



EU Approved



The True cost of Mycoplasma MG/MS in commercial layers



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The Mycoplasma Treatment



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Mycoplasma gallisepticum (MG) and Mycoplasma synoviae (MS)

- Pathogenic in chickens : *M. gallisepticum* (Mg), *M. synoviae* (Ms)
- Large economics losses
- Complex diseases / problems (Agent – Mg / Ms > Host > Environment)
- Infected birds are subject to additional challenge stresses found in the field environment such **ammonia (20 PPM)**
- Coinfection with respiratory viruses: IB, AI and ILT and/or respiratory bacteria: E.coli and ORT

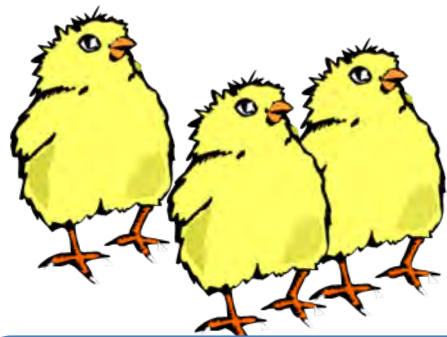


MG – 2 Sources of Infection

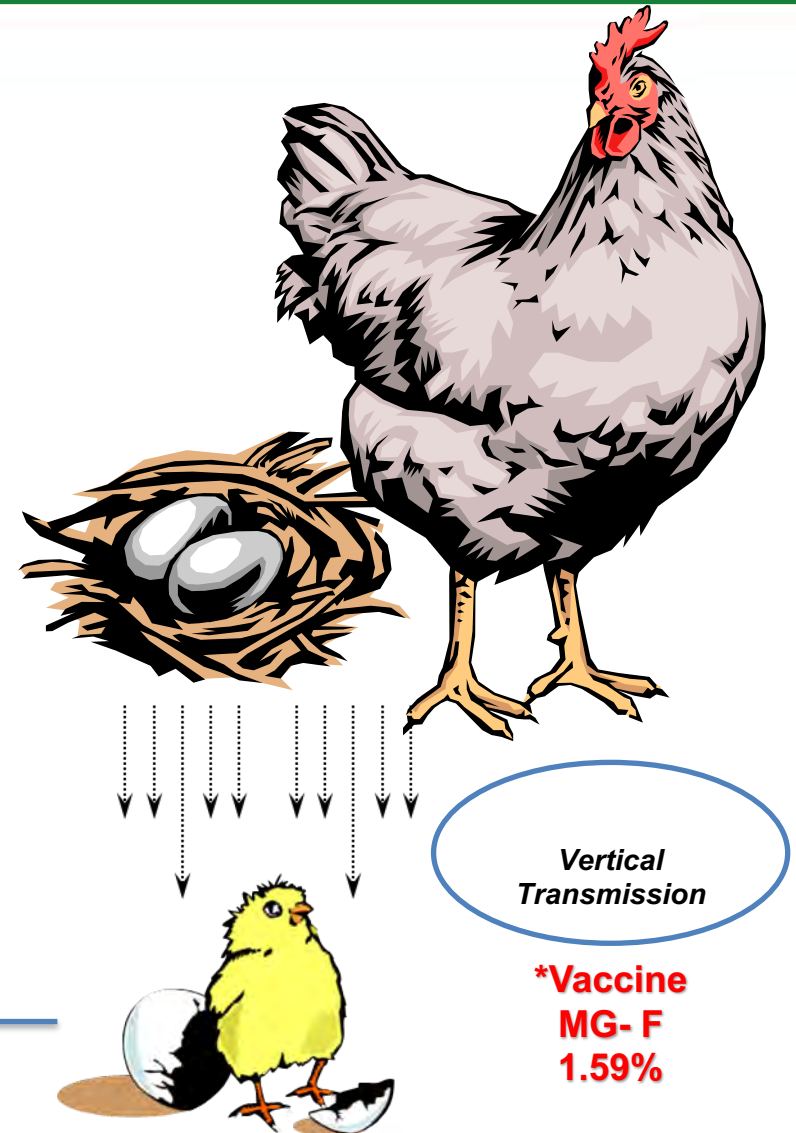
1) Vertical transmission

Through the eggs to chicks, at variable rates
(Egg transmission probably involves infection
of the OVA following the air sac infection or
bacteremia)

(Ref Roberts & McDanie; Glisson & Kleven, 1984)



**Horizontal
Transmission**



Reported peak egg transmission rates for the MG – R strain ranging from 14% to 53%, between 3 and 8 weeks after infection, highlighting the variable nature of the *M. gallisepticum* vertical transmission”

(Ref. Lin & Kleven, 1982 ; Glisson & Kleven, 1985; Sasipreeyajan et al., 1987b; Ortiz et al., 1995).

Why is control important

2) Horizontal transmission

- In the hatchery, and within flocks (flocks/farms)
- Birds remains positive for life
- Other birds – turkeys, ducks, goose, pheasants, quail, partridges, pigeons, parrots, house finch etc.
- Mechanical, fomites, equipment, airborne?
- MG/MS survives in the environment

MG: about 4 hrs to 4 days in feathers, timber, shavings, straw, boots and cotton

(Ref. Christensen, N. H., C. A. Yavari, A. J. McBain, and J. M. Bradbury, Avian Pathology, 23:127-143, 1994.)



Mycoplasma gallisepticum (MG) - Clinical Signs

Signs:

- Nasal discharge, coughing, sneezing, tracheal rales, sinusitis & conjunctivitis (esp. turkeys & game)

Economical consequences:

- Poor weight gain, poor FCR, mortalities
- Downgrading at slaughter (air-sacculitis)
- Reduced egg production in layers
- Reduced hatchability & livability of chicks/poults



Airsacculitis



Naola Ferguson-Noel - Nov 2018

Caseous Airsacculitis



Naola Ferguson-Noel - Nov 2018

Ovarian regression (Follicle Atresia)



Chronic Respiratory Disease



Naola Ferguson-Noel - Nov 2018

Treatment

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M. synoviae (Ms)

- M. synoviae incidence has increased over recent years, especially in commercial layers
- Figures for commercial layers indicate a high *Ms prevalence world-wide (65-95%)*
- Landman (2014): *"Is Mycoplasma synoviae outrunning Mycoplasma gallisepticum ?"*

Ref: A viewpoint from the Netherlands. Avian Pathology, 43, 2-8



Mycoplasma synoviae (MS) - Clinical Signs

A remarkable pathogen in the global poultry industry
3 syndromes

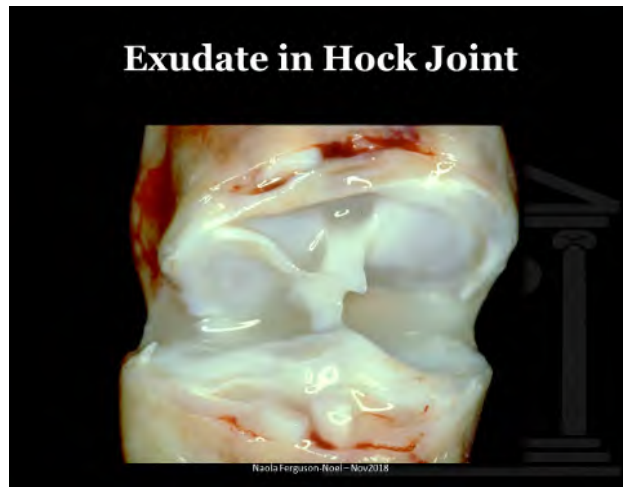
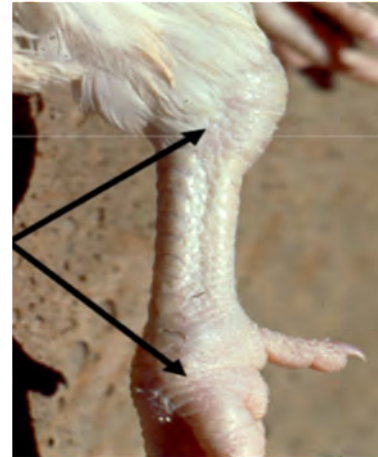
- 1. MS infection frequently occurs as a subclinical infection of the upper respiratory tract in chickens
- 2. The systemic infection of MS causes infectious synovitis showing an inflammation of tendons or synovial membranes of joints
- 3. In addition to respiratory tract tropism strains and arthropathic strains, the oviduct tropism strains are able to induce eggshell apex abnormalities (EAA)



Mycoplasma synoviae (MS)

- **Respiratory system – Air-sacculitis**
- **Joints – amyloid arthropathy in layers, broilers, turkeys**
- **Oviduct**

Egg Apex Abnormalities (EAA) - new MS strain



Egg shell abnormalities

- Egg shell apex abnormalities have been associated with MS colonization of the oviduct

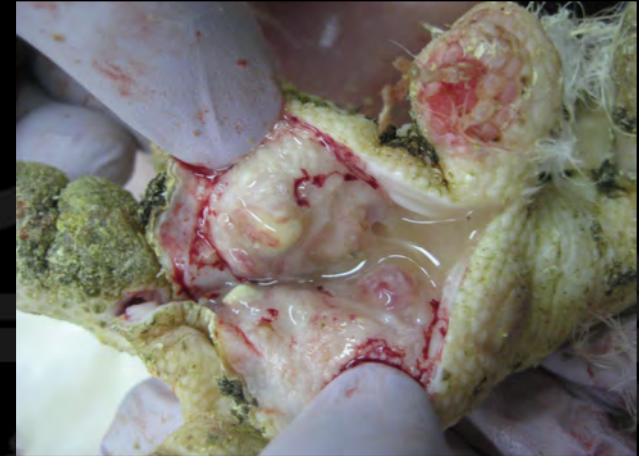


Feberwee, A., J. J. de Wit, and W. J. Landman Induction of eggshell apex abnormalities by *Mycoplasma synoviae*: field and experimental studies. *Avian Pathol.* 38:77-85. 2009.

Naola Ferguson-Noel – Nov2018

N.Italy: Approximately 1.3% to 1.8% of eggs in one flock were affected, amounting to 300-400 eggs per day; the abnormalities resulted in a great deal of breakage and spoilage of healthy eggs

Ref. AVIAN DISEASES 54:961-964, 2010 Salvatore Catania.

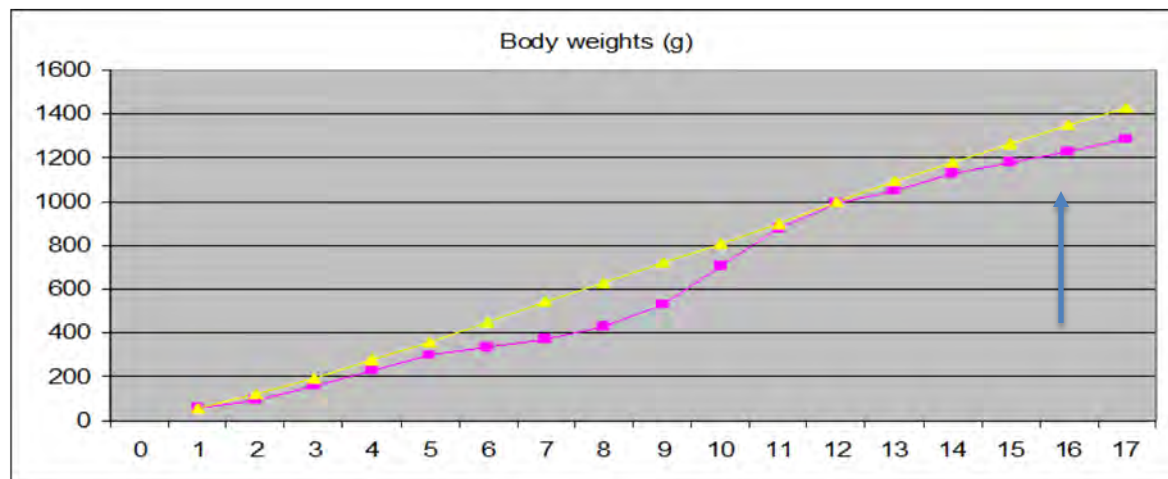


Mycoplasma organisms disappear from the lesions after few weeks of infection, but these organisms persist in the upper respiratory tract

Global Experience - Commercial Layer Rearing Phase up to 16 weeks age

In a *Mycoplasma synoviae* positive flock,

- it can be very difficult to achieve ideal pullet weight profiles in the **rearing phase**
- with consequent later deleterious effects on **delayed and less egg production** and **smaller egg size**
- when weights are hampered by MS infection.



ภาพที่ 3.2 อุ้งเท้า (foot pad) บวมและอักเสบทั้ง 2 ข้างของไก่ไข่น้ำอายุ 12 สัปดาห์ (ลูกศรีสะเกษ) เมื่อทำการกรีดเปิดอุ้งเท้าจะพบสิ่งขี้ม้วนและหนืดซึ่งเป็นรอยโรคอย่างหนึ่งการติดเชื้อเอ็มเอสระยะแรก

infectious synovitis at 12 weeks in MS positive flock in Thailand

Mycoplasma synoviae (MS) + *E.coli* at the peak of production

Study at University of Georgia, USA

- Ms infection at the start of the laying period increases the risk of peritonitis due to *E. coli* at the peak of production
- The same strain of *E. coli* is isolated from the trachea, the abdomen and the bone marrow (evidence of a respiratory infection)
- Ms + *E. coli* induce significant damage to the tracheal mucosa lesions and peritonitis
- 10,000 layers : 1% week mortality
100 Birds at 5 \$ = \$500 per week !

	Weekly Mortality
MS +	0.26% - 1.71%
MS Free	0.07% - 0.30%



Ref. Raviv et al. (2007) 'Role of *Mycoplasma synoviae* in commercial layer *Escherichia coli* peritonitis syndrome.' Avian Dis. Sep, 51(3):685-90.

Free Range Commercial layers in UK



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**ZERO
DAY**
EGG WITHDRAWAL

The Mycoplasma Treatment



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Mycoplasma synoviae (MS) – The true cost ! **Not only 21 eggs per hen/housed**

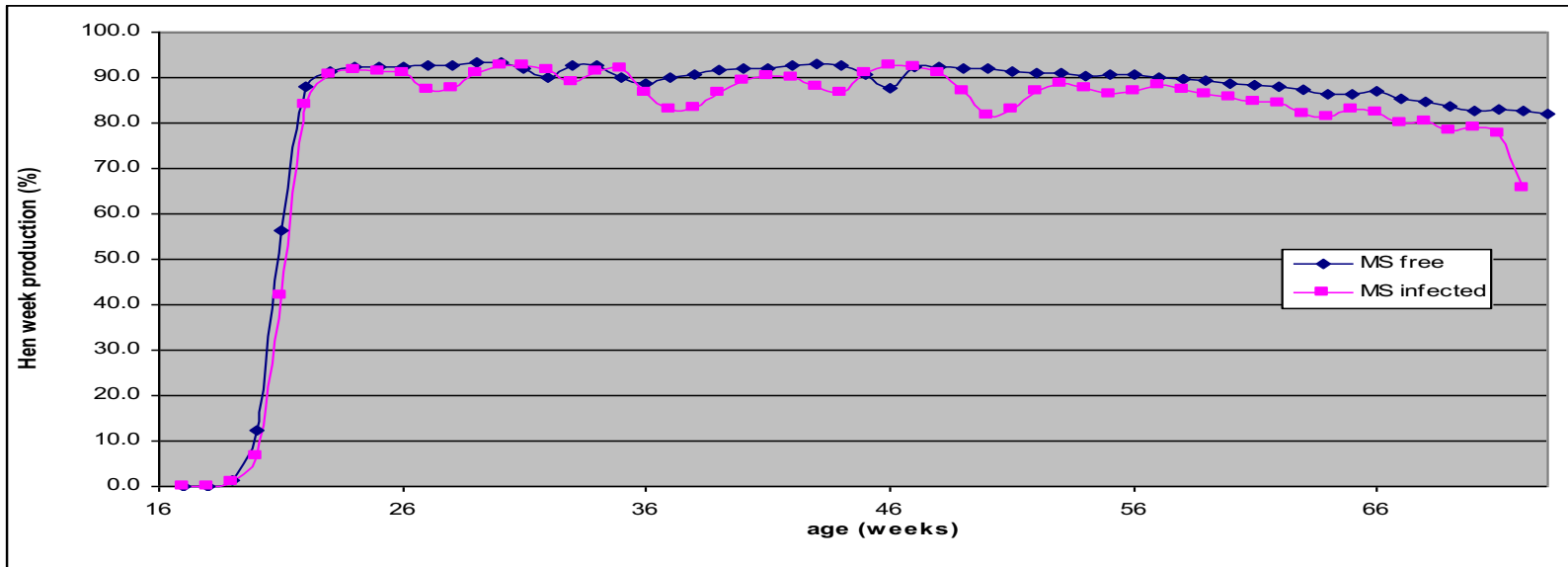


Table 2 – Performance data for MS negative and MS positive layer flocks.

	MS free	MS positive
Eggs per hen housed	321	300
B- Grade percentage	2,87%	3,76%
FCR	2,36	2,47
Mortality	5%	12,60%
Point of lay pullet price	£3,90	£3,90
Price of Feed per tonne	£ 210	£ 210

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Ms investigation in a Free Range commercial layer site in UK

Case study – “WS Aivlosin®, ” (In production)

- Serology results at 30 weeks before treatment.
- MIC results from the culture carried out by Liverpool University and MIC analysis through Mycoplasma Experience showing low MIC and MBC for Aivlosin®, the drug of choice.
- Egg production graphs up to 64 weeks.
- Mortality % showing when the first treatment started at 33 weeks of age for Houses 5 and 6.



Ms – ELISA Titre investigation in a Free Range site

Houses 5 and 6 at weeks: MS and ORT positive

**Houses 5 and 6 at
30 weeks**

			Titre				Titre Group													
Test (Method Ref)	Hse	Num	Mn	CV	Max	Min	0	1	2	3	4	5	6	7	8	9	10	11	12	
# Mg Elisa (DGN005)	5	9	29	53	65	12	9													
# Ms Elisa (DGN006)	5	9	3258	73	6602	984		4		1		2	2							
ORT (Elisa)	5	9	7332	32	10691	4371					4	1	2	2						

			Titre				Titre Group													
Test (Method Ref)	Hse	Num	Mn	CV	Max	Min	0	1	2	3	4	5	6	7	8	9	10	11	12	
# Mg Elisa (DGN005)	6	10	42	97	130	4	10													
# Ms Elisa (DGN006)	6	10	3688	61	7854	533	1			5		2	2							
ORT (Elisa)	6	10	6932	50	12814	2437			1	1	3	1	2	2						

MIC - Ms investigation in a Free Range site

Ms culture grown at Liverpool University, UK

MIC testing for KG34, KG36 Ms trains

Tylvalosin showed lowest MIC as compared to Tiamulin and Oxytetracycline

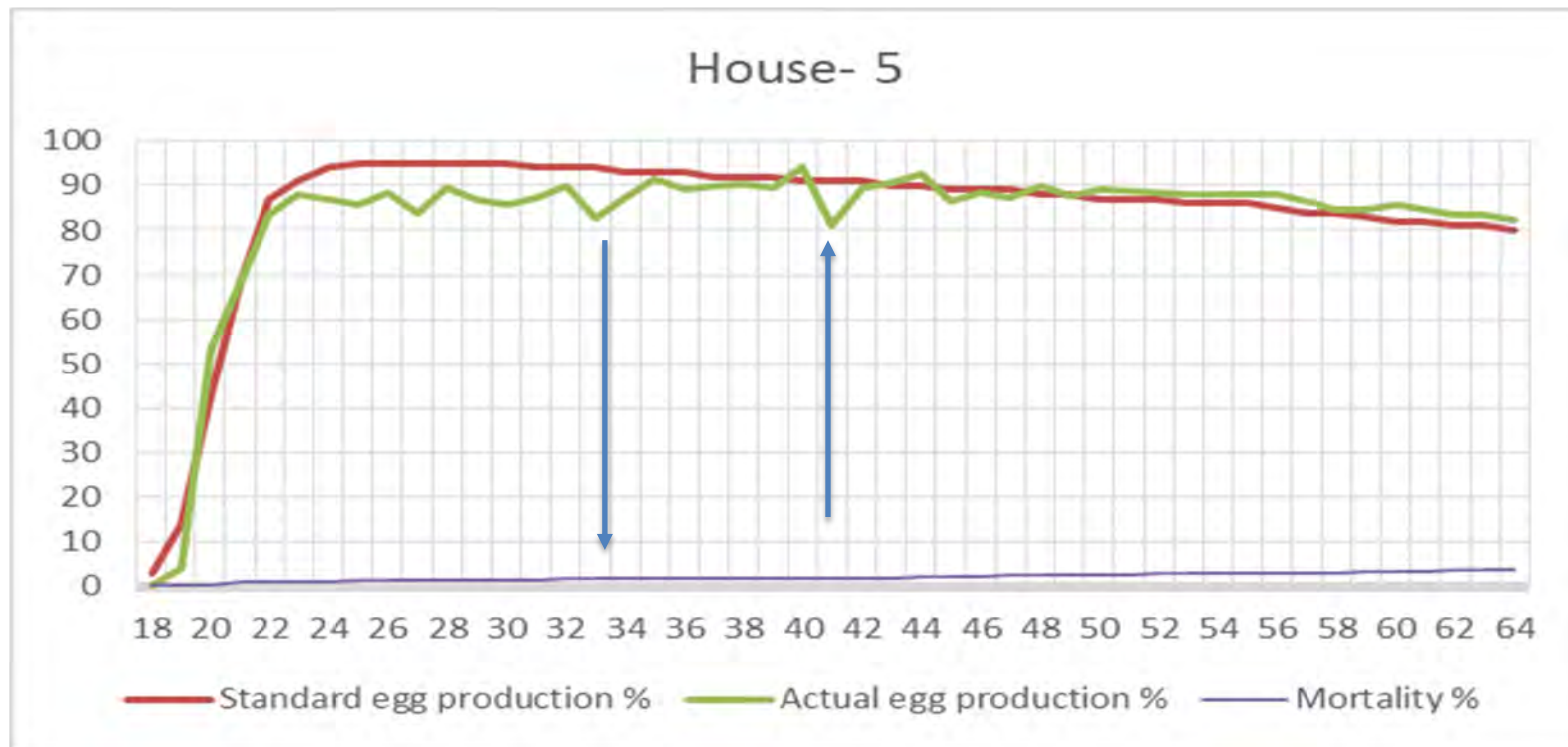
MS STRAIN - values in µg/ml

	MIC KG34	MBC	MIC KG 36	MBC
Tylvalosin (Aivlosin®)	0.008	0.03	0.03	0.03
Tiamulin	0.06	0.5	0.06	0.125
Oxytetracycline	0.125	2	0.03	0.125



Ms investigation in a Free Range site

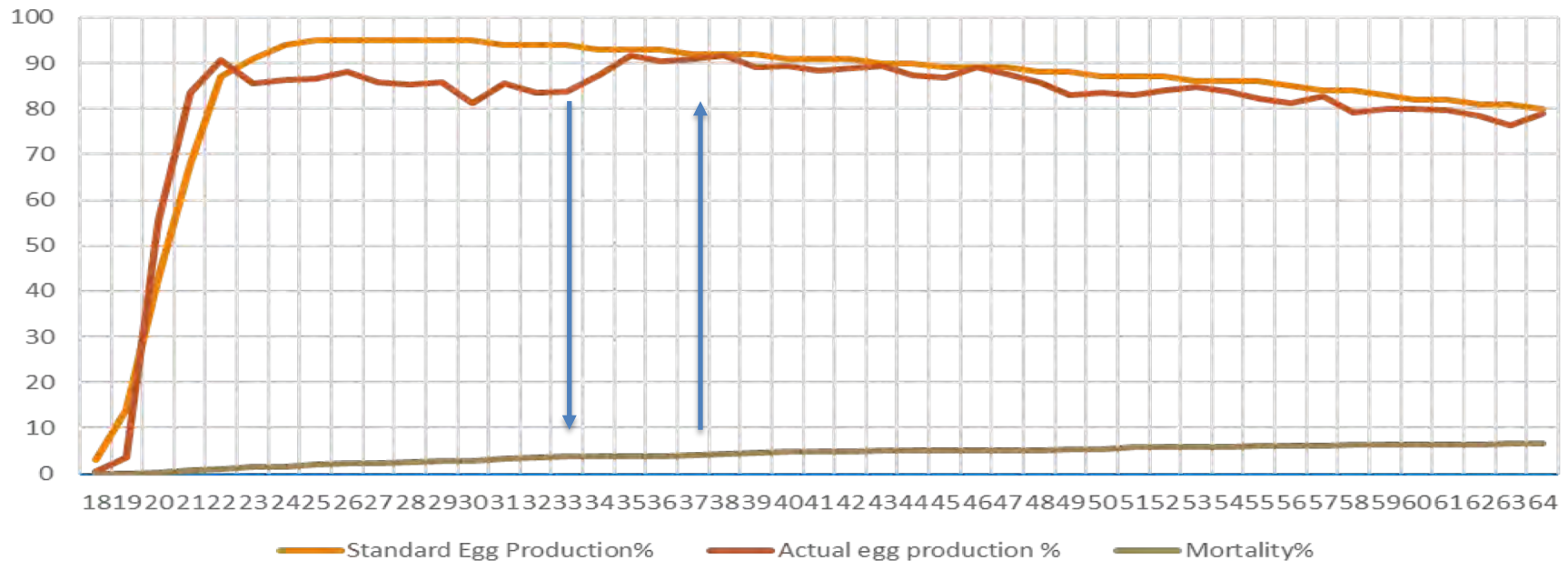
Egg Production and start of treatment at 33 weeks of age



Ms investigation in a Free Range site

Egg Production and start of treatment at 33 weeks

House -6 MS + IB



Ms investigation in a Free Range site

- Blood samples taken in the rearing, and every four weeks throughout lay as well as swabs for PCR. If they were negative, we tested again four weeks later. If they were positive, we treated with Aivlosin® Water Soluble for 3 consecutive days in drinking water
 - The birds in the rearing were initially **positive for Ms**, indicating poor bio-security **and placed in Houses 5 and 6**.
 - This had an effect on Houses **1, 2 and 4**, which remained negative for Ms **but did become infected with ORT**.
 - Houses 1, 2 and 4 were treated with Aivlosin®
 - Whilst Houses 5 and 6 were depleted and remained negative for Ms.
- New birds entering from the rearing house were negative for Ms and the site had become Ms negative.

Overall costs of MG - MS infections

For a Systemic disease (respiratory, reproductive and skeletal)

PRODUCTION COSTS

- **Mortality**
- **Reduced, delayed egg production**
- **Reduced number eggs set**
- **Reduced hatchability**
- **Loss of exports - in some countries (in case of MG+)**
- **Poor weight gain / Reduced feed conversion rate**
- **Reduced egg quality (shell quality), breaking eggs**

Commercial layers and broiler breeders: 10-20% loss of egg production and 5-10% increased embryo mortality

(Ref.: Stipkowits & Kempt, 1996)

OTHER COSTS

- **Laboratory tests**
- **Treatments**
- **Increased labour**

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