

Advances In Brucellosis Research

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Research Progress in Live Attenuated *Brucella* Vaccine Development

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Abstract: *Brucella* spp. are facultative intracellular bacteria that cause brucellosis, which is a globally occurring zoonotic disease that is characterized by abortion in domestic animals and undulant fever, arthritis, endocarditis, and meningitis in humans. There are currently no licensed vaccines against brucellosis for human use, and only a few licensed live *Brucella* vaccines are available for use in animals. However, the available animal vaccines may cause abortion and are associated with lower protection rates in animals and higher virulence in humans. Much research has been performed recently to develop novel *Brucella* vaccines for the prevention and control of animal brucellosis. This article discusses the approaches and strategies for novel live attenuated vaccine development.

Keywords: *Brucella*, Brucellosis, Intracellular pathogen, Research progress, Vaccine.

1. INTRODUCTION

Brucella spp. are Gram-negative, facultative, intracellular bacteria that cause brucellosis [1]. The pathogen was first isolated in 1886 by David Bruce from the spleen of a British soldier who had died of a febrile illness [2]. Later, the bacteria were discovered in many areas of the world. To date, at least 10 species of *Brucella* have been recognized and classified that are based mainly on their host preferences and pathogenicity, including *Brucella melitensis* (usually found in sheep and goats), *B. abortus* (cattle and buffalo), *B. suis* (pigs), *B. ovis* (rams), *B. canis* (dogs), *B. neotomae* (desert wood rat), *B. microti* (voles), *B. inopinata* (breast implant), *B. pinnipedialis* (seals and walrus), and *B. ceti* (whales, dolphins and porpoises). *B. melitensis*, *B. abortus*, and *B. suis* are the most frequent causative agents of zoonotic infection and thus are the most clinically important worldwide. In domestic and wild animals, *Brucella* infection predominantly causes abortion at late gestation in females and orchitis and epididymitis in males [3]. After the first episode of *Brucella*-induced abortion, brucellosis in the primary hosts usually becomes latent, although abortions in subsequent gestations may occur occasionally [4]. Females may shed the bacteria periodically through milk, uterine, and vaginal discharges in subsequent parturitions, as has been described in ewes [5]. Calves that acquire the infection vertically or by ingesting contaminated milk may remain serologically negative and show no sign of the disease, but the heifers with latent asymptomatic infection may abort or give birth to infected calves that are essential to the maintenance of the disease in the herd [4, 6]. Aborted fetuses and fetal membranes and

uterine secretions that are obtained after abortion or parturition are the most important sources of infection [7].

In humans, *Brucella* infection produces varied and non-specific symptoms, such as intermittent fever and associated sweats, chills, malaise, and nausea in addition to anorexia, headaches, myalgia, and back pain [8]. The incidence of human brucellosis is strongly dependent upon animal disease prevalence. Human infection typically occurs through cuts and abrasions in the skin that contact contaminated animals or their products or by the inhalation of contaminated aerosols and ingestion of unpasteurized milk products [9]. Occupational exposure is also an important transmission route; for instance, the disease may be transmitted to humans when infected animals are slaughtered or contaminated organs are processed. Therefore, to limit human infection, the prevention and control of animal brucellosis is a top priority.

The successful control and eradication of brucellosis depends on animal vaccinations, serological examinations, and the culling of infected animals followed by the destruction of the carcasses [10]. Following these strategies, some developed countries, such as Australia, Canada, and New Zealand, have eradicated animal brucellosis effectively [11–13] by means of government compensation and producer cooperation. In addition, countries such as Sweden, Finland, Germany, the Netherlands, and Norway have also eliminated animal brucellosis by test-slaughter-compensate strategies and are declared to be brucellosis-free regions by the European Union [14–18]. However, in developing countries, the elimination of infected animals is not affordable; thus, brucellosis is more prevalent in these countries. Vaccination has become the main method of controlling animal brucellosis in these areas. In 1947 and 2001, Argentina and Brazil implemented control and eradication measures for bovine brucellosis, which included the vaccination of cows that were aged 3–8 months with *B. abortus* S19; the accreditation of brucellosis-free herds, periodic surveillance, the requirement of sero-

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Finally, this issue will present findings in which novel vaccine strategies to address *Brucella* are also described. Collectively, the research presented provides an MEYER ME. Metabolic characterization of the genus *Brucella*. III. Oxidative metabolism of strains that show anomalous characteristics by conventional. Enlarge Cover Image. Advances in Brucellosis Research. Veterinary Medicine. 6 x 9, pp. 7 b&w photos., 95 tables. Pub Date: 09/01/Advances in Brucellosis Research [L. Garry Adams] on kachemile.com *FREE* shipping on qualifying offers. Thirty papers, and abstracts of 30 more, from a EDITORIAL. Recent advances in brucellosis bovine brucellosis caused by *Brucella abortus*, the only show > 95% homology in DNA-DNA pairing studies. Background/Objectives In spite of all the research effort for developing new vaccines against brucellosis, it remains unclear whether these new Advances in brucellosis research / edited by L. Garry Adams Station; International Symposium on Advances in Brucellosis (Texas A&M University). *Brucella abortus* vaccines play a central role in bovine brucellosis been used in the brucellosis control over the years and the current research advances in the .some of the current advances in the research for a new. *B. abortus* vaccine. 2. Vaccines, vaccination and their use in. brucellosis control and eradication. Recent Advances in Understanding Immunity Against Brucellosis: Application for This review discusses recent studies in host immunity to *Brucella* and new. Recent Advances In *Brucella* Diagnosis. Dr. Gamal Wareth Historically, *Brucella* was recognized for the first time in Malta in From. advances in brucellosis research. Education WorldBook Center. WorldBook ID f. Education WorldBook Center. Advances In Brucellosis Research. Although much information is available on the diagnosis and control of brucellosis, most of it is concerned with *Brucella abortus* in cattle. In contrast, no specific. areas despite notable advances in science, technology, and management in the. 19th and 20th and reviewed brucellosis as an illustrative case study of. Adams L.G., Development of live *Brucella* vaccines, in: Adams L.G. (Ed.), Advances in brucellosis research, Texas A&M University Press, College Station, Although molecular studies have found such high homology that some authors have proposed that all *Brucella* are actually 1 species, the epidemiologic and.

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