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SEROLOGICAL INVESTIGATION OF SCHMALLENBERG VIRUS IN CATTLE IN MOSUL CITY, IRAQ

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ABSTRACT

Schmallenberg virus (SBV) is a new Orthobunyavirus that infects animals and results in pregnancy loss, congenital deformity, and decline milk supply. The serological research for evidence of SBV was highly beneficial for management and early warning. Thus, the study aimed to determine SBV antibodies in the sera of cows and buffaloes with a history of reproductive issues, to determine the relationship between the percentage of infection and certain risk factors, and to find out the severity of infection. Between March 2023 and February 2024, the study was carried out in a number of districts in Nineveh governorate. Ninety-two blood samples from cows and buffaloes older than two years were collected. Schmallenberg virus antibodies were detected using the commercial ELISA kit. At a significance level of $P \leq 0.05$, the chi-square test was applied. Overall, the percentages of SBV antibodies in cows and buffaloes were 74.07% and 63.15%, respectively, with no significant differences between the districts included in the investigation. The results also showed that the highest percentages were found in cows (84.61%) and buffaloes (77.77%) that were three years of age or less. These percentages vary significantly, with those older than four years. Spring had the highest percentage of SBV antibodies (87.09%), and it differed significantly from summer (52.63%) and winter (47.05%). Serologically, the most prevalent infection type was severe (46.73%), which differed significantly from moderate (15.21%) and mild (7.6%). In conclusion, there is a high and widespread level of serological evidence of SBV in the studied areas.

***Keywords**:* Nineveh Governorate, cELISA, Buffaloes, Cows

Highlights

1. The serological evidence of Schmallenberg virus was highly prevalent in cows and buffaloes in Nineveh Governorate.
2. The percentage of Schmallenberg virus antibodies in cows and buffaloes varied significantly and noticeably with age and season of sampling.
3. Compared to animals with moderate or mild infection, most of the investigated animals had severe infection.

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INTRODUCTION

The first detection of SBV occurred in Germany in November 2011 in blood samples taken from cattle showing acute clinical signs, such as decreased milk supply, elevated temperature, and diarrhea (Hoffmann *et al*., 2012). The virus belongs to the Simbu serogroup and is a negative-sense single-stranded RNA that shares genetic similarities with the Aino, Akabane, and Shamonda viruses (Pawaiya and Gupta, 2013). SBV is an arbovirus, which means that hematophagous insect vectors, particularly Culicoides spp, are the primary mode of transmission (Carpenter *et al*., 2009; Carpenter *et al*., 2013). Transmission of virus through the placenta may also occur in ruminants during the early stages of pregnancy, and result in teratogenic consequences. In addition, several studies have confirmed the presence of schmallenberg virus in cattle semen (Laloy *et al*., 2017). Following the initial outbreak in Germany and Netherlands, the SBV rapidly spread throughout ruminant populations, with numerous reports of clinical symptoms and serological directories of the disease in various countries around the world, including Iraq (Beer *et al*., 2013; Tonbak *et al*., 2016; Zhai *et al*., 2017; Taha and Alhankawe, 2022). SBV infection in mature cattle is evident by clinical symptoms such as fever, diarrhea, lack of appetite and decreased milk production. It has also been shown that infection during a crucial stage of pregnancy will affect the neuro-musculoskeletal systems of the fetus, leading to neonatal malformations, which are happening between days 47 and 162 of gestation (Hoffmann *et al*., 2012; Wernike *et al*., 2014). Consequently, SBV causes pecuniary losses and negatively impacts the cattle industry due to its potential to cause embryo distortionist, retained placenta, endometritis, abortion, and stillbirths (Lievaart-Peterson *et al*., 2015; Laloy *et al*., 2017). Diagnostic technologies have been developed for detecting SBV infection, and they posted speedily in afflicted areas. Viral genome analysis and antibody detection are approaches relied upon to diagnose SBV (Humphries and Burr, 2012; Gerhauser *et al*., 2014). Several tests are used for virus diagnosis, including reverse transcriptase-polymerase chain reaction, virus neutralization test (VNT), ELISA, and fluorescent-immunoassay test (Garigliany *et al*., 2012; Tarlinton *et al*., 2012). RT-PCR for viral RNA has been shown to be the most accurate in confirming acute SBV infection. However, the short duration of viremia (4-6 days) and the non-specific symptoms associated with SBV infection in mature animals propose that detection of SBV specific antibodies may be a more accurate diagnostic test than detection of the virus itself (De Regge *et al*., 2013). The virus neutralization test has high sensitivity and specificity. Moreover, it is not possible to be automated and takes a long time. In addition, indirect immunofluorescent assays may be done using plates that contain antigen matrix made of BHK-21 cells infected with SBV. However, this may not be the main perfect method for detecting antibodies of SBV (Loeffen *et al*., 2012; Breard *et al*., 2013). So that, it was essential to use a diagnostic test that would permit serological testing of multiple samples for detection of the existence of SBV in affected regions (Van der Poel *et al*., 2014). A recombinant SBV nucleoprotein antigen served as the basis for the development of the competitive enzyme-linked immunosorbent test, which now offers a rapid, cost-effective method for serological diagnosis, is more sensitive and specific and can test for a greater number of samples at once (Breard *et al*., 2013). Although clinical cases involving the genital system are common in the Nineveh region, there is limited concrete evidence that cattle are infected with SBV. Therefore, this study was conducted to determine SBV antibodies in the sera of cows and buffaloes with a history of reproductive disorders, to determine the relationship between the percentage of infection and certain risk factors, such as

district, age, and sampling season, and to find out the severity of infection.

MATERIAL AND METHODS

1 Ethical approval

In March 2023, the sera collecting method was authorized by approval issue number UM.VET.2023.090.

2. Study time, districts and blood sampling

Between March 2023 and February 2024, the study was carried out in a number of districts in Nineveh governorate, which are listed in Table (1). Ninety-two blood samples were obtained from cows (54) and buffaloes (38), older than two years, from various farms. Five milliliters of blood were drawn, and the sera were then placed in a two-milliliter tube and stored at -20°C till testing.

3. Screening for Schmallenberg virus antibodies and infection severity

Schmallenberg virus antibodies were detected from cattle sera using commercial ELISA kit (ID vet, France), following the procedures outlined in the previous study (Taha and Alhankawe, 2023). According to the manufacturer's instructions, the S/P value of every sample was determined.

4. Classifying the disease severity according to the ELISA optical density (OD) data

The classification involved comparing the measured OD to predefined thresholds. The mean OD of negative controls plus two or three standard deviations was used to calculate a cut-off value, which was subsequently used to distinguish between positive and negative outcomes. Samples with OD values over this cut-off value were categorized as positive and placed into different severity groups. Mild cases have OD values that are 1.5–2 times higher than the cut-off, moderate cases have OD values that are 2-3 times higher, and severe cases have OD values that are much higher (more than 3–5 times the cut-off).

5. Analytical statistic

The frequencies of competitive ELISA findings were compared using the chi-square test. The significance threshold ($P \leq 0.05$) was employed with the SPSS V25 program (Petrie and Watson, 2006).

Table 1: Number of blood samples collected from different districts in the Nineveh governorate

No.	region	Number of blood samples		Total
		Cows	Buffaloe	
1	Mosul	10	5	15
2	Ba'ashiqah	8	3	11
3	Badoush	6	7	13
4	AL-Shoura	5	2	7
5	TelKaif	6	6	12
6	Wanna	7	3	10
7	Al-Hamdaniya	5	5	10
8	Nimrud	3	4	7
9	Bartella	4	3	7
	Total	54	38	92

RESULTS

1. The SBV antibody percentages according to district

Percentages of SBV antibodies in cows and buffaloes do not differ significantly, according to the districts. In cows, the overall SBV antibodies percentage was 74.07%. The Badoush and TelKaif districts had the highest percentage (83.33%). Whereas, Wanna had the lowest percentage (57.14%), and the remaining districts fell between these two percentages. The overall percentage of SBV antibodies in buffaloes was 63.15% and varied between 33.33% and 85.71% in the districts under investigation. Badoush recorded the highest percentage (85.71%), while Ba'ashiqah and Bartella recorded the lowest percentage (33.33%) (Table 2).

Table 2: District's percentage of SBV antibodies

No.	District	Cows		Buffaloes	
		Number of positive	*Percentage %	Number of positive	*Percentage %
1	Mosul	8/10	80	3/5	60
2	Ba'ashiqah	6/8	75	1/3	33.33
3	Badoush	5/6	83.33	6/7	85.71
4	AL-Shoura	3/5	60	1/2	50
5	TelKaif	5/6	83.33	4/6	66.66
6	Wanna	4/7	57.14	2/3	66.66
7	Al-Hamdaniya	4/5	80	3/5	60
8	Nimrud	2/3	66.66	3/4	75
9	Bartella	3/4	75	1/3	33.33
	Total	40/54	74.07	24/38	63.15

* The SBV antibody percentages do not differ significantly, according to the district

2. The SBV antibodies percentages according to age

The findings demonstrated that the percentage of SBV antibodies in two age groups for both species varies significantly (P≤0.05). In the age range of equal or less than three years, the highest percentages were seen in both cows (84.61%) and buffaloes (77.77%). It differs significantly, with the lowest percentages occurring in cows and buffaloes older than four years, at 46.66% and 27.27%, respectively (Table 3).

Table 3: Percentages of SBV antibodies according to age.

Species	Age	Total number examined	Number of positive	Percentage (%)
Cows	≤ 3 years	39	33	84.61**a**
	>4 years	15	7	46.66**b**
Buffaloes	≤ 3 years	27	21	77.77**c**
	>4 years	11	3	27.27**d**

Vertical difference between letters (a, b, c, d) indicating significant difference at P≤ 0.05.

3 The SBV antibody percentages according to season of sampling

The percentage was highest in the spring (87.09%; 27 out of 31), and it differed significantly (P≤0.05) from summer (52.63%) and winter (47.05%). There was also a significant difference between autumn (76%) and winter (47.05%) at P≤0.05. Whereas, spring and autumn, summer and winter, and summer and autumn did not vary significantly (P≤0.05) (Figure 1).

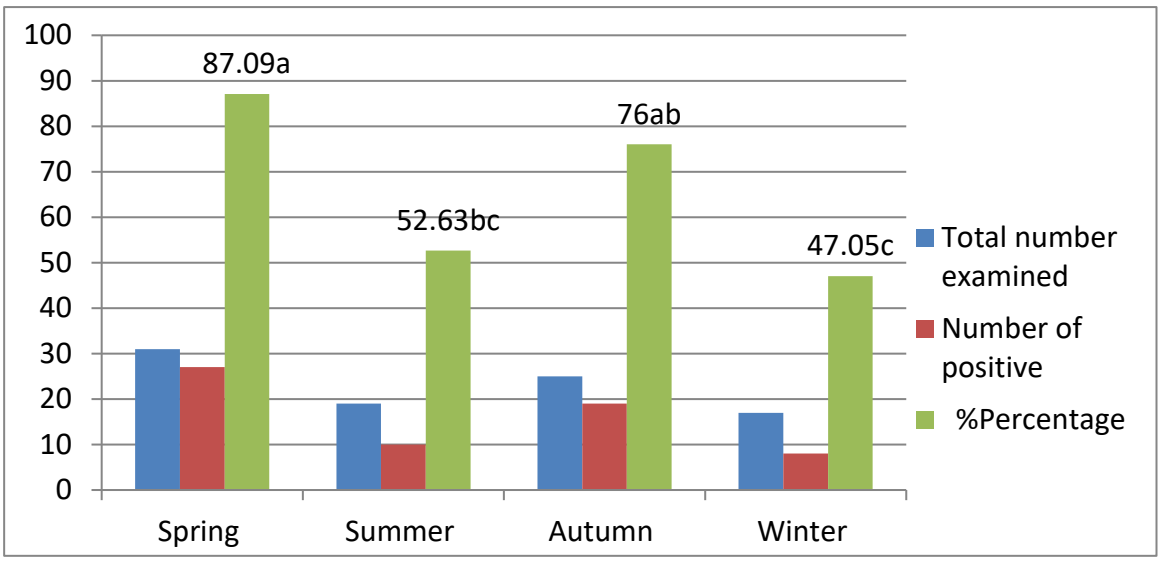

Figure 1: Percentages of SBV antibodies according to season of sampling. Difference between letters significant at P≤ 0.05.

3.4 The SBV antibody percentages according to infection severity

The findings indicated 43 out of the 92 examined samples had a severe Schmallenberg virus infection (46.73%), which was significantly (P≤0.05) higher than moderate (15.21%) and mild (7.6%) infections. Nevertheless, there were no significant variations between moderate (15.21%) and mild (7.6%) infections. (Figure 2).

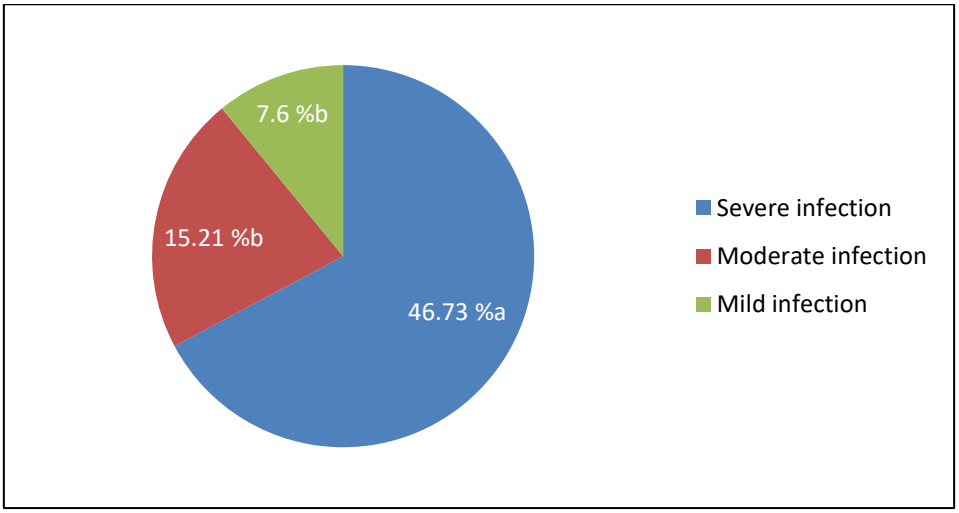

Figure 2: The SBV antibody percentages according to infection severity. Difference between letters significant at P≤ 0.05.

DISCUSSION

The results of this investigation provide the first indication of SBV disease in cows and buffaloes in Nineveh province. Since there is no vaccine present against SBV in the entire country, the finding of seropositive animals among the cattle under test indicates the animals were exposed to the virus. Overall, cows and buffaloes had SBV antibody percentages of 74.07% and 63.15%, respectively, with no significant differences in percentages throughout the study's involved districts. These percentages were seen to be quite high, in comparison to other previous findings from our country. Al-Baroudi (2021) reported that 21% of imported calves carried antibodies to the Schmallenberg virus. Moreover, Naji *et al.* (2021) found 47.7%

of buffaloes in Basrah were infected with virus using cELISA. The results of this study are consistent with the results of former research conducted in other regions of the world, and the percentages were seen to be rather high. A study by sibhat *et al*. (2018) using cELISA showed that 56.6% of cattle in Ethiopia were infected with the virus. Additionally, a study in Mozambique indicated 90% of cattle were infected with SBV, employing cELISA to detect the viral antibodies in bovine serum (Blomstrom *et al*., 2014). There are several factors responsible for the variation in disease spread across regions and countries, including the animal's origin, disease history in each nation, quarantine laws, variations in farm management techniques, and the existence of arthropods (Pawaiya and Gupta, 2013; Al-Baroodi *et al*., 2022). Moreover, lack of effective mosquito control programs in Iraq may lead to an increase in the seroprevalence proportion. It is also possible that the high levels of SBV antibodies in local Iraqi cows and buffaloes compared to cattle in other nations, such as Turkey and China, are the consequence of sampling techniques, or that animal movement is a major source of SBV infection (Schulz *et al*., 2014; Tonbak *et al*., 2016). The results also showed a significant variation in the percentages between cows and buffaloes with age, three-year-olds and younger animals had the highest percentages. On the other hand, the lowest percentages were seen in animals older than four years. This finding was at odds with Armin *et al*. (2012), who found there were no obvious age differences, indicating that the SBV is emerging from other regions. Whereas this finding is consistent with the findings of Meroc *et al*. (2013), who found that calves older than two years had a greater seroprevalence and proposed a link to the highest level of insect bite exposure in this group. The findings showed that the winter had the lowest percentage of SBV antibodies, while the spring had the highest. Also, the majority of the animals under examination had severe infections. The environment was more suited to the transmission of vector-borne illnesses when temperatures increased, as opposed to fall. Moreover, the virus can spread during the winter months when there are fewer midges, but to a lesser degree (Rasmussen *et al*., 2012; Dominguez *et al*., 2014; Bessell *et al*., 2014; Haider *et al*., 2018).

CONCLUSION

In Nineveh province, cows and buffaloes have significant levels of SBV antibodies. It was extensively distributed over the studied areas. Age and sample season had a significant impact on the percentages, with the majority of the animals under examination having severe infections.

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

REFERENCES

Al-Baroodi, S.Y. (2021): Seroprevelance of schmallenberg virus infection as emerging disease in cattle in Iraq. *Iraqi Journal of Veterinary Sciences* 35(3), 495-499. https://doi.org/10.33899/ijvs.2020.127071.1454.

Al-Baroodi, S.Y.; Mossa, D.A. and Al-Attar, M.Y. (2022): Detection of Maedi-visna virus in sheep in Nineveh province. *Iraqi Journal of Veterinary Sciences* 36(1), 61-64. https://doi.org/10.33899/ijvs.2021.129075.1622.

Armin, R.W.; Elbers, W.A.; Loeffen, S.Q.; Els de Boer, L.; Arco, N.; Spek, R.B.; Riks, M.; Marcel, A.H.; Spierenburg, E.P.; De Kluijver, A.; Gerdien van,

S. and Wim, H.M. (2012): Seroprevalence of Schmallenberg Virus Antibodies among Dairy Cattle, the Netherlands, Winter 2011-2012. *Emerging Infectious Diseases* 18(7):1065-1071. https://doi.org/10.3201/eid1807.120323.

Beer, M.; Conraths, F.J. and Van Der Poel, W.H. (2013): 'Schmallenberg virus' – a novel orthobunyavirus emerging in Europe. *Epidemiology and Infection* 141, 1–8. https://doi.org/10.1017/S0950268812002245.

Bessell, P.R.; Auty, H.K.; Searle, K.R.; Handel, I.G.; Purse, B.V. and Bronsvoort, B.M. (2014): Impact of temperature, feeding preference and vaccination on schmallenberg virus transmission in Scotland. *Scientific Reports* 4:5746. https://doi.org/10.1038/srep05746.

Blomstrom, A.L.; Stenberg, H.; Scharin, I.; Figueiredo, J.; Nhambirre, A.P.; Abilio, J.; Fafetine, J. and Berg, M. (2014): Serological screening suggests presence of schmallenberg virus in cattle, sheep and goat in the Zambezi province, Mozambiqu. *Transboundary and Emerging Diseases* 61:289-292. https://doi.org/10.1111/tbed.12234.

Breard, E.; Lara, E.; Comtet, L.; Viarouge, C.; Doceul, V.; Desprat, A.; Vitour, D.; Pozzi, N.; Cay, A.B.; De Regge, N.; Pourquier, P.; Schirrmeier, H.; Hoffmann, B.; Beer, M.; Sailleau, C. and Zientara, S. (2013): Validation of a commercially available indirect elisa using a nucleocapside recom-binant protein for detection of Schmallenberg virus antibodies. *PLoS ONE* 8 e53446. https://doi.org/10.1371/journal.pone.0053446.

Carpenter, S.; Groschup, M.H.; Garros, C.; Felippe-Bauer, M.L. and Purse, B.V. (2013): Culicoides biting midges, arboviruses and public health in Europe. *Antiviral Research* 100:102–13. https://doi.org/10.1016/j.antiviral.2013.07.020.

Carpenter, S.; Wilson, A. and Mellor, P.S. (2009): Culicoides and the emergence of bluetongue virus in northern Europe. *Trends in Microbiology* 17:172–8. https://doi.org/10.1016/j.tim.2009.01.001.

De Regge, N.; Van Den Berg, T.; Georges, L. and Cay, B. (2013): Diagnosis of Schmallenberg virus infection in malformed lambs and calves and first indications for virus clearance in the fetus. *Veterinary Microbiology* 162, 595–600. https://doi.org/10.1016/j.vetmic.2012.11.029.

Dominguez, M.; Kristel, G.; Anne, T.R.; Jean-Baptiste, P.; Alexandre, F.; Eric, C.; Emmanuel, B.; Corinne, S.; Cyril, V.; Gina, Z.; Stephan, Zi.; Pascal, H. and Didier, C. (2014): Spread and impact of the Schmallenberg virus epidemic in France in 2012-2013. *BMC Veterinary Research* 10 (248):1-10. https://doi.org/10.1186/s12917-014-0248-x.

Garigliany, M.M.; Bayrou, C.; Kleijnen, D.; Cassart, D. and Desmecht, D. (2012): Schmallenberg virus in domestic cattle, Belgium, 2012. *Emerging Infectious Diseases* 18, 1512–1514. https://doi.org/10.3201/eid1809.120716.

Gerhauser, I.; Weigand, M.; Hahn, K.; Herder, V.; Wohlsein, P.; Habierski, A.; Varela, M.; Palmarini, M. and Baumgartner, W. (2014): Lack of schmallenberg virus in ruminant brain tissues archived from 1961 to 2010 in Germany. *Journal of Comparative Pathology* 150:151–154. https://doi.org/10.1016/j.jcpa.2013.11.210.

Haider, N.; Ana, C.; Lene, J.; Jens, H. and Rene, B. (2018): Microclimatic temperatures at Danish cattle farms,

2000-2016: quantifying the temporal and spatial variation in the transmission potential of schmallenberg virus. *Parasites & Vectors* 11:128. https://doi.org/10.1186/s13071-018-2709-8.

Hoffmann, B.; Scheuch, M.; Höper, D.; Jungblut, R.; Holsteg, M. and Schirrmeier, H. (2012): Novel orthobunyavirus in cattle, Europe, 2011. *Emerging Infectious Diseases* 18: 469–472. https://doi.org/10.3201/eid1803.111905.

Humphries, D. and Burr, P. (2012): Schmallenberg virus milk antibody ELISA. *Veterinary Record* 171: 511–512. https://doi.org/10.1136/vr.e7739.

Laloy, E.; Breard, E. and Trapp, S. (2017): Fetopathic effects of experimental Schmallenberg virus infection in pregnant goats. *Veterinary Microbiology* 211: 141–149. https://doi.org/10.1016/j.vetmic.2017.10.011.

Lievaart-Peterson, K.; Luttikholt., S.; Van Den Peperkamp, K. and Vellema, P. (2015): Schmallenberg disease in sheep or goats: past, present and future. *Veterinary Microbiology* 181:147–53. https://doi.org/10.1016/j.vetmic.2015.08.005.

Loeffen, W.; Quak, S.; De Boer-Luijtze, E.; Hulst, M.; Van Der Poel, W.; Bouwstra, R. and Maas, R. (2012): Development of a virus neutralisation test to detect antibodies against Schmallenberg virus and serological results in suspect and infected herds. *Acta Veterinaria Scandinavica* 54: 44. https://doi.org/10.1186/1751-0147-54-44.

Méroc, E.; Poskin, A.; Van Loo, H.; Quinet, C.; Van Driessche, E.; Delooz, L.; Behaeghel, I., Riocreux, F.; Hooyberghs, J.; De Regge, N.; Caij, A.B.; Van Den Berg, T. and Van Den Stede, Y. (2013): Large–scale cross–sectional serological survey of Schmallenberg virus in Belgian cattle at the end of the first vector season. *Transboundary and Emerging Diseases* 60, 4–8. https://doi.org/10.1111/tbed.12042.

Naji, H.A.; Saud, Z.A.H.; Saleh, W.M.M. and Alsaad, I.A.W. (2021): Seroprevalence of Schmallenberg virus antibodies in buffalo from north Basra governorate-Iraq. *Veterinary Practitioner* 22(2): 14-17. Available from https://www.researchgate.net/publication/356972595.

Pawaiya, R.S. and Gupta, V.K. (2013): A review on schmallenberg virus infection a newly emerging disease of cattle, sheep and goats. *Veterinarni Medicina* 58(10):516-526. https://doi.org/10.17221/7083-VETMED.

Petrie, A. and Watson, P. (2006): Statistics for Veterinary and Animal Science 3E (3rd ed.). Wiley-Blackwell.

Rasmussen, L.D.; Kristensen, B.; Kirkeby, C.; Rasmussen, T.B.; Belsham, GJ.; Bodker, R. and Botner, A. (2012): Culicoids as vectors of schmallenberg virus. *Emerging Infectious Diseases* 18(7): 1204-1206. https://doi.org/10.3201/eid1807.120385.

Schulz, C.; Wernike, K.; Beer, M. and Hoffmann, B. (2014): Infectious Schmallenberg virus from bovine semen, Germany. *Emerging Infectious Diseases* 20(2): 338. https://doi.org/10.3201/eid2002.131436.

Sibhat, B.; Ayelet, G.; Gebremedhin, EZ.; Skjerve, E. and Asmare, K. (2018): Seroprevalence of schmallenberg virus in dairy cattle in Ethiopia. *Acta Tropica* 178:61-67. https://doi.org/10.1016/j.actatropica.2017.10.024.

Taha, F.Y. and Alhankawe, O.K. (2022): Serodiagnosis of schmallenberg virus infection in sheep in Nineveh governorate, Iraq. *Iraqi Journal of Veterinary Sciences* 36: Supplement I: 235-239. https://doi.org/10.33899/ijvs.2022.136029.2557.

Taha, F.Y. and Alhankawe, O.K. (2023): Molecular evidence of schmallenberg virus associated by ovine abortion with fetal anomalies in Nineveh province, Iraq. *Iraqi Journal of Veterinary Sciences* 37(1), 115-120. https://doi.org/10.33899/ijvs.2022.133665.2276.

Tarlinton, R.; Daly, J.; Dunham, S. and Kydd, J. (2012): The challenge of Schmallenberg virus emergence in Europe. *Veterinary Journal* 194, 10–18. https://doi.org/10.1016/j.tvjl.2012.08.017.

Tonbak, S.; Azkur, A.K.; Pestil, Z.; Biyikli, E.; Abayli, H.; Baydar, E. and Bulut, H. (2016): Circulation of Schmallenberg virus in Turkey, 2013. *Turkish Journal of Veterinary & Animal Sciences* 40(2): 175-180. https://doi.org/10.3906/vet-1507-3.

Van der Poel, W.H.; Cay, B.; Zientara, S.; Steinbach, F.; Valarcher, J.F.; Botner, A.; Mars, M.H.; Hakze-van der Honing, R.; Schirrmeier, H. and Beer, M. (2014): Limited interlaboratory comparison of Schmallenberg virus antibody detection in serum samples. *Veterinary Record* 174: 380. https://doi.org/10.1136/vr.102180.

Wernike, K.; Jöst, H.; Becker, N.; Schmidt-Chanasit, J. and Beer, M. (2014): Lack of evidence for the presence of Schmallenberg virus in mosquitoes in Germany, 2011. *Parasites & Vectors* 7, 402. https://doi.org/10.1186/1756-3305-7-402.

Zhai, SL.; Lv, DH.; Wen, XH.; Zhu, XL.; Yang, YQ.; Chen, QL. and Wei, WK. (2018): Preliminary serological evidence for Schmallenberg virus infection in China. *Tropical Animal Health & Production* 50:449-453. http://doi.org/10.1007/s11250-017-1433-2.

التحري المصلي عن فيروس شمالنبرغ في الأبقار في مدينة الموصل ، العراق

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فيروس شمالنبرغ من فيروسات أورثوبونيا الحديثة الذي يصيب الحيوانات مؤدياً إلى فقدان الحمل والتشوهات الخلقية وإنخفاض إنتاج الحليب. البحث المصلي عن تواجد الفيروس ذو فائدة كبيرة كإنذار عن خطرهِ ولإتخاذ التدابير اللازمة. بالتالي، هدفت الدراسة إلى التحري عن تواجد الأجسام المضادة لفيروس شمالنبرغ في مصول الأبقار والجاموس التي لديها تاريخ من الإضطرابات التناسلية، لتحديد العلاقة بين نسبة الإصابة وبعض عوامل الخطورة، ومعرفة شدة الإصابة. بين أذار ٢٠٢٣ وشباط ٢٠٢٤، شملت الدراسة عدد من المناطق في محافظة نينوى. تم جمع إثنان وتسعون عينة دم من الأبقار والجاموس التي يزيد عمرها عن عامين. تم الكشف عن وجود الأجسام المضادة لفيروس شمالنبرغ بإستخدام عدَة إختبار الإليزا التجارية. إحصائيا, تم إستخدام إختبار مربع كاي عند مستوى دلالة $P\leq0.05$. كانت نسب تواجد الأجسام المضادة الكلية لفيروس شمالنبرغ في الأبقار والجاموس هي ٧٤,٠٧٪ و٦٣,١٥٪ على التوالي، مع عدم وجود فروق ذات دلالة إحصائية بين المناطق المشمولة في التحري. أظهرت النتائج أيضًا أن أعلى نسبة لوحظت في الأبقار (٨٤,٦١٪) والجاموس (٧٧,٧٧٪) التي كانت أعمارهم ثلاث سنوات أو أقل, مع وجود فروق ذات دلالة إحصائية مع التي تزيد أعمارهم عن أربع سنوات. أظهر فصل الربيع أعلى نسبة لتواجد الأجسام المضادة لفيروس شمالنبرغ (٨٧,٠٩٪)، مع وجود فروق ذات دلالة إحصائية مع التي سُجلت في الصيف (٥٢,٦٣٪) والشتاء (٤٧,٠٥٪). مصلياً, كانت الإصابة من النوع الشديد أكثر إنتشاراً (٤٦,٧٣٪) والتي أختلفت إحصائياً مع النوع المتوسط (١٥,٢١٪) والخفيف (٧,٦٪). يُستنتج بأن هناك مستوى مرتفع ومنتشر من الأدلة المصلية لفيروس شمالنبرغ في المناطق المدروسة.

الكلمات المفتاحية: محافظة نينوى, الإليزا التنافسي, الجاموس, الأبقار