

IDEXX SNAP 4Dx Plus Test provides sensitive and specific detection of heartworm and tick-borne diseases



Significant performance differences between the Abaxis VetScan FLEX4 Rapid Test and the IDEXX SNAP 4Dx Plus Test could have clinically relevant consequences

Introduction

Since 2001, IDEXX has been a world leader in tick-borne disease testing by offering generations of high-quality, multiplexed diagnostic products (SNAP® 3Dx® Test, SNAP® 4Dx® Test, and SNAP® 4Dx® Plus Test). The latest version, the SNAP 4Dx Plus Test, detects, in addition to heartworm antigen, antibodies to five pathogens, which include *A. phagocytophilum*, *A. platys*, *B. burgdorferi* (Lyme), *E. canis*, and *E. ewingii*. Its accurate performance has been documented in large-population studies around the globe.¹⁻³

Recently, Abaxis introduced the VetScan® FLEX4 Rapid Test with product claims similar to the SNAP 4Dx Plus Test. IDEXX conducted a study to compare the performance of this new test with the SNAP 4Dx Plus Test for the detection of heartworm and tick-borne diseases, using a scientifically rigorous methodology in a broad population of field samples.



SNAP 4Dx Plus Test



VetScan FLEX4 Rapid Test

Study design

Canine samples were sourced from worldwide commercial reference laboratories (IDEXX Reference Laboratories) and veterinary clinics. They were positive by reference methods (see table 1) that included immunofluorescence assay (IFA), Western blot, PetChek® Heartworm PF Antigen Test (ELISA), and necropsy. These samples were further characterized based on geographic distribution of tick-borne diseases and species-specific ELISA.^{4,5} Species-specific ELISA was necessary, particularly to differentiate *Ehrlichia* species that overlap in geographic distributions. To further enhance monospecific identification of *E. canis* samples, clinical submissions were used from dogs in Germany and southern Europe where *E. ewingii* and its competent tick vectors have not been reported.

Disease	# Samples	Reference method	Further characterization method
Heartworm	105	Positive = Necropsy Negative = PetChek Heartworm PF Antigen Test	N/A
Lyme	105	Western blot	N/A
<i>Anaplasma spp.</i>	275	IFA, ELISA	Geography, species-specific ELISA
<i>Ehrlichia spp.</i>	359	IFA, ELISA	Species-specific ELISA

Table 1. Sample set and reference methods.

Samples were tested, in a blinded and randomized manner, on the VetScan FLEX4 Rapid Test and the SNAP 4Dx Plus Test following manufacturers' instructions. The test results were compared to reference method results for calculation of sensitivity and specificity.

Conclusion

For all vector-borne infections evaluated in this study, the IDEXX SNAP® 4Dx® Plus Test was meaningfully more accurate than the Abaxis VetScan® FLEX4 Rapid Test.

Because the consequences of missing a heartworm infection are substantial, of particular note is the relatively low sensitivity of 88.2% on heartworm for the VetScan FLEX4 Rapid Test (see figure 1).

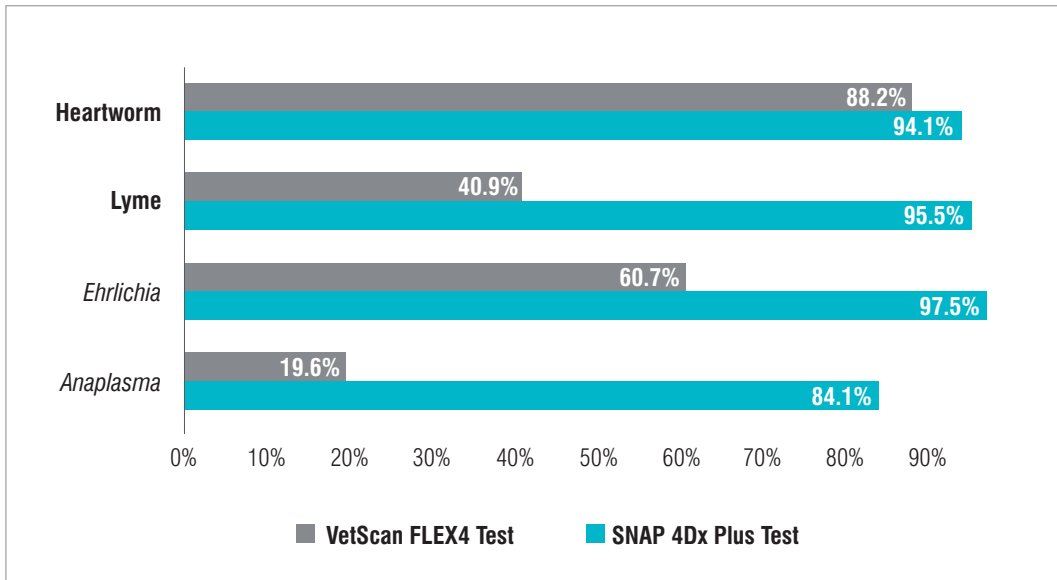


Figure 1. Sensitivity vs. gold-standard reference methods.

This study revealed the sensitivity limitations of the VetScan FLEX4 Rapid Test and showed its performance to be similar to or worse than that of Abaxis VetScan® single-strip tests as documented in peer-reviewed studies.^{6,7} Specificities were similar between the VetScan FLEX4 Rapid Test and the IDEXX SNAP 4Dx Plus Test, ranging 98%–100%.

References

1. Stillman BA, Monn M, Liu J, et al. Performance of a commercially available in-clinic ELISA for detection of antibodies against *Anaplasma phagocytophilum*, *Anaplasma platys*, *Borrelia burgdorferi*, *Ehrlichia canis*, and *Ehrlichia ewingii* and *Dirofilaria immitis* antigen in dogs. *J Am Vet Med Assoc.* 2014;245(1):80–86.
2. Little SE, Beall MJ, Bowman DD, Chandrashekar R, Stamaris J. Canine infection with *Dirofilaria immitis*, *Borrelia burgdorferi*, *Anaplasma* spp., and *Ehrlichia* spp. in the United States, 2010–2012. *Parasit Vectors.* 2014;7:257.
3. Miró G, Montoya A, Roura X, Gálvez R, Sainz A. Seropositivity rates for agents of canine vector-borne diseases in Spain: a multicentre study. *Parasit Vectors.* 2013;6(1):117.
4. O' Connor T, Saucier JM, Daniluk D, et al. Evaluation of peptide- and recombinant protein-based assays for detection of anti-*Ehrlichia ewingii* antibodies in experimentally and naturally infected dogs. *Am J Vet Res.* 2010;71(10):1195–1200.
5. Qurollo BA, Chandrashekar R, Hegarty BC, et al. A serological survey of tick-borne pathogens in dogs in North America and the Caribbean as assessed by *Anaplasma phagocytophilum*, *A. platys*, *Ehrlichia canis*, *E. chaffeensis*, *E. ewingii*, and *Borrelia burgdorferi* species-specific peptides. *Infect Ecol Epidemiol.* 2014;4(1):24699. doi: 10.3402/iee.v4.24699
6. Liu J, Eberts M, Bewsey H, O'Connor TP, Chandrashekar R, Breitschwerdt EB. Sensitivity and specificity levels of two rapid assays for antibodies to *Anaplasma* spp. in dogs. *J Vet Diagn Invest.* 2018;30(2):290–293.
7. Bewsey H, Thatcher B, Liu J, Beall M, O'Connor T, Chandrashekar R, Breitschwerdt E. Comparative evaluation of in-clinic tests for antibodies to *Anaplasma* and *Ehrlichia* species in dogs [poster 34]. Poster presented at: 58th AAVLD/19th USAHA Annual Meeting; October 22–28, 2015; Providence, RI. www.aavld.org/assets/2015_AnnualMeeting/Proceedingbook/proceedings%20book%20final%20with%20covers.pdf. Accessed April 13, 2018.