
# Brucellosis and its effect on animal production In Iraq (Literature Review)

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ABSTRACT

This article highlight on the Brucellosis and its effect on animal production In Iraq. Brucellosis is a common zoonotic disease, which may spread widely in Iraq and neighboring countries, with great economic loss for livestock and their products. This study aims to identify the main features of brucellosis and virulence factors present in animals infected with brucellosis, as well as study the prevention and treatment of brucellosis. Brucellosis is an occupational disease that mostly affects those who work with infect animal or their tissue, particularly farm employees, veterinarians, slaughterhouse workers, and microbiology laboratory workers. Brucella penetrates macrophages and contains lipopolysaccharides, which are the main virulence factors. Here the bacteria multiply and arise intracellularly in the host resulting in immunosuppression and chronic infection. Brucellosis in Iraq was motionless an widespread and dangerous disease amongst domestic animals and humans, despite the attempt that have been implement in the country to control the disease, whether through bilateral projects with some parties or international organizations. The conclusion showed Brucellosis was an infectious disease causing disease in humans and domestic animals, and able to exist in both( intracellular and extracellular) environments. Avoidance of human brucellosis relies mainly on control the infection in animals

**Keywords:** Brucellosis, animal production, Iraq.

## Introduction

Brucellosis in Iraq is still an endemic and dangerous disease among domestic animals and humans, despite the attempts that have been implemented in the country to control the disease, whether through bilateral projects with some parties or international organizations (1). Brucellosis is a common zoonosis disease, perhaps with high prevalence in Iraq and nearby countries, with a great economic loss of livestock and their products. The disease might be over looked especially in its acute forms(2). Brucellosis is mainly an work-related disease of those working with infected animals or their tissue, specially farm worker, veterinarian, slaughterhouse workers and personnel in microbiology laboratories. Sporadic cases and outbreaks of brucellosis occur among consumers of raw (unpasteurized) milk and milk products from infected cows; sheep and goats; and by the aborted fetus afterbirth, or other reproductive tract discharge. The disease is not or rarely transmission from a person to another(3). *Brucella* penetrates the macrophages and contain lipopolysaccharide the main virulence factors. Here the bacteria multiply and establish intracellular in the host that lead to immune suppression and occurrence the chronic infection(4). Therefore

aims of the study major characteristic of *Brucella* and the virulence factors present in *Brucella* infected of animals, also study of preventions and treatment of Brucellosis

**1-Brucellosis**

Brucellosis is an infectious cause by microbes of the *Brucella*. It is a infection of human and domestic animal chiefly goat, ewe, cow, pig, dog, camel and horse (Table: 1). The common name for "brucellosis" arises as of the quality ripple (or "wave-like" nature) of fever that rise and fall over a period of weeks in unprocessed patient. In the twentieth century, this first name, along with "Malta fever" after Brucella, after Dr. Bruce, replace the nineteenth-century name "Mediterranean fever" and "Malta fever" (5

**Table(1): Disease and Principal Hosts of the *Brucella* species according(6,7).**

| N0 | species | Host | Diseases |
|---|---|---|---|
| 1 | *Brucella melitensis* | Goats, sheep, cattle, humans | Abortion, sporadic abortion, Malta fever. |
| 2 | *Brucella abortus* | Cattle, sheep, goats, swine, horses, humans | Abortion, orchitis, bursitis, undulant fever. |
| 3 | *Brucella suis* | Swine, humans | Abortion, orchitis, arthritis, spondylitis, undulant fever. |
| 4 | *Brucella ovis* | sheep | Epididymitis, sporadic abortion |
| 5 | *Brucella canis* | Dogs, humans | Abortion, epididymitis, discospondylitis, infertility, undulant fever. |
| 6 | *Brucella neotomae* | Neotomae lepida (round worm). | a pathogen |
| 7 | *Brucella maris* | Marine mammals (Bottlenose-dolphin) and may be humans. | Abortion |
| 8 | *Brucella pinnipedialis* | The seal isolation | a pathogen |
| 9 | *Brucella microti* | The seal isolation | a pathogen |
| 10 | *Brucella ceti* | The cetacean isolation | a pathogen |

**2- Classification of *Brucella***

**That classification according to discretion by (8). :-**

Kingdom:- Bacteria
Phylum:- Proteobacteria.
Class:- Alphaprotobacteria
Order:- Rhizobiales.
Family:- Brucellaceae.
Genus:- *Brucella*.

**3.Major Characteristic of *Brucella***

Brucella are Gram(Neg-) bacilli (short rod) measure concerning ( 0.6 - 1.5 μm by 0.5 to 0.7 μm). They are non-spore and not have capsule or flagella and are consequently immobile. The external covering intimately resemble those of previous Gram-(Neg-) bacilli with a predominant lipopalysaccharide constituent and three major groups of protein. The happy of guanine plus cytosine in DNA is 55-58 mol / cell. Previous research demonstrated that LPS and proteins classically exhibit a virulence mechanism in Brucella(9). *Brucella* was not truly acidic—it may resist rapid depolarization by weak acids or alkalis of the solution and thus

stain red by a modified Ziehl–Neelsen method stamping or by special stains such as Macchiavello's stain(10).

**4.Pathogenesis**

Brucella spp. They are facultative intracellular parasites. The disease was transmit either during contamination. unprocessed milk throughout directly make contact with infect animal, which may include dog, horse, pig, camel, and ruminant; Goats, ewe, and cow. This also include communication with their corpses. Brucella can enter the body through a variety of gates, through fissures of the skin, and mucous membrane of many organs(11). Organisms progress from the entrance gate through the lymph ducts and local lymph node, to the bloodstreom and thoracic duct, which distribute them to the parenchymal organs. After infection, Brucella is taken up by neutrophils, which multiply inside causing lysis of cell. Neutrophils contain feasible organism flow in the bloodstreom and are then ingest by reticulaendothelial cells in the spleen, liver, bone marrow and other parts of it. If left untreated, granulomas will subsequently develop in these organs, with the organisms remaining in monocytes and macrophages (12).

**5.Virulence Factors of *Brucella***

bacterial pathogen, many cellular component donate to the continued existence and virulance of Brucella. Nevertheless, the personality of mainly of these component has not been clarified. Investigate on virulance factor express by Brucella has mainly focus on the stractural component of the surface covering(13). Ingredients are include as virulance agents based on the follow categorization: (1) ingredients that when inactivate by mutagenesis significantly reduce virulance, (2) ingredients that imitate pathological effect when administer in pure form, and (3) ingredients that partially induce a virulance factor. defensive immune response. Unlike other Gram--negative pathogen, the outer outside of *Brucella* does not contain a multifaceted structure, such as granules, and does not contain capsule substance. The external membrane contain only two component that have been recognized as virulance factor: lipopolysaccharides and external membranes protein (14).

**6-Diagnosis**

**6.1. Specimens**

Blood must be taken for transplantation, biopsy, materials for transplantation (lymph nodes, bones, etc.) and serum for serological tests(12).

**6.2. Culture**

The ultimate method of diagnosis is isolation of the organism. The use of discriminating media contain antibiotic has amplified the prospect of isolating brucellosis from blood, vaginal secretions, placenta, aborted fetuses and milk(15).

**6.3. Serological Tests**

**6.3.1. Rose Bengal Test (RBT)**

RBT is a topical augmentation practice for the reason that not require particular laboratory amenities and is easy and simple to achieve. It is use to check for *Brucella* antibody in ser. The test detect exact antibodies to IgM and IgA and is more efficient in detect IgG1 antibody than IgM and IgG2 (15).

**6.3.2 Serum Agglutination Test (SAT)**

The SAT test is the mainly extensively use of all serological test for brucellasis, which has traditionally serological test use to identify brucellasis that measure agglutinate antibodies to *IgM, IgG1, IgG2,* and *IgA* species(12). The agglutination test was highly sensitive to antibody-induced immunize(16).

**6.3.3 Two – Mercaptoethanol Test**

Two -ME reduce the disulphide bonds that link IgM molecules to release the subunits. This test estimates the titer of those agglutinins that remain reactive in the presence of ME. The procedure is the same as the SAT except that the serum dilution are prepared in 0.85% sodium chloride (NaCl) containing ME 0.05 Mol./litter. This test is usually used to distinguish among acute infected and chronic infected, or between infected and vaccinated animals as well as infected(17).

**6.3.4. Coomb's test (Anti – Human Globulin Test (AHGT))**

AHGT was urbanized to identify antibodies, even although they mingle with antigen. The attendance of supposed unfinished agglutinin'

can be detect with an antibodies concentrating in opposition to the IgG test and is more sensitive than the normal, acute and chronically infect tubular agglutinator test(17).

**6.3.5. Milk Ring Test (MRT)**

The MRT test was a serological test for anti-Brucella IgM and IgA lactate bounce to milk fat globule in cow, goat or sheep milk. A false positive result with this test may be colon and milk at the end of the lactate periad, but the specificity has been reported to be 99%, while a false negative result may appear with this test in milk with a low concentration of lactate antibody. or lack of lipid-accumulating factors, sensitivity has been reported to be 56% (18).

**6.3.6. Brucellacapt**

It is a serodiagnostic immunoassay for human brucellosis that detects all antibodies against brucellosis, and the employ of brucellosis inhibitors in the identification of human brucellosis can assist identify the infection in patient with extended growth periods, serogroup aggregation cannot be (19).

**6.3.7. Skin Delayed – Type Hypersensitivity Test (SDTH)**

compound brucellin is used to provoke a skin allergy in cattle with acute, chronic, or latent brucellosis(20).

**6.3.8. Complement Fixation Test (CFT)**

It is use to recognize brucellasis in cow, ewe and goat for the discovery of IgM and IgG1 antibody (21). The test is of the high accuracy and is consider the ultimate indicative test after the organisms has been isolated. Sheep red blood cells, sheep sera of rabbit antigens, and sera of guinea pigs serve as source of effective supplements, and the primary reagent used(16).

**6.3.9 Indirect Fluorescence Test (IFAT)**

Fluorescent dye (eg fluorescent and rhodamine) able to be attach to antibody molecule and prepared evident by fluarescence microscopes. This label antibodies preserve used to recognize antigen or in cell in a tissue part or previous sample. The IFT response occur when a two-stage progression was used - eg, a known antigen is attach to a slide, and unidentified serum was additional(22).

**6.3.10. Polymerase Chain Reaction (PCR)**

A PCR analyze was urbanized to distinguish Brucell. These tests are concentrating towards the variable genetic loci between species/biotypes. These target are unusual in Brucella because is extraordinarily harmonized and has been suggested to be a lone species (23).

**6.3.11. Enzyme Linked Immunosorbent Assay (ELISA)**

It is a quick immunohistochemical test. Ongoing efforts to get better serological technical systems have led to widespread receipt of ELISA. Indirect ELISA, for example, detect all antibody phenotypes, but lack competence in distinguishing post-vaccine antibodies from those caused by natural infection or reactive bacterial antigens(24) and is therefore well suitable for serosurveys where vaccination is not practice(25).

**7.Prevention and Control**

As a general rule, avoidance of brucellosis in humans relies mostly on disease control in animals. Occupational showing individuals can be secluded to some degree by tiring resistant clothes, rubber boat, glove, and face mask, and by practice good individual sanitation. The pasteureization of milk for intake and for its amalgamation into other dairy product was efficient in protect customers. No extensively established vaccine has been residential for human other than advances in accepting Brucella epitopes and immunity could change this(24).

**8.Treatment**

The World Health Organization endorses a treatment combining doxyciycline 100 mg and rifampin 600-1200 mg daily for 6 weeks or doxyciycline for 6 weeks and streptamycin 15 mg/kg. daily for 2-3 weeks. The latter group is considered better, but requires the administration of injections of 5 mg / kg for 2-7 days. Alternative include Trimethaprim-Sulfamethaxazole in a variety of combination, and groups include oflaxacin or ciprafloxacin. Quinolane-conteining regimens are usually sufficient, but cost-effectivness and potential for neighbor resistance are issues to consider. In serious complications, long-term treatment

regimen should be second-hand, with endovascular procedure, as indicate. Rifmpicin and trimethaprim-sulfamethaxazole are the main phase of treatment during pregnancy and children, respectively(25).

## Conclusion

Brucellosis was an infectious disease. It is a disease of human and animal, and a facultative intracellular parasite (able to exist in both intracellular and extracellular environments). Avoidance of human brucellosis rely chiefly on controlling the disease in animals. Brucellosis was an infectious by bacteria of the *species Brucella*. It is a illness of humans and pets, and a facultative intracellular parasite. Avoidance of human brucellosis rely mostly on controlling the infection in animal.

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