Impact of FMD on milk yield, mastitis, fertility and culling on a large-scale dairy farm in Kenya

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Background – FMD Economics

Lack of objective field data looking at FMD impact particularly in *endemic* settings

Tendency to rely upon *expert opinion* and *assumptions*

More data needed to inform *cost-benefit* analyses of *control* measures (e.g. vaccination strategies, culling and compensation measures)

Need data from *different people involved in the system* as outlined in the PCP stage 1
Background

**Objective**: to quantify the *impact* of FMD on a large-scale dairy farm in Kenya focussing on:

- **Milk yield**
- **Clinical Mastitis**
- **Culling**
- **Fertility**
Outbreak

KENYA

NAKURU COUNTY
Farm background

Dairy Herd: 650 mainly Holstein-Friesian
Milking around 250 cows
Calving all year around
Artificial insemination only

All cows uniquely identified

Record daily milk yields, health and fertility events, sales etc in InterHerd (InterAgri, School of Agriculture, University of Reading, UK).
Outbreak – August/September 2012

Serotype SAT2, lasting 29 days

**Case definition:** Hypersalivation with any other sign indicative of FMD: decreased milk yield, decreased feed intake, oral/interdigital/teat lesions, pyrexia

**Vaccine:** Limited/no vaccine effect in preventing clinical disease. Overall Attack rate: 400/644 (62.1%)
Milk yield – overall impact

Outbreak period
Milk yield – Reported FMD cases versus non-cases

Outbreak period
Milk yield – No difference?

Possible reasons:

1. Poor/inaccurate recording of cases
2. Insensitive case definition
3. Subclinical infection

Next approach:

**Predict** yield for all individuals based on historic farm records accounting for parity, days in milk, and season (GEE model with a AR1 autocorrelation matrix)

**Compare** production from beginning of outbreak to end of 305 day lactation irrespective of disease status
Milk yield – Actual vs Predicted

Impact dependent on parity and lactation stage when diseased.
Clinical mastitis and culling – Survival analysis

Follow up: 12 months from beginning of outbreak

Statistics: Cox proportional hazard regression

Adjusted for any non-proportional hazards by incorporating time varying effects

Study population: Culling - All animals

Mastitis - ≥18 months old
Clinical mastitis

Study population restricted to animals over the age of 18 months at start of outbreak
Clinical mastitis

Adjusted Hazard Ratio (first month) = 2.9, 95%CI 0.97-8.9, P=0.057
Culling

Adjusted Hazard ratio: HR=1.7, 95% CI 0.90-3.4, P=0.10

Culling is defined as exiting the herd for any reason associated with an adverse health event.
Submission rate decreased, but pregnancy rate not affected
No obvious effect on abortion, but increased returns to service.
Summary - overall

- **Milk yield** – Depends on parity and lactation stage
- **Clinical mastitis** – 3 times the hazard in first month
- **Culling** – 1.7 times the hazard over 12 months
- **Fertility** – impact on submission rate, returns to service

Data may be used in developing cost analyses

**Limitations**

Generalisability

(Smallholders produce ≈ 70% milk output)

Lack of statistical power

Vaccination mitigating impact
Conclusions - summary

Great need for *rigorous evaluations* of disease impact.

There needs to be *investment in data collection* on *disease losses and costs* so that we can move away from relying on expert opinion and assumptions.

Essential to reliably quantify impact for allocating *limited resources* in animal disease control.

More need for field data from *different farming systems* in *different settings*.
Acknowledgements

Hamish Grant and his workers at Gogar Farm, Rongai

Co-authors of research:
Neal Alexander, Paul Fine (LSHTM)
Jonathan Rushton, Katharina Stärk (RVC)
Andrew James (University of Reading)
Keith Sumption (EuFMD), Thomas Dulu (Kenyan DVS)

Funders:
Bloomsbury Colleges, University of London
EuFMD
MSD Animal Health, Royal Veterinary College (London)