awareness.

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NOVELTY STATEMENT

This study provides novel insights into livestock breeders' awareness of zoonotic diseases, a topic that remains underexplored in many rural contexts. By identifying knowledge gaps and highlighting risk factors, the research offers valuable implications for public health interventions and veterinary extension programs aimed at reducing the transmission of zoonotic diseases in agricultural communities.

AUTHOR'S CONTRIBUTION

Mustafa Manaf: Data collection, field visits to livestock breeders, and writing of the introduction section. Ahmed Saker: Data analysis, interpretation of results, and writing of the conclusion section.

Generative AI or AI-assisted Technology Statement

The author(s) declare that no Genrative AI was used in the creation of this manuscript.

Conflict of interest

The authors have declared no conflict of interest.

REFERENCES

Abdullah AS, Adbullah RR, Salih KJ, Shada MS, Farhan IS (2025). Extension management and its role in facing the challenges of using solar energy systems in the agricultural sector from the point of view of agricultural employees in Salah Al-Din Governorate, Iraq. Edelweiss Appl. Sci. Technol., 9(4): 518–529. https://doi.org/10.55214/25768484.v9i4.6024

Abdullah AS, Fadi AA, Younes SA (2025). The role of artificial intelligence applications in providing extension services and supporting environmental sustainability from the point of view of agricultural employees in Tikrit District, Iraq. Int. J. Environ. Sci., 11(1): 100-111.

Abdullah AS, Hammood RS, Latif SS (2025). Job satisfaction of new workers in agricultural extension in Salah Al-Din Governorate, Iraq. IOP Conf. Ser. Earth Environ. Sci., 1487(1): 012235. https://doi.org/10.1088/1755-1315/1487/1/012235

Ahaly SA (2024). Livestock breeders behavior towards preventive measures for foot-and-mouth disease in beheira

Governorate. J. Adv. Agric. Res., 29(4): 737–755. https://doi.org/10.21608/jalexu.2024.332124.1236

Ahmed S, Mazhar A, Madloul, Najla S (2022). Cattle breeders' knowledge of scientific recommendations related to the management of cattle farms in the Naameh area of Tikrit District, Iraq. J. Acad. Stud., 4(4): 43-55.

Ali AS, Kadhim NA, Rasool EMA, Al-Erjan M, Lahhob QR, Mudhafar M (2024). Harnessing CRISPR-Cas9 gene editing for the eradication of inherited retinal diseases in purebred dogs: A path to preservation and health. J. Anim. Health Prod., 12(Special Issue 1): 145–156.

Al-Sailawi HA, Hadi AA, Raheem HA, Mudhafar M, Dhahi SJ, Lahhob QR (2024). Impact of serratiopeptidase vs. N-acetyl cysteine (NAC) on skin grafting healing in albino male rabbits. Adv. Anim. Vet. Sci., 12(10): 1941-1947. https://doi.org/10.17582/journal.aavs/2024/12.10.1941.1947

Amin HM, Ali MK (2021). Vegetables framer's attitudes towards participating in the training courses in Al-Alam District/Salah Al-Din government. Int. J. Agric. Stat. Sci., 17. https://www.researchgate.net/publication/362945635

Gortazar C, Feruglio E, Hoefli U, Fröhlich K, Vicente J (2020). Diseases shared between wildlife and livestock: A European perspective. Eur. J. Wildl. Res., 53: 241–256. https://doi.org/10.1007/s10344-007-0098-y

Hamed AA, Abdullah AS (2024). Knowledge level of the agricultural employees about environmental conservation in the Upper Euphrates Basin-Anbar Governorate. Euphrates J. Agric. Sci., 16(1). https://www.iraqoaj.net/iasj/download/875f9f317064964d

Hamed AA, Abdullah AS (2024). The level of environmental conservation from the point of view of agricultural employees in the Upper Euphrates Region, Anbar Governorate, Iraq. IOP Conf. Ser. Earth Environ. Sci., 1371(2): 022007. https://doi.org/10.1088/1755-1315/1371/2/022007

Jawad HSA, Ali NAL, Al-Kassie GA, Al-Rubaie ARL, Lokman IH (2024). The modification of broiler physiological and immunological traits caused by the administration of varying concentrations of oregano leaf aqueous extract (*Origanum vulgare*). J. Anim. Health Prod., 12(s1): 113-119. https://doi.org/10.17582/journal.jahp/2024/12.s1.113.119

Shada MS, Amin HM, Abdullah AS (2023). Cognitive training needs of hybrid maize growers in Al-Naameh village, Al-Alam District and its relationship to some variables. IOP Conf. Ser. Earth Environ. Sci., 1214(1): 012058. https://doi.org/10.1088/1755-1315/1214/1/012058

Shareef MO, Amin HM, Abdullah AS (2020). Attitudes of first and second year students in the Department of Economics and Agricultural Extension, College of Agriculture, Tikrit University, towards agricultural extension specialization. J. Tikrit Univ. Human., 27(12): 438–451. https://doi.org/10.25130/jtuh.27.12.2020.21

Shareef MO, Amin HM, Abdullah AS (2021). A study about the knowledge level of wheat growers on sprinklers irrigation towards the Zero-tillage technology in Baiji district. Kirkuk Univ. J. Agric. Sci., 12(1) Appendix). https://www.iraqoaj.net/iasj/download/3341908a7391bf79

Varela B (2015). The livestock roles in the wellbeing of rural communities of Timor-Leste.