



## RESEARCH

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### Medical Treatment of Abomasal Displacements of Cattle with Zeolite

The incidence of displaced abomasum (DA) in cattle increases due to intensive feeding. In this study; oral zeolite (2 days; once a day, 1.5 g/BW) was administered in six dairy cows with right (n=4) and left (n=2) DAs as clinically diagnosed. Hypochloremia in two, hypokalemia in one and increased hematocrit in three cases in right DAs and clinical findings as rumen motility, asymmetry in abdominal wall, ping sounds, appetite in both right and left DAs restored following the application except one right DA. As a result, while oral zeolite administration was effective in five cows with right and left DAs, was ineffective in one right DA due to adhesion in the abomasal wall. This new medical treatment method is becoming more common at both academic area and private Veterinarians in our country.

**Key Words:** Cattle, abomasal displacement, zeolite

#### Sığırlarda Abomazum Deplasmanlarının Zeolit ile Medikal Tedavisi

Sığırlarda Abomazum deplasmanlarının insidansı, yoğun beslenmeye bağlı olarak artmaktadır. Bu çalışmada, klinik muayene ile sağ (dört inek) ve sol (iki inek) abomazum deplasmanı tanısı konulan altı süt ineğinde zeolit minerali oral yolla (iki gün; günde bir kere, 1.5 g/kg canlı ağırlık) uygulandı. Oral zeolit verilmesini takiben, sağ deplasmanlı iki vakada hipokloremi, bir vakada hipokalemi ve üç vakada hematokrit artışı tespit edilirken, sağ ve sol deplasmanlı vakalarda rumen hareketleri, karın duvarında asimetri, ping sesleri ve iştah gibi klinik bulgular, bir sağ deplasman vakası hariç normale döndü. Sonuçta oral zeolit kullanımı, sağ ve sol taraflı abomasum deplasmanlı beş inekte başarılı olurken, abomazum duvarındaki yapışmadan dolayı bir sağ deplasman vakasında etkisiz bulunmuştur. Bu yeni medikal tedavi yöntemi ülkemizde hem akademik camiada hem de pratisyen Veteriner hekimler arasında gün geçtikçe yaygınlaşmaktadır.

**Anahtar Kelimeler:** Sığır, abomazum deplasmanı, zeolit

#### Introduction

Displaced abomasum (DA) represents a group of pathological events due to smooth muscle atony, gas and fluid accumulation following displacement of the abomasum from its normal ventral position on the abdominal floor (1, 2). Left or right displacement of the abomasum is one of the most important metabolic and organic internal disorders of cattle and the disease is most prevalent in high performing milk breeds (3, 4).

DA is one of the most frequent causes of surgery in dairy cattle and various surgical approaches have been developed (1, 5). Throughout the literature, several different methods of surgical correction have been proposed. The most accepted methods are right side laparotomy with concurrent caudoventral omentopexy, left side laparotomy with concurrent ventral omentopexy, Ljubljana method and toggle suture (6, 7).

Despite favorable prognosis, surgery is not economically feasible in many cases. All operative techniques have their inherent advantages and disadvantages. The potential drawbacks of laparotomy include recurrence, local or diffuse peritonitis, incisional infection, incisional dehiscence, abomasal fistulation, duration of procedure, costs and milk loss as a result of administration of antimicrobials. Recurrence of abomasal displacement in dairy cattle was determined to be the most common reason to perform a second surgery (6).

Zeolite mineral selectively adsorb such gases as ammonia, hydrogen sulfide, carbon monoxide, carbon dioxide, sulphur dioxide, water vapor, oxygen, nitrogen, formaldehyde, and others. It also purifies the methane gas produced by the anaerobic digestion of manure. Natural zeolites also possess a high affinity for water and have the capability of adsorbing and desorbing it without damage to the crystal structure. It also acts as adsorbent of toxins in the digestive system (8).

Based on this knowledge, we thought that use of zeolite can be useful in the treatment of displaced abomasum. The objective of the current research is the assessment of the clinical efficacy of zeolite mineral used orally in the treatment of right and left DA in cattle.

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## Materials and Methods

Six cows (four with right DA and two with left) were used. Routine general examinations of the cows such as palpation, simultaneous percussion and auscultation, body temperature, heart and respiratory rates, ruminal movements and existence of asymmetry (Figure 1) were examined prior to treatment procedure. Clinical diagnosis has been done via ping sounds formed especially with percussion-auscultation and shaking-auscultation in both right and left displaced cases.



**Figure 1.** Asymmetry in flank of right displaced case

Zeolite (Rotamin; Rota Mining, Turkey) was administered orally within few liters of water for 2 days (1.5 g/BW, once a day) via a stomach tube. Furthermore, zeolite (50 g/day) was added to the ratio of animals during three months after the treatment to prevent recurrence. Patients were clinically examined (presence of rumination, ping effect, appetite, ruminal movement, etc.) following zeolite administration on day 1, 2. Blood samples in all cases for the baseline values were taken before the treatment. The samples were also collected on day 4, at the clinical recovery period. Haematocrit values were measured using microhaematocrit method. Biochemical analyses (Natrium (Na), Potassium (K), Clor (Cl)) were performed with autoanalyzer (Cobas Integra 800, Roche). Nonparametric Wilcoxon Signed Rank test, used in comparison of dependent values, in MINITAB for Windows were used because case numbers limitation.

## Results

The ping on the right and left flanks had disappeared following end of third day and clear rumen motility returned to normal after the second application and all the cows started consuming food except one case with right DA. Normal defecation of five cows was observed after 48 hours and zeolite reduced completely the malodour of the faeces. Laboratory parameters have been shown in Table 1. As evaluated totally as the right and left cases in Table 1; the significant results were found ( $P < 0.05$ ). When right and left displacements were evaluated separately; the parameters were not significant ( $P > 0.05$ ). However, individually hypochloremia, hypokalemia and haemoconcentration at different degrees in right DAs were common laboratory findings. Following treatment, these findings returned to the normal values. One unsuccessful right DA was slaughtered due to adhesion during omentopexy. Regarding with recurrence of the DAs, the animals were monitored during three months and no recurrence was encountered during observation period.

We used oral zeolite at several DA cases in field conditions. This method is becoming more common at both academic area and private Veterinarians in our country. Our feedbacks from veterinarians and academic areas shows success rate as 70%.

## Discussion

Several surgical corrective procedures including omentopexy, abomasopexy, blind suture and bar suture have been used as routine methods for treatment of left or right abomasal displacements. Although the success rate of surgical correction of abomasal displacement in cattle is high, there have been many problems associated with surgical correction including owner's anxiety, high cost, and postoperative complications including recurrence (6, 9).

Some authors cite cases of successful conservative treatment using spasmolytic or peristaltic stimulants, but once there is rotation of the abomasum, it can only be surgically remedied (10). Conservative methods also carry the risk of a recurrence of the condition (4). To prevent recurrence we added zeolite to ratio of the animals and no recurrence was observed.

**Table 1.** Laboratory findings in right and left displaced abomasums

		n	Median	Min.	Max.	P
Natrium (mmol/L)	Before treatment	6	138.50	135.00	143.90	$P > 0.05$
	After treatment	6	139.40	135.50	143.00	
Potassium (mmol/L)	Before treatment	6	4.45	2.92	5.10	$P < 0.05$
	After treatment	6	4.60	4.19	5.00	
Clor (mmol/L)	Before treatment	6	93.69	87.32	97.80	$P < 0.05$
	After treatment	6	95.96	86.58	100.21	
Haematocrit Values (%)	Before treatment	6	39.00	28	48	$P > 0.05$
	After treatment	6	34.00	28	46	

For that reason, prophylactic use of zeolite as feed additive may prevent possible recurrence of displacements after medical treatment with zeolite.

As shown in Table 1, the results and individual differences as haematocrit increase, hypochloremia, hypokalemia especially in right displaced cases are consistent with the literature (3). Hypochloremia, which we encountered in the cases and tended to recover after treatment with zeolite, can be explained by hypersecretion of the displaced abomasum and reflux occurring from abomasum to rumen. Hypokalemia may be related to hypochloremic alkalosis, due to invasion of potassium ions to intracellular medium (3). Improvements at both clinical and laboratory changes increases in ruminal movements, feed and water consumption.

Hypocalcaemia at parturition is a risk factor for pathogenesis of displaced abomasum. A decline in plasma calcium concentration around parturition linearly

decreases abomasal contractility, which is suspected to lead to atony and distention of abomasum (11). In a study (12), the addition of zeolite mineral to the daily ration during the last month of pregnancy prevented parturient paresis as well as subclinical hypocalcemia in Jersey cows. Zeolite mineral, as a feed supplement is approved by the Federal Drug Agency. Supplementation of zeolite to the daily ration have been found to increase body weight without disturbing animals' health. In Cuba, natural zeolites are being studied as buffers to reduce stomach acidity and to treat stomach ulcers (8).

This research using the oral zeolite in the treatment of DAs is the first report in the literature to our knowledge. We are of the opinion that the application of zeolite is useful in the treatment of left and right DA. Oral zeolite has been found as insufficient when adhesions of abomasum occurs. Unsuccessful cases can be originated from adhesion of abomasum wall to surrounding tissues.

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