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Brucellosis seropositivity in animals in Algeria: A comprehensive meta-analysis

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Abstract

This systematic review and meta-analysis aimed to evaluate the prevalence, diagnostic approaches, and spatial distribution of animal brucellosis in Algeria. Following PRISMA guidelines, a comprehensive literature search was conducted using five databases (PubMed, Thomson Reuters, ScienceDirect, Scopus, and Google Scholar) to identify relevant studies published in English up to February 2025. A total of 34 eligible articles, encompassing 67 individual studies conducted between 2003 and 2025, were included. These studies investigated brucellosis in cattle, sheep, goats, camels, and equines. Pooled prevalence estimates showed species-specific variations: 14.87% in sheep, 14.7% in goats, 4.62% in cattle, 3.35% in camels, and 0.85% in equines. Diagnostic methods varied across studies, with the Rose Bengal Plate Test (RBPT) being the most commonly used (in 33 studies), followed by the Complement Fixation Test (CFT) (20 studies), and ELISA (18 studies), Delayed Type Hypersensitivity Test with Dead *Brucella* Antigen - NH Strain (DDG-NH), real-time PCR (RT-PCR), Buffalo Agglutination Plate Test (BAPT) and Tube Agglutination Test (TAT). Spatial analysis revealed hotspots primarily in northern and central regions, notably Medea, Tiaret, Sidi Bel-Abbes, and Djelfa, with sporadic cases in arid and semi-arid areas. Brucellosis persistence is driven by several risk factors including, herd size, husbandry practices, lack of systematic vaccination, and interspecies transmission. The absence of an OIE-accredited reference laboratory in Algeria limits accurate diagnosis and surveillance. This first systematic *meta-analysis* on animal brucellosis in Algeria underscores the urgent need for harmonized diagnostic protocols, enhanced biosecurity measures, nationwide vaccination strategies, and robust surveillance systems to control the disease and protect animal and public health.

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Introduction

Brucellosis is a major zoonotic disease with significant economic and public health implications worldwide (1). It is caused by bacteria of the genus *Brucella*, which primarily infect livestock-cattle, sheep, goats, and pigs-leading to reproductive losses, reduced productivity, and trade restrictions (2). Humans typically acquire the infection through direct contact with infected animals or consumption of unpasteurized dairy products. Globally, *Brucella melitensis*, *B. abortus*, and *B. suis* are the most relevant species for human and animal health, with *B. melitensis* being the most virulent and frequently reported in endemic regions (2, 3). The global prevalence of brucellosis varies widely by region and species. In the Mediterranean and Middle East regions, *B. melitensis* remains endemic in small ruminants, with high seroprevalence rates reported in countries such as Morocco, Tunisia, and Turkey (4). In sub-Saharan Africa, the overall prevalence of livestock is estimated at approximately 8%, although underreporting and limited surveillance hinder accurate assessments (5). In Asia, certain regions of China, India, and Central Asia continue to report rising trends in animal and human brucellosis, often linked to pastoral systems and inadequate control measures (6). Even in regions where brucellosis had been previously controlled—such as parts of Europe and North America—sporadic outbreaks still occur, reflecting re-emergence risks due to lapses in biosecurity (6, 7).

In Algeria, brucellosis remains a persistent endemic problem, particularly in rural and pastoral communities where livestock plays a central economic role (8). Despite national control programs, including vaccination and test-and-slaughter strategies, the disease continues to affect animals and humans, suggesting gaps in implementation, surveillance, and public awareness. Several epidemiological studies have reported varying prevalence rates across regions and animal species, influenced by differences in husbandry practices, diagnostic tools, and study designs (2, 4, 8–37). For instance, a retrospective study in western Algeria estimated a bovine brucellosis seroprevalence of 1.02% between 2009 and 2019, with notable interannual variability (1). Similarly, in Theniet El Had, the human brucellosis incidence among hospitalized patients ranged from 49.18 to 66.02 cases per 100,000 inhabitants, largely associated with animal contact and consumption of raw dairy products (2).

Given the heterogeneity of these findings, a systematic review and meta-analysis are essential for consolidating existing data and providing a reliable estimate of the national burden. This study aims to synthesize epidemiological data on animal brucellosis in Algeria across various periods and geographic areas. Specifically, it seeks to estimate the overall prevalence in cattle, sheep, and goats; analyze regional variation in infection rates; assess the influence of diagnostic methods on reported prevalence; and offer evidence-based recommendations for strengthening national brucellosis control programs. While previous studies have provided valuable localized insights (2, 3), an integrated analysis is necessary to identify broader trends in disease distribution and transmission. The findings of this *meta-analysis* will contribute to more effective veterinary and public health interventions, to reduce the prevalence of brucellosis and its socio-economic impact in Algeria.

Materials and Methods

Search Strategy

This systematic review was conducted following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (38). The inclusion criteria were limited to English-language studies exploring the main causes of abortion in animals in Algeria. To ensure comprehensive coverage, a literature search was carried out across five major databases: PubMed, Thomson Reuters, ScienceDirect, Scopus, and Google Scholar. The initial search took place on December 1, 2024, with the latest update performed on February 25, 2025. A broad range of keywords was employed, including "abortion", "brucellosis", "seroprevalence", "epidemiology", "risk factors", "camels", "cattle", "goats", "small ruminants", "sheep", "equines" and "Algeria". To maintain the accuracy and reliability of the analysis, duplicate references were systematically detected and eliminated.

Eligibility Criteria

The selection of articles followed a rigorous evaluation process, beginning with a preliminary screening of titles and abstracts, followed by a thorough analysis of the full text. To be considered for inclusion, studies had to meet the following criteria: the full text had to be available online in English up to February 2025; the study had to be either descriptive or cross-sectional, with clearly defined objectives and reported prevalence estimates; the research had to be conducted in Algeria; the primary focus of the study had to be the prevalence of different causes of abortion in camels and the associated risk factors; and the article had to provide comprehensive data, including the total sample size, the number of positive cases, the studied region, and the study period.

Data Extraction

Duplicate data, conference abstracts, and review articles were excluded from this analysis. The data extraction process focused on key information from each selected study, including the primary author, year of publication, research location, total sample size, number of confirmed cases, prevalence rate, and laboratory diagnostic methods used.

Data Analysis

The collected data was initially organized in an Excel spreadsheet before being imported into Comprehensive Meta-Analysis software (Version 2.2, BioStat, USA) for statistical processing. Additionally, geographic mapping was performed using Cb Geo software (Version 6.03).

Results

Literature search result

The search process identified 34 articles encompassing 67 studies conducted between 2003 and 2025, all of which met the inclusion criteria for this systematic review. The screening process and article selection are summarized in the flow diagram (Figure 1). The electronic database search, guided by predefined strategies, resulted in the selection of 34 articles published between 2003 and 2025, which were subsequently included in this systematic review and meta-analysis. Figure 1 illustrates the number of articles screened, excluded, and ultimately incorporated into the meta-analysis, while Table 1 presents the detailed results of the literature search. Of the 34 published studies, one focused on camels, one on equines, 15 on cattle, and 17 on small ruminants (Table 1).

Our analysis included a total of 117,749 cattle, 88,539 small ruminants, 264 camels, and 238 equines. All selected studies were cross-sectional, aiming to map and evaluate the prevalence of Brucellosis infection among animals across different regions of Algeria. Various diagnostic tests have been employed to detect brucellosis, differing in methodology, sensitivity, and specificity. Among the most frequently used tests, the Rose Bengal Plate Test (RBPT), also known as the Card Test, was the most commonly applied (33 cases), followed by the Complement Fixation Test (CFT) (20 cases) and Enzyme-Linked Immunosorbent Assay (ELISA) (18 cases). These tests are widely used for screening and confirmation due to their reliability in detecting *Brucella* antibodies. Additionally, real-time PCR (RT-PCR) (3 cases) serves as a confirmatory test, offering high specificity and sensitivity by detecting *Brucella* DNA directly.

Other diagnostic methods included Buffalo Agglutination Plate Test (BAPT) (3 cases), Tube Agglutination Test (TAT) (1 case), and Delayed Type Hypersensitivity Test with Dead Brucella Antigen - NH Strain (DDG-NH) (4 cases), which are less frequently used but may provide complementary insights in specific epidemiological contexts. Bacterial culture (1 case) remains the gold standard for brucellosis diagnosis, though it is less commonly performed due to biosafety concerns and the lengthy process required for bacterial isolation.

For milk-based diagnostics, the Ring Test (RT) and Milk Ring Test (MRT) (3 cases combined) were employed, demonstrating their role in detecting *Brucella* in dairy products. Additionally, the Rapid Immuno-Viscosity Test (RIV) (1 case) was used as an alternative serological method. While some tests are primarily used for screening, others, such as CFT, ELISA, and RT-PCR, are essential for confirmation.

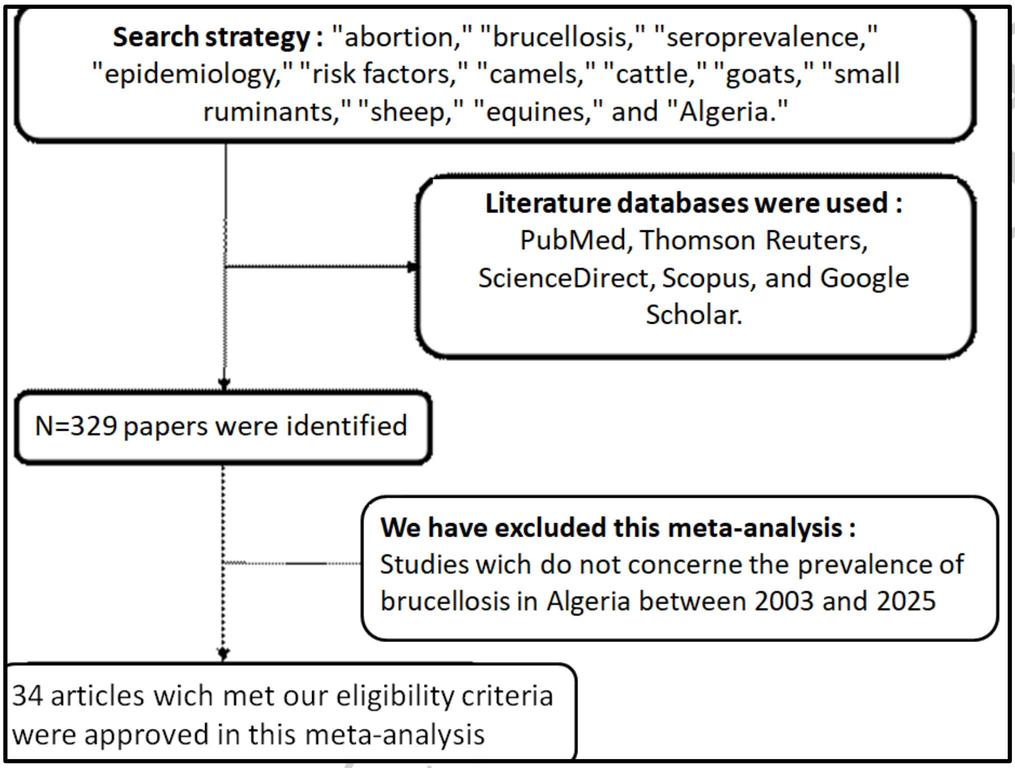

Fig. 1. Flowchart showing study inclusion and exclusion criteria

Spatial distribution of eligible studies

Brucellosis exhibits a heterogeneous spatial distribution across Algeria, affecting multiple regions with varying prevalence levels. The disease has been reported in several key provinces, particularly Algiers, Tiaret, Medea, and Djelfa, which appear to be recurrent hotspots. Additionally, cases have been recorded in Ghardaïa, Laghouat, and several regions in western Algeria, including Sidi Bel-Abbes and Mostaganem, indicating a significant presence in both west and central parts of the country (10, 12, 14, 16).

In the eastern and southeastern regions, brucellosis has been documented in Batna, Biskra, Skikda, Annaba, El Tarf, and El-Oued (8, 15, 31), suggesting a broader spread into semi-arid and arid zones. The high plateaus of Algeria, including areas such as Sidi Bel-Abbes and Mostaganem, have also shown evidence of the disease, emphasizing its persistence in both agricultural and pastoral settings (19, 20, 30).

The disease has also been detected in the north and northeastern regions, including Blida, Tipaza, and Constantine, reinforcing its widespread nature across various ecological zones (13, 21). The arid zones of Algeria appear particularly affected, highlighting the role of climatic and environmental factors in disease transmission.

This wide geographical spread suggests that brucellosis remains a persistent and evolving zoonotic threat in Algeria, necessitating targeted surveillance and control measures across multiple regions. Further temporal analyses are essential to identify potential seasonal variations and emerging hotspots.

The prevalence of brucellosis varies among different animal species in Algeria

In cattle, the overall prevalence is estimated at 4.62% (95% CI: 4.40 - 4.85). The lowest values were recorded in the western regions of the country, at 0.40%, while the highest rates were observed in Medea (11.62%), Tarf (10.44%), and Tiaret (9.70%).

In sheep, the overall prevalence is 14.87%, with significant regional variations. Depending on the diagnostic method used, prevalence rates range from 0.07% (CFT and card test) to 30.56% (i-ELISA in Sidi Bel Abbes). High prevalence rates were also recorded in Constantine (24.46%) and Sidi Bel Abbes (27.78%).

In goats, the prevalence is similarly high, reaching 14.7% in certain regions. The rates vary according to studies and locations, with peaks of 68.42% in the high plateaus of eastern Algeria and 23.81% in arid zones.

In dromedaries, the estimated prevalence is 3.35% (95% CI: 1.22 - 5.60). In Ghardaïa, it varies depending on the diagnostic technique, with 5.30% detected using ELISA and 1.40% with RBPT.

In equids, the prevalence in horses is low at 0.85%, while no positive cases have been detected in donkeys, resulting in a prevalence of 0%.

Among small ruminants, combining both sheep and goats, a recent study reported a prevalence of 54.17% in blood samples and 80.7% in milk samples in the regions of Medea and Sidi Bel Abbes. These findings suggest a high circulation of brucellosis in these areas.

Brucellosis is present at varying levels across animal species and regions in Algeria. It is particularly concerning in sheep and goats, with prevalence rates exceeding 60% in some areas. In cattle, the disease is less widespread, though certain regions such as Medea and Tiaret exhibit significant prevalence. In dromedaries, the infection rate is moderate, while equids appear to be minimally affected.

The forest plot (Figure 2) presents the prevalence of animal brucellosis in Algeria across different studies and species, along with their 95% confidence intervals. The prevalence varies significantly, ranging from nearly 0% to over 80%, indicating substantial heterogeneity among studies. In cattle, prevalence is mostly low to moderate (around 0%–10%), whereas sheep and goats show higher prevalence, sometimes exceeding 30%. Small ruminants have the highest prevalence, with some studies reporting values above 80%. Camels, horses, and donkeys generally exhibit lower prevalence, often close to 0%. Studies with larger sample sizes display narrower confidence intervals, indicating more precise estimates, while smaller sample sizes result in wider intervals, reflecting greater uncertainty. The heterogeneity observed suggests methodological differences among studies, such as variations in diagnostic tests and sampling methods.

The analysis of the funnel plot (Figure 3) shows that the studies, represented by yellow points, are relatively well distributed around the central axis but exhibit a slight asymmetry to the right. This asymmetry may indicate a potential bias, possibly due to studies reporting higher prevalence rates and methodological heterogeneity among studies (differences in diagnostics, species studied, and sampling methods). Studies with a low standard error (at the top of the graph), corresponding to larger sample sizes**,** are more concentrated around the estimated mean effect. Conversely, studies with a higher standard error (at the bottom, representing smaller sample sizes) are more dispersed, which is expected. However, some points exceed the triangle’s boundaries on the right, suggesting a possible overrepresentation of studies reporting high prevalence rates of animal brucellosis in Algeria.

Table 1. Characteristics of included studies

	Diagnostic	Region	Sample size	Positive cases	Prevalence (%)	CI 95%	Ref.
Camels	ELISA	Ghardaia	132	7	5.30	[1.48, 9.13]	(10)
	RBPT	Ghardaia	132	2	1.52	[0, 3.60]	(10)
	RBT	Blida, Tipaza	64	0	0.00	[0, 0]	(13)
	RBT CFT	Algiers	360	11	3.06	[1.28, 4.83]	(14)
	PCR	Batna	65	2	3.08	[0, 7.28]	(15)
	ELISA	Tiaret	92	6	6.52	[1.48, 11.57]	(16)
	RBT	Center	64	0	0.00	[0, 0]	(21)
	RBT		402	24	5.97	[3.65, 8.29]	(17)
	CFT, DDG	Several regions	402	23	5.72	[3.45, 7.99]	
	ELISA		402	16	3.98	[2.07, 5.89]	
	RBT FCT	Tarf	450	47	10.44	[7.62, 13.27]	(31)
	RBT card test FCT	Several regions	69760	302	0.43	[0.38, 0.48]	(18)
	RBT FCT DDG-NH	Medea	520	32	6.15	[4.09, 8.22]	(12)
	RBT		1032	85	8.24	[6.56, 9.91]	(32)
Cattle	MRT		765	31	4.05	[2.66, 5.45]	
	BAPAT		1032	100	9.69	[7.89, 11.49]	
	RIV	Tiaret	1032	31	3.00	[1.96, 4.05]	
	TAT		1032	51	4.94	[3.62, 6.26]	
	CFT		1032	27	2.62	[1.64, 3.59]	
	RBT		280	7	2.50	[0.67, 4.33]	(33)
	RBT	Medea	215	25	11.63	[7.34, 15.91]	
	Card test CFT	Djelfa	10827	152	1.40	[1.18, 1.63]	(34)
	Ring Test	Djelfa	12716	267	2.10	[1.85, 2.35]	(35)
	RB, CFT	West	744	3	0.40	[0, 0.86]	(36)
	ELISA	West	744	112	15.05	[12.48, 17.62]	
	ELISA	Laghouat	1393	87	6.25	[4.97, 7.52]	(37)
	RBT	Algiers	351	16	4.56	[2.38, 6.74]	(4)
	Card test	Djelfa	10827	152	1.40	[1.18, 1.63]	(34)
Horses	CFT	Skikda, Annaba, El Tarf	118	1	0.85	[0.02 - 4.64]	(11)
Donkeys	RBPT	Skikda, Annaba, El Taref	120	0	0.00	[0.00 - 3.05]	(11)
Sheep	RBT	Algiers	402	24	5.97	[3.88 - 8.74]	(17)
Sheep	CFT,DDG	Algiers	402	23	5.72	[3.69 - 8.45]	(17)
Sheep	Elisa	Algiers	402	16	3.98	[2.31 - 6.37]	(17)
Sheep	RBPT	Tiaret	142	6	4.22	[1.56 - 8.99]	(9)
Sheep	BAPAT	Tiaret	142	2	1.41	[0.17 - 5.04]	(9)
Sheep	Card test, CFT	North and High Plateaus	4594	3	0.07	[0.01 - 0.19]	(18)

Sheep	RBPT, CFT	Mostaganem	450	10	2.22	[1.07 - 4.05]	(19)
Sheep	i-ELISA	Sidi Belabbes	180	55	30.56	[24.09 - 37.59]	(20)
Sheep	i-ELISA	Constantine	552	135	24.46	[20.89 - 28.30]	(21)
Sheep	i-ELISA	Sidi Belabbes	180	50	27.78	[21.53 - 34.70]	(20)
Sheep	RBT, CFT, DDG, Elisa	Algiers	203	2	0.98	[0.12 - 3.53]	(17)
Sheep	Elisa	Msila	184	7	3.80	[1.54 - 7.68]	(22)
Goats	RBPT	Tiaret	230	2	0.87	[0.11 - 3.13]	(9)
Goats	BAPAT	Tiaret	230	7	3.04	[1.23 - 6.16]	(9)
Goats	Card test, CFT	North and High Plateaus	19568	1224	6.26	[5.92 - 6.62]	(18)
Goats	RBPT, CFT	Eastern High Plateaus	4955	49	0.99	[0.73 - 1.31]	(23)
Goats	RBPT, CFT	Eastern High Plateaus	38	26	68.42	[51.34 - 82.54]	(23)
Goats	RBPT, CFT	Arid regions	105	25	23.81	[16.09 - 32.76]	(24)
Goats	Ring test	Arid regions	43	6	13.95	[5.26 - 27.79]	(24)
Goats	RBPT, CFT	Mostaganem	287	15	5.23	[3.07 - 8.48]	(19)
Goats	Culture	Arid regions	43	0	0.00	[0.00 - 8.22]	(24)
Goats	Card test, CFT	Several regions	51475	7567	14.70	[14.38 - 15.02]	(25)
Goats	RBPT	Medea	383	64	16.71	[13.12 - 20.96]	(2)
Goats	Elisa	Sud-Est	196	4	2.04	[0.66 - 5.40]	(26)
Goats	RBT	Sud-Est	196	17	8.67	[5.44 - 13.46]	(26)
Goats	RBT	Biskra	789	75	3.21	[2.55 - 4.01]	(8)
Goats	Elisa, RBT, CFT	El Oued	612	30	3.98	[2.77 - 5.64]	(27)
Small Ruminants	i-ELISA	Several regions	164	14	8.54	[4.99 - 14.04]	(28)
Small Ruminants	rt-PCR	Several regions	199	30	15.08	[10.81 - 20.51]	(28)
Small Ruminants	i-ELISA	Ksar El-Boukhari	144	51	35.42	[27.88 - 43.70]	(28)
Small Ruminants	i-ELISA	Several regions	227	32	14.10	[9.99 - 19.30]	(29)
Small Ruminants	RT-PCR	Several regions	267	57	21.35	[16.65 - 26.87]	(29)
Small Ruminants	Elisa	Medea, Sidi Bel-Abbes	96	52	54.17	[43.87 - 64.12]	(30)
Small Ruminants	Elisa	Medea, Sidi Bel-Abbes	57	46	80.70	[68.73 - 89.02]	(30)
Total	-	-	207249	11542	10.54		-

RBPT : Rose Bengal Plate Test/Card Test; CFT : Complement Fixation Test; ELISA : Enzyme-Linked Immunosorbent Assay; rt-PCR : real-time PCR; BAPT : Buffalo Agglutination Plate Test; TAT: Tube Agglutination Test; DDG-NH : Delayed Type Hypersensitivity Test with Dead ***Brucella*** *Antigen - NH Strain; RT : Ring Test ; MRT : Milk Ring Test; RIV : Rapid Immuno-Viscosity Test*

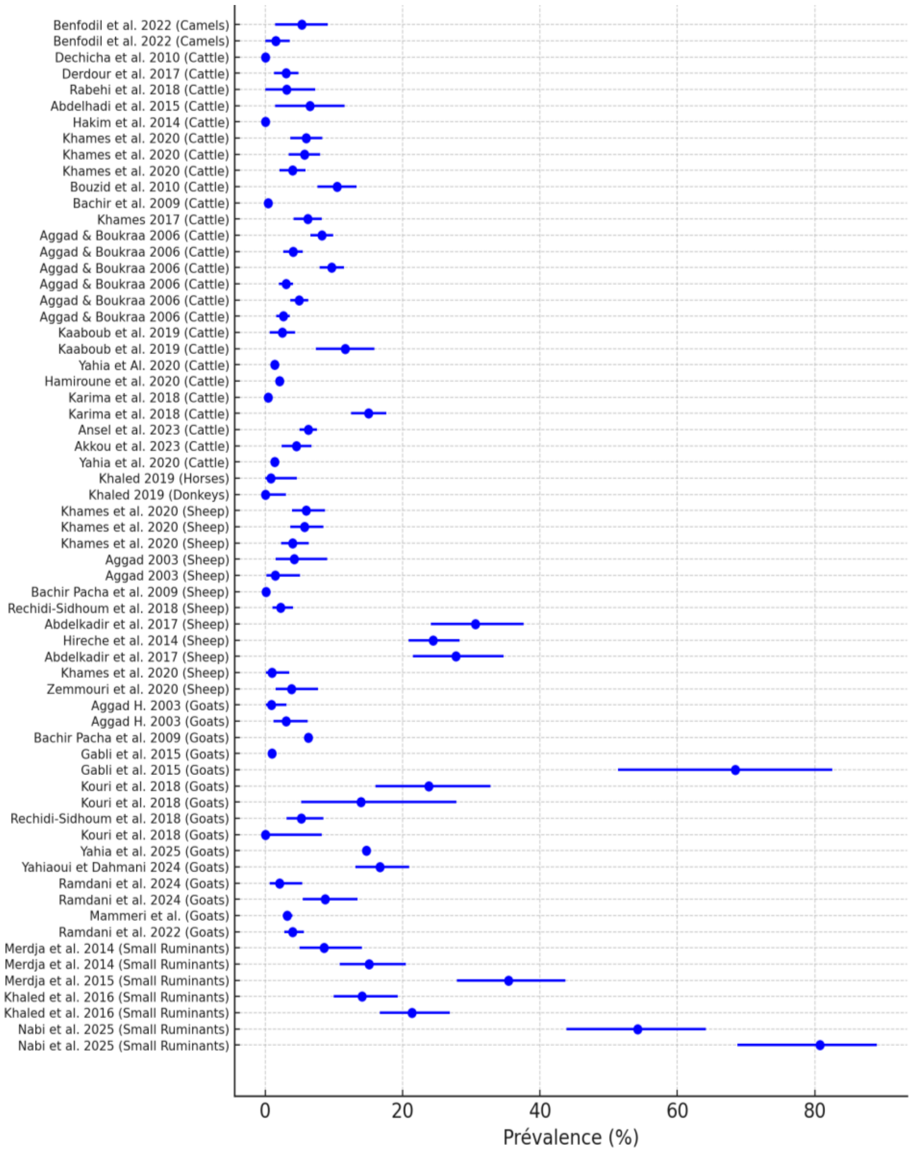

Fig. 2. Forrest plot of prevalence of brucellosis seropositivity in animals

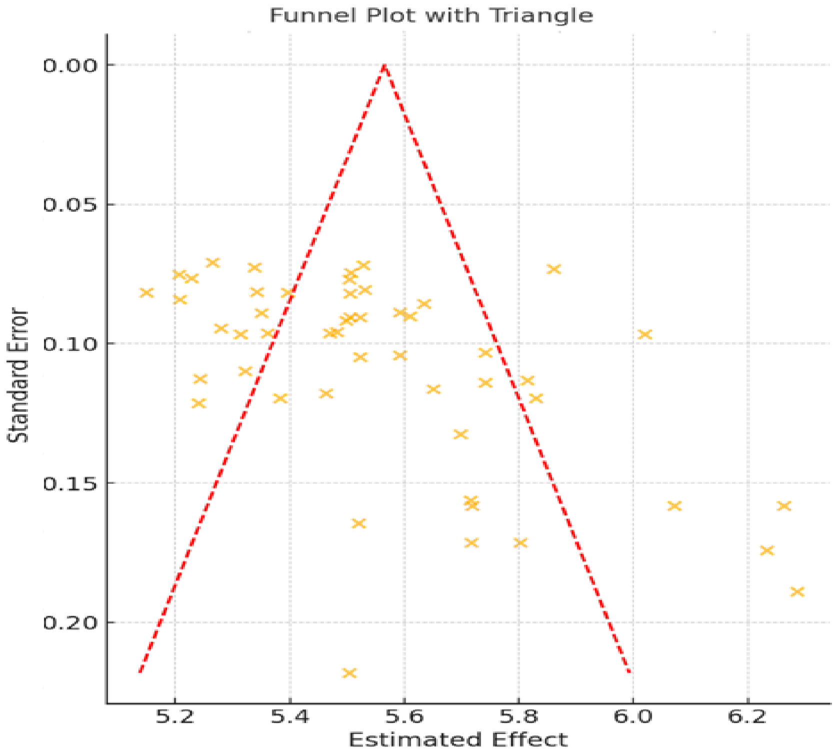

Fig. 3. Funnel plot of published studies (n = 34) on *Brucella* seroprevalence in animals in Algeria showing study precision vs. transformed prevalence estimate. Curved lines indicate cut-off for statistically significant difference ($P < 0.05$) vs. pooled estimate (vertical line).

Discussion

Improving animal health in Algeria, particularly regarding reproductive disorders caused by abortive pathogens, is of great importance (39). Brucellosis, a major zoonotic disease, remains a persistent issue in North Africa. The first review on brucellosis in Algeria was conducted in 2003 (9), with no prior comprehensive studies available. This systematic review represents the first extensive analysis of brucellosis in animals in Algeria, consolidating data from studies conducted between 2003 and 2025. 34 articles covering 67 studies were included, focusing on diagnostic methods, affected animal species, and identified pathogens. These studies examined various species, including camels, cattle, horses, and donkeys, revealing significant research gaps in infectious and parasitic abortifacient diseases affecting these animals.

Brucellosis, caused by *Brucella* species, is a major reproductive disease affecting various animal species. In females, it leads to complications such as abortion, placental retention, placentitis, and endometritis, ultimately reducing fertility (40-43). In males, the infection manifests as orchitis, epididymitis, and inflammation of the accessory sex glands, negatively impacting reproductive function (42).

The transmission of the disease occurs primarily through three main pathways. First, ingestion of contaminated feed or water is a major route of infection, enabling the pathogen to enter the host's system via the digestive tract (42-44). Second, genital exposure is a critical factor, particularly during contact with infected animals, especially after abortion events, where large quantities of the pathogen are shed (42-44). Lastly, environmental contamination poses a persistent threat, as infected pastures and surfaces serve as reservoirs for the pathogen,

facilitating its spread to susceptible animals (42-44). These transmission routes underscore the necessity of strict biosecurity measures to effectively control and prevent infection.
Despite its severe reproductive consequences, effective management strategies and vaccination programs have shown promise in controlling the disease and reducing its impact. These findings underscore the importance of preventive measures, disease surveillance, and improved biosecurity practices to safeguard animal health and reproductive efficiency (43).
The prevalence of brucellosis varies significantly across livestock species and depends on the diagnostic methods used. In camels, a seroprevalence rate of 5.3% was determined using ELISA (10, 45). In bovines, prevalence rates ranged from 0.0% to 39%, with an overall estimated prevalence of 6.77% (45). In equines, lower prevalence rates were reported, with 0.8% in horses and no detected cases in donkeys (11, 45).
Algeria's prevalence rates align with those of neighboring countries. In Tunisia, seroprevalence was reported at 23.5% in extensive systems and 13.84% in intensive systems (46-48). In Morocco, the prevalence was 2.1% in intensive systems and 1.9% in semi-intensive systems (48, 49).
Algeria is part of the Mediterranean basin, where brucellosis remains endemic. In this region, Algeria, Morocco, and Tunisia report high incidence rates of human brucellosis, primarily associated with the consumption of unpasteurized dairy products and close contact with infected animals (4). The predominance of Brucella melitensis biovar 3 in Algeria shows genetic similarities with strains circulating in European countries, reflecting historical and socio-economic connections (50). Within the Middle East and North Africa (MENA), Algeria shares epidemiological characteristics with neighboring countries such as Morocco and Tunisia. In Morocco, a seroprevalence of 33.2% has been reported among farmers and rural residents, with key risk factors including contact with cattle, handling of aborted materials, and consumption of raw milk (7). Similarly, in Tunisia, the disease remains endemic in small ruminants, with B. melitensis as the predominant species (4). Although brucellosis is less prevalent in sub-Saharan Africa compared to the MENA region, it remains a significant zoonotic concern. A systematic review and meta-analysis across African and Asian countries estimated a pooled livestock prevalence of 8%, with Algeria contributing to the regional burden (5). Underreporting is common in sub-Saharan Africa, largely due to limited diagnostic capacity and inadequate surveillance systems. Globally, brucellosis is re-emerging in areas where it was once controlled, such as the United States and parts of Europe. Algeria continues to be among the high-burden countries, along with Syria, Iran, and Kenya, where the persistence of the disease is linked to socio-economic challenges, including reliance on livestock and insufficient public health infrastructure (6).
Several risk factors influence *Brucella* seropositivity across species, including age, gender, breed and abortion history within the herd, husbandry system, herd size, and geographic location (10). Higher seroprevalence has been observed in female animals and herds with a history of abortion, regardless of species.
Despite control and eradication programs, brucellosis continues to be a major zoonotic threat in North Africa, particularly in Algeria, Morocco, and Tunisia, where its true prevalence may still be underestimated (50). The disease remains a significant public health concern in the Maghreb region and persists in the Middle East, Latin America, South and Central Asia, and parts of Africa (51).
In Algeria, *Brucella abortus* biovar 3 is the primary strain affecting cattle, followed by *B. abortus* biovar 1 and *B. melitensis* biovar 3 (12). Most isolates show genetic similarity to European strains, while others differ from European and Sub-Saharan African lineages. Since 1995, Algeria has implemented a test-and-slaughter (T/S) control program for cattle, involving serological screening every six months (52). however, the lack of an OIE-accredited reference laboratory for brucellosis limits confirmatory diagnostics. Current data primarily rely on serological surveys conducted in restricted regions, despite the need for bacteriological and molecular analyses to accurately confirm infections and investigate outbreaks (53).

Variations in recorded prevalence rates across species may be attributed to factors such as husbandry practices, interspecies contact, water sources, age, sex, and seasonal influences (11, 54, 55). These findings emphasize the necessity of improved surveillance, enhanced diagnostic capabilities, and more effective control measures. Strengthening laboratory capacities and implementing comprehensive disease control programs are essential to mitigating the impact of brucellosis on both animal and public health in Algeria.

Conclusion

This *meta-analysis* is, to the best of our knowledge, the first comprehensive review of brucellosis studies in animals in Algeria. By consolidating data from multiple studies, it offers a clearer understanding of the prevalence, transmission pathways, and risk factors associated with the disease across different livestock species. These findings provide valuable insights that can enhance the management and surveillance of brucellosis control programs, aiding in the development of more effective prevention and eradication strategies. Improved disease monitoring and targeted interventions could lead to a significant reduction in infection rates, thereby minimizing reproductive losses in livestock, mitigating economic burdens on farmers, and ultimately strengthening animal health and food security in Algeria.

Ethical Approval

Not Applicable.

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Not applicable.

Conflict of Interests

The authors declare no competing interests.

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