

Prevalence of Rotavirus and Coronavirus Origin Diseases by Age Groups Among Calves in the North-West Region of Azerbaijan

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Abstract

The purpose of the study was to identify the prevalence of diarrhea caused by rotavirus and coronavirus in newborn calves located in the North-West region of the republic using rapid testing. The study was conducted among 45 heads of calves of local races and crosses in 20 farms of the Ismaili, Gabala, and Zagatala districts. In 14 heads of calves out of 45 calves (35.5%), pathogens were not identified, and in 31 heads of calves pathogens were identified in single or mixed cases. The identified pathogens among them were distributed as follows: rotavirus in 22 calves (48.9%), coronavirus in 3 calves (6.7%), in 8 calves - (*cryptosporidium parvum*) 17.8%), in 5 calves calves - *Giardia* (11.1%) and another 5 calves had *E. coli* K99 (11.1%). The results of the study show that the causes of diarrhea in calves in the North-West region of the republic, among other pathogens, include rotavirus and coronavirus infections, and it is important that this be taken into account when carrying out treatment and preventive measures.

Key words: coronavirus, rotavirus, prevalence, express, diarrhea.

Introduction

Field and laboratory studies indicate that most cases of diarrhea in calves are caused by several factors, both infectious and non-infectious. Neonatal diarrhea occurs predominantly in the first 2-3 weeks after birth and is most common in calves 2-10 days of age (Bourhy, et al., 1999; Radostits, et al., 2006). Among viral diarrhea of calves, rotaviruses and coronaviruses are the most common (Hall et al., 1992). Field studies have confirmed that the most common causes of diarrhea are *E. coli*, rotavirus, coronavirus, cryptosporium and giardia (Svensson et al., 2003). The

incidence and location of each varies depending on the season and year, and in many cases rotaviruses and coronaviruses occur either separately or as part of mixed infections. The purpose of this study was to study the prevalence (the degree of incidence) of rotaviruses and coronaviruses in single or mixed form in the Ismaili-Zagatala-Gabala region using the rapid testing method.

Methodology

During the study, 1-2 samples of feces from calves with clinically observed signs of diarrhea were used, collected from calves located in the following farms - 5 farms in the village of Talistan, Ismayilli region, 5 farms in the villages of Nohur-Kishlyk and Vandan, Gabala region, 10 farms in the villages of Yeni Suvagil, Kurdamir, Aliabad and Mukha, Zagatala region. The experiment was carried out on 45 calves in 20 farms during the period July-October 2023. Of the 45 calves, 28 heads of calves are local breed calves, 11 heads of calves are a cross between Simmental and local breed calves, 3 heads of calves are a cross between Angus and local breed calves, 3 heads of calves are a cross between Swiss and local breed calves. Farms were selected on the basis of having 10-50 dairy cows. For clinical signs, factors such as animal manure moisture, its color, frequency of excretion and organoleptic characteristics of the animal manure contents were taken into account.



Figure. 1. Farms located in Talistan village, Ismayilli district



Figure 2. Zagatala region: location of farms in the villages of Yeni Suvagil, Kurdamir, Aliabad, Mukhakh.



Figure 3. Farms located in Gabala district, Nohur Kishlaq and Vandam villages.

To identify the pathogenic factor, the BoviD-5 Ag Test Kit (Bionote, Inc. Korea) was used - diagnostics were carried out for the presence of cryptosporosis, rotavirus, coronavirus, E. coli, and lamblia (Chen, et al., 2010; Altuğ, et al., 2013; Çabalar, et al., 1998). During inspections, sterile gloves, 70% alcohol, disposable uniforms and masks were used, farm owners were interviewed, and diarrhea incidence was discussed.

Results

As can be seen from Table 1, out of 45 calves examined using the express method, the pathogen was not detected in 14 calves (35.5%), and in single and mixed cases the pathogen was detected in 31 calves. Of these, 22 calves were diagnosed with rotavirus (48.9%), 3 calves had coronavirus (6.7%), 8 calves had (cryptosporidium parvum) 17.8%), 5 calves had lamblia (11.1%) and 5 calves had E. coli K99 (11.1%). According to the results given in Table 2, the following forms of rotavirus were identified: 15 heads of calves had a single one, 1 head of calf had E. coli + rotavirus, 1 head of calf had rotavirus + coronavirus, 1 head of calf had rotavirus cryptosporosis, 2 heads of calves had - rotavirus + Giardia, 1 head of calf - rotavirus + cryptosporosis + coronavirus, 1 head of calf - cryptosporosis + rotavirus + Giardia. Coronaviruses were identified as follows: in 1 head of calf - coronavirus + E. coli, in 1 head of calf - rotavirus + coronavirus, in 1 head of calf - cryptosporosis + rotavirus + coronavirus. Rotoviruses were observed in 4 calves aged 3-10 days, in 12 calves aged 11-20 days and in 7 calves aged 21-28 days. There were 0 cases of coronavirus in calves 3-10 days of age, coronavirus was detected in 3 calves 11-20 days of age and 0 cases of coronavirus were observed in calves 21-28 days of age.

Table 1. Detection rates of pathogens in animal manure samples and their percentage expression

	Pathogen	Number of samples	Percentage expression %
1		45	
2	Unidentified	14	31.1
3	Identified single and mixed	31	68.9
4	Including		
5	Rotavirus	22	48.9
6	Coronavirus	3	6.7
7	Cryptosporiasis	8	17.8
8	Giardia	5	11.1
9	Escherichia coli	5	11.1

Figure 4. Schematic representation of diarrhea caused by various types of identified pathogens and unidentified or non-pathogenic factors.

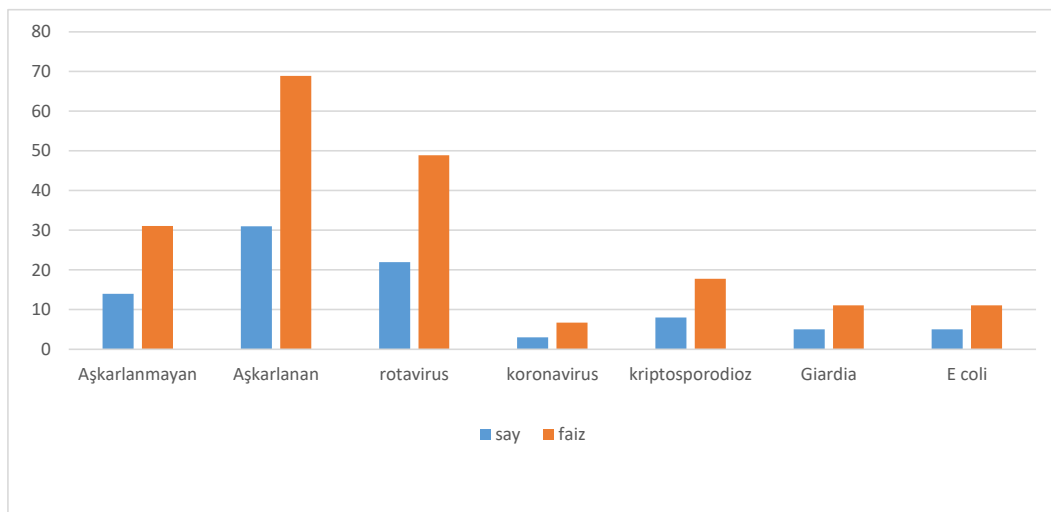


Diagram 1 shows that in 68.9% of cases of diarrhea, the main factors play the role of any identified pathogen, of which 48.9% are rotaviruses, and 6.7% are coronaviruses. 31.1% of diarrhea cases are considered either non-pathogenic or caused by pathogens not included in the rapid test.

Table 2. Coefficients of mixed or single detection of pathogens and distribution by age groups

Pathogen	Quantity 45	%	Calves aged 3-10 days	Calves aged 11-20 days	Calves aged 21-28 days
Negative	14	31.11	5	6	3
Positive	31	68.9	6	15	10
Rotavirus	15	33.3	4	6	5
Escherichia coli	2	4.4	2		
Escherichia coli + Rotavirus	1	2.2	-	1	-
Escherichia coli Coronavirus	1	2.2	-	1	-
Cryptosporiasis	4	8.9	-	2	2
Giardia	1	2.2	-	-	1
Rotavirus + Coronavirus	1	2.2	-	1	-
Rotavirus + Cryptosporiasis	1	2.2	-	1	-

Rotavirus + Giardia	2	4.4	-	1	1
Cryptosporiasis Rotavirus+ Coronavirus	1	2.2	-	1	-
Cryptosporiasis, Rotavirus, Giardia	1	2.2	-	-	1
Cryptosporiasis, Escherichia coli + Giardia	1	2.2	-	1	-

Discussion

Rotoviruses are among the most common viruses that cause acute diarrhea in calves less than one month of age, as well as in humans, indicating a high potential for zoonotic and economic impact (Al, et al., 2006; Alfieri, et al., 2012; Barrington., et al., 2002). Viral RNA viruses belong to the reoviridae family and have 7 serogroups. Group A is thought to cause disease in calves. Research shows that rotaviruses are the most common enteropathogens, accounting for 20-60% of diarrheal diseases in different countries (the prevalence of rotavirus in India ranges from 11.8% to 26.8%. Rotaviruses have been studied extensively in European countries and it has become clear that the prevalence was 24–47% in Switzerland in 1993–2006, 42% in the UK and 37–47.4% in France. Among Asian countries, the rate ranges from 0–7% in Bangladesh to 16.7% in Ethiopia (Conrad, et.al., 2011; Saif, 2007). Studies conducted among calves with diarrhea in Turkey indicate that the prevalence of rotavirus infection ranges from 0-53%, and the prevalence of coronavirus infection ranges from 13-18% (Cook, et.al., 2002; Malik, et al., 2006; De Verd, 1986; Bendali , 1999; Alkan, 1998; Abraham, 1992) .

Calf coronavirus is one of the main viruses causing enteritis in calves and wild animals (Clark, 1993; Burgu, et al., 1995). An RNA virus, it belongs to the Orthocoronavirinae subfamily of the Coronaviridae family and causes diarrhea and pneumonia in calves and winter dysentery in older cows (Saif, et al., 1990; Sezgin, 2012; Reynolds, et al., 1986). The frequency and timing of coronaviruses vary by country as follows. Until 2000, BC (bovine coronavirus) was reported as an intestinal symptom in the Americas, Europe and Asia. North and South America, Canada, the USA and Argentina have a high incidence rate, ranging from 2.41 to 84%. In the UK, Europe and Belgium, 14% and 8% were recorded in 1986 and 1999 respectively. From 2000 to 2009, incidence rates in Asia, namely Turkey and Korea, were 10.8–28.1% and 5.6–58.2% (Pesavento and Billingsley, 2003).

Conclusion

The results of the study show that rotaviruses and coronaviruses among calves are among the main factors of calf diarrhea in the North-West region of the republic (Ismaily, Gabala, Zagatala), and both diseases can cause economic losses and losses to farmers, occurring in the form of a single or mixed infection. Timely diagnosis of the disease by checking animal manure samples taken from calves using express test kits allows for further treatment and preventive measures, which not only has a positive effect on the development of calves on farms, but also prevents the death of calves and increases the economic profitability of farmers (Çabalar, et al., 2001; Keha, et al., 2019). During the study, the prevalence of rotaviruses in the northwestern region of our republic is 48.9% (0-53%), and the prevalence of coronaviruses is 6.7% (13-18% in Turkey). Infectious diseases that occur together with rotaviruses and cause further exacerbation of the disease and deeper losses of calves should be studied separately and be the focus of attention.

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