

MICROBIAL AND VIRULENT VIEW TO CAUSATIVE AGENT OF FOOT AND MOUTH DISEASE IN UNVACCINATED DAIRY COWS IN DIYALA GOVERNORATE, IRAQ

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Abstract: Aphthous fever or Foot-and-mouth disease (FMD) is a highly contagious and serious viral disease of animals. It affects animals with cloven-hoofed including cattle, buffalo, camels, sheep, goats, deer and pigs. Africa, the Middle East, Asia and South America were between the countries whom report the disease. High losses of milk and meat production could be occurred due the infection and, affect the trade in livestock and livestock products.

Twenty unvaccinated dairy cows with foot and mouth vaccine and their newborn calves were included in this study to investigate about the effects of their infection with foot and mouth disease virus. The results were revealed high severity clinical signs as weakness, loss of milk production, mastitis with appearance of blisters on teats, lameness, cough, rough coat and sings of panting. Also the study was investigates about the fate of their newborn calves which were mostly dead from the infection through vertical transmission of the virus with lactated milk or owners.

In recommendation, in order to maintain the flock from FMDV, annual vaccination with FMD vaccine contain endemic strains A, O and Asia (Shamir).

Key words: FMDV, dairy cattle diseases, Diyala province.

INTRODUCTION

Foot and mouth disease is an infectious viral disease and sometimes fatal that affects cloven-hoofed animals, including domestic and wild bovids. High fever had been remain from two to six days, followed by blisters on the gum,

tongue and on the feet , when ruptured result in lameness (Arzt *et al.*,2011).

Severe implications to animal farming followed the infection. The disease is highly infectious and the direct contact with infected animals considered as the main route of infection in

addition to contaminated fomites, equipment, vehicles, clothing and feed. Vaccination, strict monitoring, trade restrictions during outbreaks, quarantines consider as important efforts to containment the spreading of the infection between the healthy animals (Radostitis *et al.*, 2000).

Cattle, water buffalo, sheep, goats, pigs, antelope, deer, and bison are the susceptible animals to FMD. Mild symptoms had been developed in hedgehogs and elephants; llamas and alpacas, but are resistant to the disease and without transmission to the same species. Mice, rats, and chickens have been artificially infected through laboratorial experiment, no evidence about the infection under natural conditions (Arzt *et al.*, 2019). All susceptible animals can become carriers to small amount of virus following an acute infection, but appear healthy (Arzt, 2020).

Aphthovirus is responsible for FMD with seven strains of the virus: A, O, C, Asia 1, SAT 1, SAT 2, and SAT 3 (Jackson *et al.*, 2007). When the virus particle is replicated to manufacture thousands copies inside the infected host cell the infection will occurred. The cell is eventually bursts after full replication of the virus and releasing in the blood stream. Genetically, the virus with similarity to other viruses is highly variable, which resists and limits the ability of vaccine against the disease (Martinez-Salas *et al.*, 2008).

A period between one and twelve days the incubation period for FMDV has a range. High fever is the first clinical signs which appear onto the infected animal and rapidly declines after two to three days. Excessive secretion of foamy saliva due to presence of blisters inside the mouth that lead to drooling. Lameness followed the rupture of the blisters on the feet. Because the cows do not recover for several months weight loss and decrease of milk production expected sequelae. Mature males will suffered from swelling in the testicles (Yadav *et al.*, 2019).

Different routes of transmission of the FMD virus, including direct contact with infected animals, fomites as vehicles and aerosol transmission. Contaminated farmer clothes and

skin of animal handlers, feed, water, and uncooked food scraps can harbor the virus,. Infected bulls can also carry FMDV with semen and can transmitted to the inseminated cows (Arzt *et al.*, 2010).

Animals inoculated by many dead samples of the FMD virus vaccines produced early, but real outbreaks might be occurred after using those vaccines sometimes (Fayna *et al.*, 2016).

This study was designed to evaluate the pathogenicity of foot and mouth disease virus and its virulent effect at general health of dairy cattle and their offspring.

MATERIALS AND METHODS

Twenty dairy unvaccinated cows with FMDV vaccine and their newborn calves were incorporated in this study. The general health of all the infected cows and calves was evaluated by determination of body temperature, heart rate, respiratory rate, eye conjunctiva, udders, testicles, tongues, gums and feets (nails).

RESULTS AND DISCUSSION

All secretions and excretions come from animals with acute FMD infection can contain the virus including droplets mixing the air of expiration, milk, urine, feces and semen, in addition to the salivary fluid from mouth, foot and teat vesicles. Also amniotic fluid associated aborted fetuses (Donaldson and Alexandersen, 2002).

All the cows were infected with FMD reveals sings of salivation due to presence of blisters on gums and tongues, also with redness or congestion of the udder in addition to presence of blisters on the udder and teats figures (1 and 2). The infected cow mostly slaughtered and another will die. The infection was transmitted to the lactating calves figure (3) accompanied with fever and shock due to heart failure followed by death. These events came agree with Jackson *et al.*, (2007) and Arzt *et al.*, (2010) studies whom refer to the rate of mortality between old cows reach to 2-5%, and high mortality between infected young calves with FMD. Secondary bacterial infection results from bursting of blisters in udder and leads to mastitis sometimes with painful milking. This sequelae came agree

with Knight-Jones and Rushton (2013) whom refer to the complications associated FMD infection in cattle. The blisters are localized between the toes ,when burst it could be cause painful raw sores and even the loss of some parts of hooves or all the hooves figure (4 and 5). Infected animals loss their ability to eat, drink, or walk, and may suffer from debility from which they do not recover for several months followed by poor growth, panting, rough coat figure(6) and weakness (Coetzer and Tustin , 2004).

The oropharyngeal fluids which are drooled from the mouth cavity of infected cows figure (7) consider as the source of infection to others through direct contact or contamination of food and water. This hypothesis came agree with Arzt *et al.*,(2018) whom refer to carrier cattle with oropharyngeal fluids.

In recommendation, because no cross immunity between the seven strains of the virus: A, O, C, Asia 1, SAT 1, SAT 2, and SAT 3, annual vaccination of all the herd with FMDV vaccine was applied including pregnant cows followed by booster vaccination to newborn calves after two months age to accentuate the full immunity. Different companies for vaccine production but, we will prefer the VETAL group (Turkey) which contain strains A,O and Asia (Shamir) whom responsible for the infection in Iraq.



Figure (1): represent infected cow with FMDV and revealed signs of salivation with bursts blisters (blue arrow).



Figure (2): represent infected udder with FMDV and revealed the secondary bacterial infection (blue arrow).

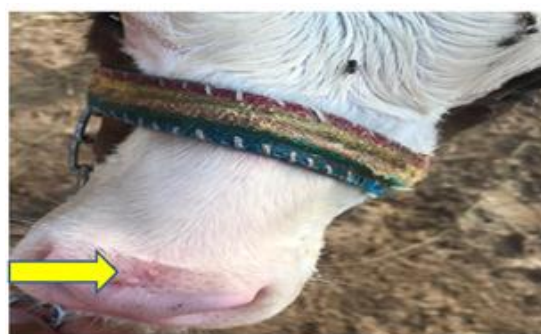


Figure (3): represent infected calf with FMDV and revealed the vertical transmission of secondary bacterial infection from direct contact with infected Dum (blue arrow).



Figure (4): represent the loosen part of hoof of calf infected with FMDV (blue arrow).



Figure (5): represent the sloughed hoof of calf infected with FMDV (blue arrow).



Figure (6): represent the rough coat of cow infected with FMDV.



Figure (7): represent the oropharyngeal fluid of infected cow with FMDV (blue arrow).

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