

## Searching for The Answer of Gluten Consumption: Is It A Bad Glue or Innocent Food Component for Dogs?

Kerem URAL<sup>1,a</sup> Serdar PAŞA<sup>1,b</sup> Hasan ERDOĞAN<sup>1,c</sup>

Songül ERDOĞAN<sup>1,d</sup> Tahir ÖZALP<sup>1,e</sup>

<sup>1</sup>Aydın Adnan Menderes University,  
Faculty of Veterinary, Department of  
Internal Medicine, Aydın, Turkey.

<sup>a</sup>ORCID: 0000-0003-1867-7143

<sup>b</sup>ORCID: 0000-0003-4957-9263

<sup>c</sup>ORCID: 0000-0001-5141-5108

<sup>d</sup>ORCID: 0000-0002-7833-5519

<sup>e</sup>ORCID: 0000-0002-9873-0364

**Sorumlu Yazar/Corresponding Author:**

[tozalp@adu.edu.tr](mailto:tozalp@adu.edu.tr)

**Başvuru/Submitted:** 2/10/2025

**1. Revizyon/ 1<sup>th</sup> Revised:** 2/12/2025

**Kabul/Accepted:** 3/12/2025

**Yayın/Online Published:** 24/12/2025

**Atf/Citation:** Ural, K., Pasa, S., Erdoğan, H., Erdoğan, S., & Özalp, T. (2025). Searching for The Answer of Gluten Consumption: Is It A Bad Glue or Innocent Food Component for Dogs?. Kafkasya Journal of Health Sciences, 2(2), 78-81.

Doi: [10.5281/zenodo.18000050](https://doi.org/10.5281/zenodo.18000050)

**Financial Disclosure:** This research received no grant from any funding agency/industry.

**Conflict of Interest:** The authors declared that there is no conflict of interest.

**Authorship Contributions:** Idea/ C onceptualization: KU, SP, HE, SE, TO, Supervision / Advising: KU, SP, HE, SE, TO, Literature Research and Review: KU, SP, HE, SE, TO, Analysis and/or Interpretation: KU, SP, HE, SE, TO, Writing-Original Draft: KU, SP, HE, SE, TO, Critical Review: KU, SP, HE, SE, TO.

### Abstract

Nobody knows it, or it has got a secret? Discussion has been thoroughly going on for gluten consumption, not solely for humans, but also for dogs. Although gluten sensitivity in dogs is considered a rare form of chronic enteropathy, it should be considered in the differential diagnosis due to its genetic predisposition and the association with neurological findings in certain breeds. Therefore, gluten sensitivity should be considered a clinical possibility in dogs presenting with unexplained chronic diarrhea, weight loss, abdominal pain, or neurological episodes. Recently developed anti-gliadin IgG, modified gliadin peptides, and transglutaminase-2 IgA measurements have emerged as biomarkers for gluten sensitivity in dogs. Furthermore, ultrasonographic findings such as mesenteric lymph node enlargement and intestinal wall thickening, similar to those described for celiac disease in humans, have been reported to be supportive diagnostic parameters in dogs. The purpose of this review is to bring together current knowledge in human medicine with veterinary literature, to raise clinicians' awareness of the potential clinical management of gluten sensitivity in dogs, and to offer an updated perspective on diagnostic methods and management strategies.

**Keywords:** Dogs, Enteropathy, Gluten-Free Diet, Gluten Sensitivity.

## Gluten Tüketiminin Cevabını Aramak: Köpekler İçin Kötü Bir Yapıştırıcı mı Yoksa Masum Bir Gıda Bileşeni mi?

### Öz

Kimse bilmiyor mu, yoksa gizli bir yönü mü var? Gluten tüketimine ilişkin tartışmalar, yalnızca insanlar için değil, köpekler için de uzun süredir yoğun bir şekilde devam etmektedir. Köpeklerde gluten duyarlılığı, nadir görülen bir kronik enteropati formu olarak kabul edilmekle birlikte, genetik yatkınlık ve belirli ırklarda nörolojik bulgularla ilişkisi nedeniyle ayırıcı tanıda mutlaka göz önünde bulundurulmalıdır. Bu nedenle, açıklanamayan kronik ishal, kilo kaybı, karın ağrısı veya nörolojik semptomlar gösteren köpeklerde gluten duyarlılığı klinik bir olasılık olarak değerlendirilmelidir. Son yıllarda geliştirilen anti-gliadin IgG, modifiye gliadin peptitleri ve transglutaminaz-2 IgA ölçümleri, köpeklerde gluten duyarlılığı için biyobelirteçler olarak öne çıkmıştır. Buna ek olarak, insanlardaki çölyak hastalığında tanımlanan bulgulara benzer şekilde, mezenterik lenf nodu büyümesi ve intestinal duvar kalınlaşması gibi ultrasonografik bulguların, köpeklerde destekleyici tanısal parametreler olduğu bildirilmiştir. Bu derlemenin amacı, insan tıbbındaki güncel bilgileri veteriner literatürüyle bir araya getirerek, klinisyenlerin köpeklerde gluten duyarlılığının olası klinik yönetimi konusundaki farkındalığını artırmak ve tanısal yöntemler ile yönetim stratejilerine ilişkin güncel bir bakış açısı sunmaktır.

**Anahtar Kelimeler:** Köpekler, Enteropati, Glutensiz Diyet, Gluten Duyarlılığı.

## Introduction

### Gluten enteropathy

Gluten is the main warehouse protein of grains (rye, barley, wheat etc.) and a combination of several different proteins (strikingly gliadin and glutenin) (Biesiekierski, 2017). Coeliac disease, denoting a version of enteropathy induced by gluten, has been recognized through a specific genetic genotype (HLA-DQ2/HLA-DQ8 genes) along with exiting autoantibodies against gluten (Leonard et al., 2017). Regarding humans, the clinical scenario of coeliac disease was initially determined by S. Gee in 1887, in which wheat was not the culprit until about 60 years later it was claimed (Diecke, 1941).

Celiac disease, has been linked to aberrant respond to gluten proteins in animals (Rudinsky et al., 2018). Given its widely recognition among humans, animal owners warranted to search its involvement among diseased dogs and cats. Its spatial distribution among dogs remains unclear, and gluten sensitivity has not been recorded among cats. In veterinary medicine, briefly, similarly to that of what have been well recognized for human celiac disease, genetic origin of identical disorder has been found among Irish Setters (Hall and Batt, 1991, Hall and Batt, 1992). Clinical and related microscopical findings are likely to those of what is found in association with inflammatory bowel disease in which clinical recovery were deemed available even dogs were fed gluten-free diet (Hall and Batt, 1990a, Hall and Batt, 1990b, Hall and Batt, 1991, Hall and Batt, 1992). Gluten sensitivity with a reflection of multisystemic form has been determined among Border Terriers (Lowrie et al., 2015, Lowrie et al., 2016).

### How may a veterinary surgeon detect gluten sensitivity at clinical practice?

Currently, apart from previous studies and related results, serum detection of gliadin (Rogers et al., 2023) and/or anti-gliadin IgG (Barker et al., 2020) along with transglutaminase-2 IgA (Rogers et al., 2023) or anti-canine transglutaminase-2-IgA autoantibodies (Barker et al., 2020) were used for tentative diagnosis (Table 1). Ultrasonography, to the present authors' knowledge, might be also helpful, to those of what have been reported (Table 1) for people with celiac disease.

**Table 1.** Summary of current diagnostic approaches for canine gluten sensitivity.

Current situation for detecting gluten sensitivity among dogs	
Serum	Gliadin IgG (Rogers et al., 2023) Anti-gliadin IgG (AGA IgG) (Barker et al., 2020)
	Transglutaminase-2 IgA (Rogers et al., 2023) Anti-canine transglutaminase-2-IgA autoantibodies (Barker et al., 2020)
Ultrasonography (for accurate prediction) [Secondary outcome/diagnostic-prognostic support]	Selected findings (i) Enlargement of mesenteric lymph nodes (ii) Free abdominal fluid (iii) Bowel wall thickening (iv) Dilated small bowel loops (Rossi et al., 2023, Riccabona et al., 1996, Rettenbacher et al., 1999).

Although not fully evidenced for dogs, in parallel line with humans exhibiting celiac disease

In a book chapter gluten-sensitive enteropathy in cats and dogs were discussed in depth. The latter has been described in genetic origin for Irish setters to those of autosomal recessive inheritance. Exhibited clinical scenario of diarrhea, weight problems, vomiting and diminished appetite, thoroughly induced by gluten in food composed of possibly wheat and other relevant grains. In that chapter, briefly, it has been denoted that gluten-free diet exhibited clinical recovery and withdrawal of clinical findings in affected Irish setters (Mott and Morrison, 2019). Gluten related enteropathy (Pemberton et al., 1997, Mott and Morrison, 2019), epileptoid cramping (Park et al., 2014, Lowrie et al., 2015), multisystemic disorder (Lowrie et al., 2016), dyskinesia (Lowrie et al., 2018) have been reported in different dog breeds up to date.

To the present authors' knowledge, in general clinical practice gluten sensitivity or related disorders are not closer to veterinary practioner's mind on first occasion. Moreover, gastrointestinal issues or neurological problems also involving ataxia, have not been thoroughly evaluated on differential diagnosis list. To those of affected dogs from gluten sensitivity; 2 mainly recognized scenario have been determined gastrointestinal issues among Irish Setters (Daminet, 1996, Garden et al., 2000) and neurological reflection among Border Terriers (Lowrie et al 2015, Lowrie et al., 2016, Lowrie, 2017).

Combined comorbidity of both forms is also recognized (Lowrie, 2017). Comparatively gastrointestinal issues among human (de Graaf et al., 2024, Skodje et al., 2018) and growth retardance among children (Andersen, 1947) are well-known. Prevalence in the total population is about 1%, with regional differences (Husby et al., 2012).

Regarding gluten consumption, gastrointestinal issues along with satiety, long duration of diarrheic episodes, weight loss, and specifically growth retardation among puppies have thoroughly been determined among Irish Setters similarly to human coeliac disease (Biagi et al., 2016). Initially clinical scenario starts within 180 days of age (Daminet, 1996). Pathology revealed intraepithelial lymphocyte infiltration, elevated intestinal permeability and selected atrophy of villi. In contrast to human being with coeliac disease, mucosal injury is frequently less determined in Irish Setters than in people suffering from (Pemberton et al., 1997).

This gluten sensitivity in dogs, which is associated with digestive problems, appears to be breed-specific to the Irish Setter (Daminet, 1996) and, according to Garden et al. (2000), is inherited in an autosomal recessive manner.

In a previous study 15 Border terriers with gall bladder mucocoeles (Group I), 17 non-Border terriers presenting gall bladder mucocoeles (Group II) and 14 control Border terriers with non-biliary diseases (Group III) were enrolled. Median transglutaminase-2-IgA autoantibodies in Group I was markedly higher than in Group III Anti-gliadin IgG did not differ among groups (Barker et al., 2020). In 31 Border Terrier model of paroxysmal gluten-sensitive dyskinesia, sera were tested for modified gliadin peptide immunoglobulin G and tissue transglutaminase-2 immunoglobulin A. Fourteen out of 31 dogs tested positive for gluten sensitivity with either gliadin IgG or transglutaminase-2 IgA or both. To those of 7 dogs, serology was described as questionable with mildly elevated biomarkers. In that research 5 of the dogs positive to gluten serology, exhibited no clinical signs of epilepsy after substituting the strictly gluten-free diet, 1 relapsed following gluten administration again. Three dogs exhibited diminished episode frequency of >50%, and other relevant 2 presented shorter and less intense episodes (Rogers et al., 2023).

## Conclusion

Although it currently is considered an uncommon chronic enteropathy, it should remain as a differential diagnosis, especially for specific breeds. Serological tests and ultrasonographic findings are increasingly contributing to the diagnostic process, and it's noteworthy that dietary approaches improve both gastrointestinal and neurological symptoms. Therefore, gluten sensitivity should be considered as a clinical approach in dogs presenting with unidentified chronic diarrhea, weight loss, abdominal pain, or neurological findings.

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