

FOOT AND MOUTH DISEASE (FMD)

Pocket Guide
Cattle

August 2015



Acknowledgements

This Pocket Guide was developed to enhance foot and mouth disease surveillance in cattle through cooperative agreement 14-9100-1473. The cooperative effort included contributions from the United States Department of Agriculture (USDA), the American Association of Bovine Practitioners (AABP), the National Cattlemen's Beef Association (NCBA), the National Milk Producers Federation (NMPF), and the Center for Food Security and Public Health at Iowa State University College of Veterinary Medicine.



The developers would like to credit the USDA APHIS Foreign Animal Disease Diagnostic Laboratory and the U.S. Department of Homeland Security (DHS) Primus Visual Information Services at the Plum Island Animal Disease Center (PIADC) for the use of the images of cattle infected in a laboratory setting with foot and mouth disease virus. We would like to thank the DHS Animal Resources Branch at PIADC for caring for these animals during this project.

Cover photos courtesy of iStockphoto.com

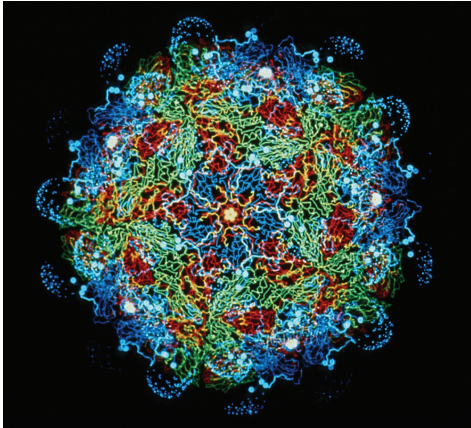


Illustration credit: Dr. Fred Brown

The cattle illustrated in this guide were infected with foot and mouth disease virus (FMDV) by contact with a pig experimentally inoculated intradermally with FMDV serotype O1 Brugge. The cattle and pig were initially housed in the same room. The pig showed vesicular lesions on all four feet on day two after inoculation. For the purpose of this Pocket Guide, the first day of contact was considered to be the day when FMD vesicles appeared on the inoculated pig. Note that FMDV infected animals may shed virus prior to the appearance of clinical signs.

With the exception of images depicting teat lesions, the images in this guide were taken in a laboratory setting. The animals were sedated, and the areas where lesions were present were cleaned to provide the best quality images for educational purposes. These do not reflect field conditions and lesions may look different on cattle on farms.

Clinical Signs

FMD is a highly contagious viral disease that affects cloven-hoofed (two-toed) animals (cattle, pigs, sheep, goats, some wildlife). Onset and severity of clinical signs will vary between animals. Vesicular lesions (blisters, ulcers, and sores) in cattle may be found in the mouth and on the feet, muzzle/nostrils, and teats. Cattle with FMD may exhibit one or more of the following clinical signs:

- Drooling
- Reluctance or inability to eat
- Lameness
- Reluctance to move
- Redness and/or blanching of coronary bands
- Nasal discharge
- Fever (103 - 106°F; 39.4 - 41.1°C)
- Depression
- Decreased milk production in lactating cattle
- Sudden death in young calves due to myocarditis

Early recognition of FMD signs and prompt reporting are **critical** to containing this highly contagious disease.

Cattle that recover from FMD infection may have long term health issues including:

- Poor growth and performance
- Chronic mastitis
- Chronic lameness



- ▲ Excessive salivation due to mouth lesions;
◀ nasal discharge.

Lameness



- ▲
- ◀ Foot lesions may cause animals to shift weight or spread out their front feet, be reluctant to move, and have a hunched back.



- ▲ Multifocal erosions/ulcerations on two teats covered with crust material.



- ▲ Severe erosions/ulcerations on two teats covered with crust material.

These teat lesions from cattle in India are estimated at 3-7 days following exposure.
Image credit: Rajeev Ranjan, Project Directorate on FMD, Indian Council of Agricultural Research.

Day 1 Dental Pad, Tongue



▲ No visible lesions.



▲ No visible lesions.

Day 1 Front of Hoof, Interdigital Skin



- ▲ Normal interdigital skin.
- ◀ No visible lesions.

Day 1 Lateral Hoof, Heel

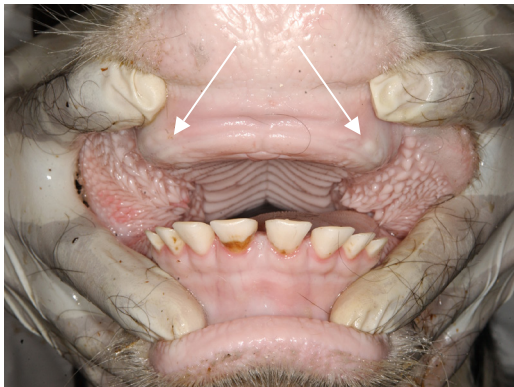


▲ Blanching and erosion of coronary band.



▲ No visible lesions.

Day 3 Dental Pad, Tongue



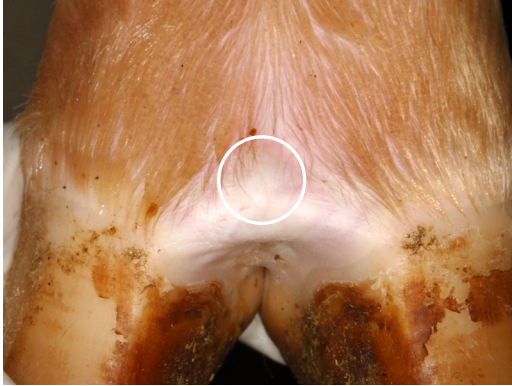
▲ Blanching of dental pad.



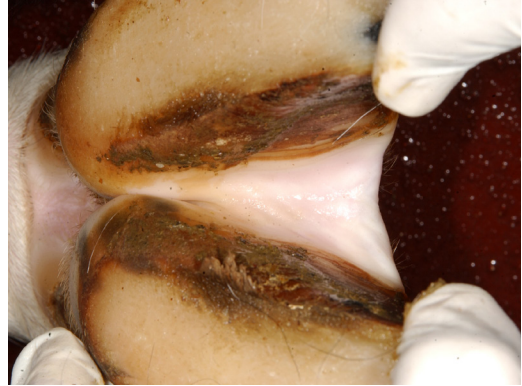
▲ Vesicle (3 cm diameter) on dorsal edge of tongue surface.

Day 3

Front of Hoof, Interdigital Skin

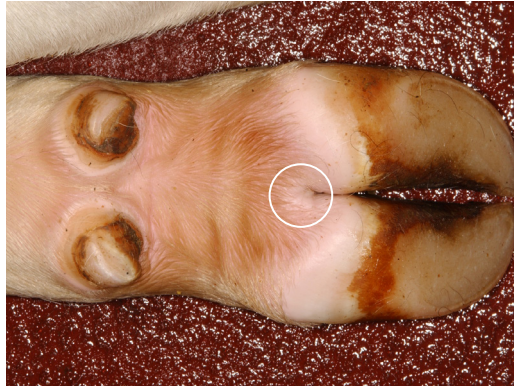


▲ Vesicle on interdigital skin.



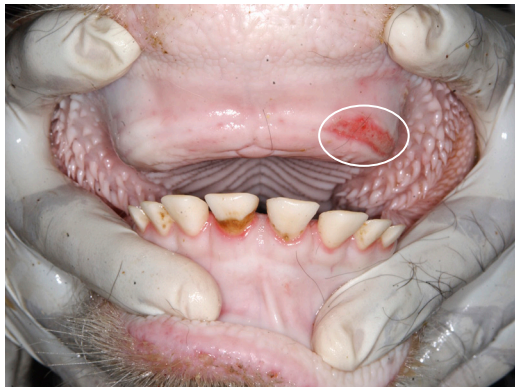
▲ No visible lesions.

Day 3 Lateral Hoof, Heel



- ▲ Small early vesicle on interdigital skin.
- ◀ Small ruptured vesicle on coronary band with blanching.

Day 7 Dental Pad, Tongue



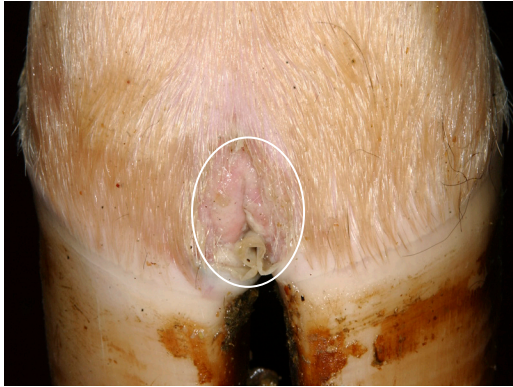
▲ Linear erosion on dental pad with fibrin.



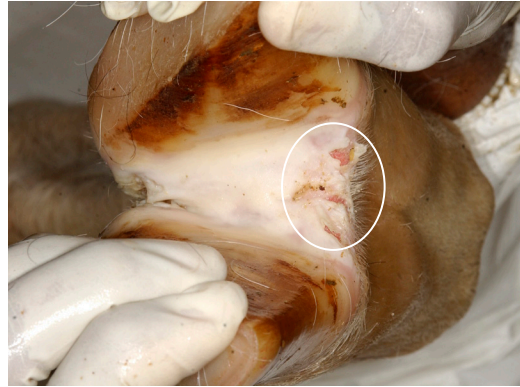
▲ Multifocal and coalescing erosions and ulcers with fibrin on dorsal surface of tongue.

Day 7

Front of Hoof, Interdigital Skin



▲ Ruptured interdigital skin vesicle.



▲ Ruptured interdigital vesicles with flaps of necrotic skin.

Day 7 Lateral Hoof, Heel

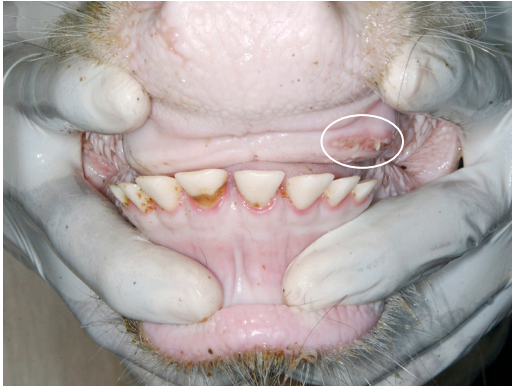


▲ Ulceration along coronary band.



▲ Discoloration and necrosis of interdigital skin.

Day 10 Dental Pad, Tongue



▲ Erosions of dental pad with fibrin.



▲ Healing and re-epithelialization of tongue surface.

Day 10

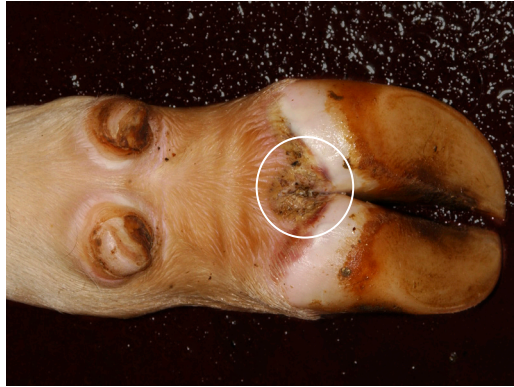
Front of Hoof, Interdigital Skin



- ▲ Ruptured vesicle on interdigital skin.
- ◀ Extensive necrosis of interdigital skin with granulation tissue formation.

Day 10

Lateral Hoof, Heel



- ▲ Extensive necrosis at the posterior coronary band with granulation tissue formation.
- ◀ Extensive ulceration along coronary band with granulation tissue formation.

Day 14

Dental Pad, Tongue



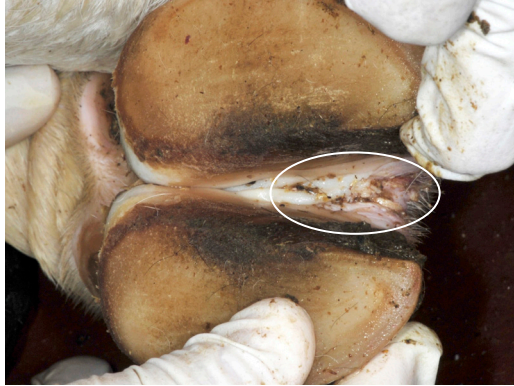
▲ Healing and contracture of dental pad erosions.



▲ Further healing of tongue epithelium.

Day 14

Front of Hoof, Interdigital Skin



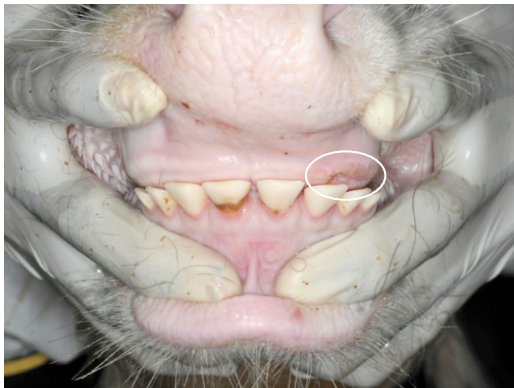
- ▲ Extensive rupture of interdigital vesicles and formation of granulation tissue.
- ◀ Healing with formation of granulation tissue of interdigital skin.

Day 14 Lateral Hoof, Heel



- ▲ Separation of hoof wall and extensive necrosis of interdigital skin.
- ◀ Ulceration along coronary band and beginning of the healing process.

Day 18 Dental Pad, Tongue



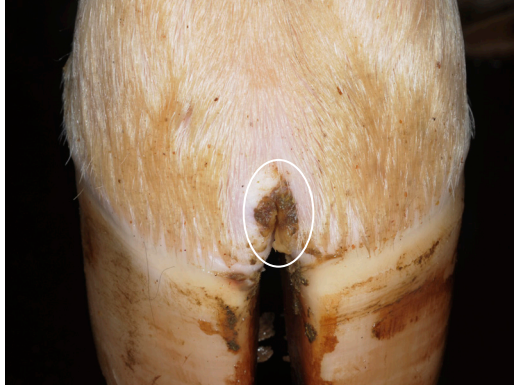
- ▲ Healing of dental pad erosions is almost complete.



- ▲ Tongue healing is almost complete.

Day 18

Front of Hoof, Interdigital Skin

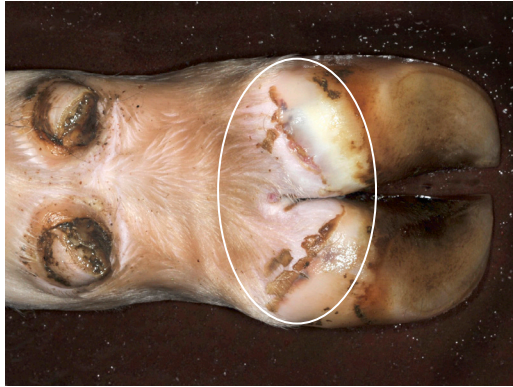


▲ Interdigital skin healing by granulation tissue.



▲ Interdigital skin healing by granulation tissue.

Day 18 Lateral Hoof, Heel



- ▲ Healing progression.
- ◀ Coronary band erosion healing.

Procedures to follow if you suspect a Foreign Animal Disease —

1. Make “the Call.”

Call the USDA APHIS Assistant Director (AD) for your state or your State Animal Health Official (SAHO). Contact information for your AD or SAHO can be obtained by calling (866) 536-7593. You can also call the USDA Emergency number (800) 940-6524 (24 hours) for assistance.

2. Discuss How to Proceed.

The AD or SAHO will let you know approximately when the Foreign Animal Disease Diagnostician (FADD) will conduct a site visit. You should discuss precautions to take regarding people movement and contact with animals while waiting for the FADD to arrive. They will also want to gather information from those involved with the operation. Discuss the next steps to follow with the AD or the SAHO you have contacted.

Information will be kept confidential during the investigation.

Items to be discussed over the phone or when the FADD arrives may include:

- When were the first lesions evident?
- When were animals last transported from the operation and what was their destination?
- When were these animals delivered to the operation and where did they come from?
- Do you or your employees care for other livestock?
- How many employees work at this location?
- Do the employees have livestock at home?
- Is equipment shared between operations or with neighbors?
- When was feed last delivered to the operation?
- Have there been any foreign visitors to the operation?
- Have any employees recently visited a foreign country?

3. Assisting the FADD

When the FADD arrives, the veterinarian, producer, and FADD will work together. Many questions will need to be answered during the investigation. Be assured that there will be a constant stream of communication to keep everyone informed of the procedures for sample testing and the timeframe involved.

Thank you to all of the individuals who contributed to this publication.

USDA APHIS Plum Island Animal Disease Center (PIADC) Foreign Animal Disease Diagnostic Laboratory

- Fawzi Mohamed
- Karyn Havas
- Ping Wu
- Gregory Mayr
- Fernando Torres-Velez
- Anthony Gonzalez

U.S. Department of Homeland Security PIADC/Primus Visual Information Services

- Kathy Apicelli

U.S. Department of Homeland Security PIADC Animal Resource Branch

- Bill White
- Jeffrey Babcock
- Ralph Soto
- Dennis Michels
- Philip Doucett

Project Directorate on Foot and Mouth Disease, Indian Council of Agricultural Research

- Rajeev Ranjan

USDA APHIS Veterinary Services

- Elizabeth Clark
- Michael Carter

American Association of Bovine Practitioners

- Gatz Riddell

National Cattlemen's Beef Association

- Kathy Simmons

National Milk Producers Federation

- Jamie Jonker

Center for Food Security and Public Health Iowa State University College of Veterinary Medicine

- Danelle Bickett-Weddle
- Abbey Smith
- Tessa Klein
- Reneé Dewell
- Jim Roth
- Dani Ausen

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3410 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515 294-7612, email eooffice@iastate.edu.



ISBN# 978-0-9846270-4-2