Comparative evaluation of Vcheck M Canine Diarrhea 8 with Real-time and Conventional PCR

Key Words : Vcheck M, Canine Infectious Diarrhea, Real-time PCR, Conventional PCR

Introduction

Diarrhea is one of the most common causes of veterinary consultation. In a cross-sectional study of vet-visiting dogs, 28.6% either presented with diarrhea or had experienced diarrhea within the previous month [1]. There are various causes of diarrhea and initial evaluations of diarrhea focus on diagnosing dietary, parasitic, and infectious causes [2]. Infectious diarrhea, which can stem from bacteria, viruses, protozoa, or a combination thereof, requires specific pathogen identification for accurate diagnosis. This step is crucial as it informs prognosis and guides treatment and preventive measures [3].

Molecular tools have revolutionized the identification and diagnosis of infectious diseases, supplementing traditional methods such as fecal smear or culture techniques. Previously, samples necessitating PCR testing were typically sent to external laboratories, where pathogens were sometimes identified individually. However, with advancements like the Vcheck M Canine Diarrhea 8, veterinary clinics can now conduct comprehensive testing on-site. This analyzer allows simultaneous detection of up to 8 different pathogens, significantly enhancing diagnostic efficiency within the clinic setting.

Purpose

The objective of this study was to evaluate the diagnostic sensitivity and specificity of the newly developed Vcheck M Canine Diarrhea 8 Panel (POCT PCR kit) to laboratory based real-time PCR or conventional PCR as a comparative test.

Materials and Methods

A total of 106 canine fecal samples were evaluated (91 randomly selected samples and 15 from dogs showing clinical symptoms of diarrhea).

Tests were carried out by 'A' Laboratory and 'B' Laboratory using the Vcheck M system. In the comparative analysis, 'A' Laboratory utilized their in-house real-time PCR method while 'B' Laboratory used commercially available conventional PCR kits or in-house conventional PCR with primers listed in guidelines from the Korea Animal and Plant Quarantine Agency. Discrepancies in results were verified through confirmation tests using third-party reagents and sequencing methods.

Sample Information		Equipment Used		
Evaluation site	Sample size	Vcheck M	Reference method	
			Comparative test	Confirmation test
'A' Laboratory (Korea)	91	Canine Diarrhea 8 panel	Real-time PCR	Third-party reagents and sequencing (for discrepant result)
'B' Laboratory (Korea)	15		Conventional PCR	

Results

The study identified concordance in 84 canine fecal samples. However, discrepancies between Vcheck M and the comparative test were observed in 22 samples. To validate these inconsistencies, supplementary confirmation tests utilizing third-party reagents and sequencing methods were undertaken. These tests confirmed the accuracy of Vcheck M results in all but one sample.

Detailed comparisons of Vcheck M with reference method are described in Tables 1 and 2.

Conclusion

Based on these findings, it was confirmed that the Vcheck M Canine Diarrhea 8 Panel excels not only in convenience but also in clinical performance.

Reference:

1. Stavisky J, Pinchbeck GL, German AJ, Dawson S, Gaskell RM, Ryvar R, Radford AD. Prevalence of canine enteric coronavirus in a cross-sectional survey of dogs presenting at veterinary practices. *Vet Microbiol*. 2010 Jan 6;140(1-2):18-24.
2. Sherding RG, Johnson SE. Diseases of the Intestines. *Saunders Manual of Small Animal Practice*. 2006:702–38.
3. Gizzi AB, Oliveira ST, Leutenegger CM, Estrada M, Kozemjakin DA, Stedile R, Marcondes M, Biondo AW. Presence of infectious agents and co-infections in diarrheic dogs determined with a real-time polymerase chain reaction-based panel. *BMC Vet Res.* 2014 Jan 16;10:23.

Canine parvovirus 2		Reference method		
		Pos	Neg	Total
Vcheck M	Pos	19	0	19
	Neg	0	78	78
	Total	19	78	97
	Sensitivity	100% (19/19)		
	Specificity	100% (78/78)		

Canine coronavirus		Reference method		
		Pos	Neg	Total
Vcheck M	Pos	14	0	14
	Neg	0	80	80
	Total	14	80	94
	Sensitivity	100% (14/14)		
	Specificity	100% (80/80)		

Canine distempervirus		Reference method		
		Pos	Neg	Total
Vcheck M	Pos	0	0	0
	Neg	0	91	91
	Total	0	91	91
	Sensitivity	-		
	Specificity	100% (91/91)		

Salmonella spp.		Reference method		
		Pos	Neg	Total
Vcheck M	Pos	0	1	1
	Neg	0	91	91
	Total	0	92	92
	Sensitivity	-		
	Specificity	98.9% (91/92)		

Campylobacter spp.		Reference method		
		Pos	Neg	Total
Vcheck M	Pos	4	0	4
	Neg	0	87	87
	Total	4	87	91
	Sensitivity	100% (4/4)		
	Specificity	100% (87/87)		

Clostridium perfringens		Reference method		
		Pos	Neg	Total
Vcheck M	Pos	58	0	58
	Neg	0	39	39
	Total	58	39	97
	Sensitivity	100% (58/58)		
	Specificity	100% (39/39)		

Giardia lamblia		Reference method		
		Pos	Neg	Total
Vcheck M	Pos	3	0	3
	Neg	0	89	89
	Total	3	89	92
	Sensitivity	100% (3/3)		
	Specificity	100% (89/89)		

Cryptosporidium spp.		Reference method		
		Pos	Neg	Total
Vcheck M	Pos	1	0	1
	Neg	0	91	91
	Total	1	91	92
	Sensitivity	100% (1/1)		
	Specificity	100% (91/91)		

Table 1. Sensitivity and specificity of Vcheck M Canine Diarrhea 8 Panel compared with reference method for each pathogen

	Canine parvovirus 2	Canine coronavirus	Canine distempervirus	*Salmonella* spp.	*Campylobacter* spp.	*Clostridium perfringens*	*Giardia lamblia*	*Cryptosporidium* spp.
Sensitivity	100% (19/19)	100% (14/14)	-	-	100% (4/4)	100% (58/58)	100% (3/3)	100% (1/1)
Specificity	100% (78/78)	100% (80/80)	100% (91/91)	98.9% (91/92)	100% (87/87)	100% (39/39)	100% (89/89)	100% (91/91)

Table 2. Overall sensitivity and specificity of Vcheck M Canine Diarrhea 8 Panel compared with reference method