Foot and Mouth Disease (FMD)

Introduction

Foot and Mouth Disease (FMD) is a highly contagious viral disease affecting livestock such as cattle, sheep, goats, and pigs. It is caused by a virus belonging to the family Picornaviridae, genus Aphthovirus. The disease results in significant economic losses due to reduced milk production, weight loss, infertility, and mortality of young .animals

There are seven major viral serotypes:

A – O – C (rare currently) – Asia 1 – SAT 1 – SAT 2 – SAT 3

✔ SAT 1 Strain

Mainly distributed in Africa and some regions of the Middle East.

Characterized by high antigenic variability.

Difficult to control with traditional vaccines.

Risk:

Rapid genetic mutation of the virus leads to vaccine mismatch and failure of non-matching vaccines.

Sources of Infection and Routes of Transmission:

1- Infected animals.

Saliva

Milk.

Urine & feces.

Vesicle fluid & lesions (mouth and foot).

2. Carrier animals (asymptomatic virus carriers).

3. Airborne transmission .

4. Contaminated feed & water .

5.Fomites (equipment, clothes, footwear) .

6. Vehicles & transport .

Clinical Signs

- Fever

- Oral and tongue ulcers

- Lameness

- Loss of appetite

- Excessive salivation

Immune Strengthening Against FMD

Enhancing immunity is a cornerstone in combating FMD, especially with highly mutating strains such as SAT 1.

Main approaches for immune support:

1. Vaccination with multivalent vaccines .

2. Balanced nutrition (vitamin and mineral deficiencies weaken immune response).

3. Good herd management (reducing stress improves immune function) .

4. Immune support with probiotics .

Probiotics: Probiotics are live microorganisms, beneficial bacteria such as:

- Lactobacillus spp.

- Bifidobacterium spp.

Role of Probiotics (Biofactor) in Animal Immunity

1. Stimulation of Innate Immunity .

Activation of phagocytes

Enhancement of natural killer (NK) cell activity

Stimulation of immune cytokines such as:

Interleukin-1 (IL-1)

Interleukin-6 (IL-6)

Tumor Necrosis Factor (TNF-α)

2. Stimulation of Adaptive Immunity .

Activation of B lymphocytes responsible for producing IgM and IgG in the intestinal mucosa.

Improvement of gut microbiome balance, enhancing both gut and systemic immunity.

IgG (Immunoglobulin G): main antibody in secondary immune response against viruses and bacteria.

IgM (Immunoglobulin M): first antibody produced during primary exposure to infection.

70% of the animal's immune system is located in the gastrointestinal tract.

Probiotics can be combined with vaccines to potentiate vaccination efficacy.

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مرض الحمى القلاعية (FMD – foot and mouth disease)

مقدمة Introduction

الحمى القلاعية (Foot and Mouth Disease - FMD) هي مرض فيروسي شديد العدوى يصيب المواشي مثل الأبقار والأغنام والماعز والخنازير. يسببه فيروس ينتمي إلى عائلة Picornaviridae، جنس Aphthovirus. يتسبب المرض في خسائر اقتصادية كبيرة نتيجة انخفاض إنتاج الحليب، فقدان الوزن، العقم، ونفوق الحيوانات الصغيره

يوجد سبعة أنماط مصلية رئيسية (Serotypes) من الفيروس:

(A – O - C (نادر حالياً) - Asia 1 - SAT 1 - SAT 2 - SAT 3)

✔ سلالة SAT 1

تنتشر بشكل أساسي في أفريقيا وبعض المناطق في الشرق الأوسط.

تتميز بقدرتها العالية على التحور (High Antigenic Variability).

تصعب السيطرة عليها باللقاحات التقليدية (Traditional Vaccines).

المشكلة:

التحور الجيني السريع للفيروس يؤدي إلى فشل اللقاحات غير المتوافقة (Vaccine Mismatch).

مصادر العدوي وطرق انتقال المرض :

1. الحيوانات المصابة (Infected animals

Saliva (لعاب)

Milk (حليب)

Urine & Feces (بول وبراز)

Vesicle fluid & lesions (فقاقيع وجروح الفم والقدم)

2. الحيوانات الحاملة للفيروس بدون أعراض (Carrier animals)

3. الهواء (Airborne transmission)

4. الأعلاف والمياه الملوثة (Contaminated feed & water)

5. الأدوات والملابس (Fomites: equipment, clothes, footwear)

6. وسائل النقل (Vehicles & transport)

- الأعراض السريرية (Clinical Signs)

- ارتفاع في درجة الحرارة (Fever)
- تقرحات في الفم واللسان (Oral and Tongue Ulcers)
- عرج (Lameness)
- فقدان الشهية (Loss of Appetite)
- إفراز اللعاب بغزارة (Excessive Salivation)

- تقوية المناعة في مواجهة FMD

تعزيز المناعة هو حجر الأساس في مقاومة الحمى القلاعية، خصوصًا مع سلالات سريعة التحور مثل SAT 1.

- الطرق الأساسية لتعزيز المناعة:

1. التحصين بلقاحات متعددة السلالات (Multivalent Vaccines)

2. التغذية المتوازنة (Balanced Nutrition)

نقص الفيتامينات والمعادن يضعف الاستجابة المناعية.

3. إدارة صحية جيدة (Good Herd Management)

تقليل الإجهاد (Stress) يحسن من أداء الجهاز المناعي.

4. دعم المناعة بالبايوفاكتور (Use of probiotics)

Probiotics : هي كائنات دقيقة حية (Live Microorganisms)، من أنواع البكتيريا النافعة مثل:

.Lactobacillus spp

.Bifidobacterium spp

دور البايوفاكتور في دعم مناعه الحيوان :

1. تحفيز الجهاز المناعي الفطري (Innate Immunity)

تنشط خلايا البلعمة (Phagocytes)

تزيد من نشاط خلايا القاتل الطبيعي (Natural Killer Cells - NK cells)

تحفز إنتاج السيتوكينات المناعية (Cytokines) مثل:

Interleukin-1

Interleukin-6

Tumor Necrosis Factor (TNF-α)

2. تحفيز المناعة المكتسبة (Adaptive Immunity)

أحد أهم أدوار البروبيوتيك هو تنشيط خلايا B Lymphocytes المسؤولة عن إنتاج IgM و IgG في بطانة الأمعاء والتي تُحسن من توازن الميكروبيوم المعوي مما يعزز مناعة الجهاز الهضمي والمناعة الكلية

IgG (Immunoglobulin G): الجسم المضاد الأساسي في الاستجابة الثانوية ضد الفيروسات والبكتيريا.

IgM (Immunoglobulin M): أول جسم مضاد يُنتج عند التعرض الأولي للعدوي

70% من الجهاز المناعي الحيواني موجود في الجهاز الهضمي.

- يمكن دمج البروبيوتيك مع اللقاحات لتعزيز فعالية التحصين (Vaccine Potentiation).

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