

Does *L. borgpetersenii* serovar *Hardjo* have an effect on New Zealand sheep production?



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Sheep farming in New Zealand

- 32 million sheep
- Market value (export)
 - Meat 2,060 million USD
 - Wool 770 million USD
- Seasonal production
 - Spring lambing (Aug-Oct)
 - Pastoral system



Lepto in New Zealand sheep

- Farm prevalence up to 90%
- Animal prevalence 40%
- Outbreaks during flood years
- Hardjo (type Hardjobovis) and Pomona
- Source of human infection

Effects of Lepto?

- In literature
 - Associated with fetal and perinatal losses in sheep
 - Genital carriage of Hardjo
- In other species
 - Abortions, subfertility in cattle
 - In New Zealand farmed deer
 - Up to 6kg difference
 - Up to 10% reduction in weaning rates



Question

- Does leptospirosis reduce sheep **growth** and **reproduction**?
- If yes, does **vaccine** reduce the losses?
- Is vaccination **cost-effective** (when compared to animal production)?



The study

- August 2011 – ongoing
- Split flock vaccination trial (1/3 – 2/3)
 - Commercial bivalent vaccine
 - *L. borgpetersenii* serovar *Hardjo*
 - *L. serovar Pomona*
 - Natural challenge
- 8 sheep and beef commercial farms
 - 2260 ewe lambs
- Comparison
 - Vaccinated and control
 - Seroconverted and seronegative



Time frame

1 month old



7 month old



1 year old



Sept

Jan

July

Sept

Jan

Lambing

Docking
d0

Weaning

Mating

Scanning

Docking of
progeny

Weaning of
progeny



vaccination

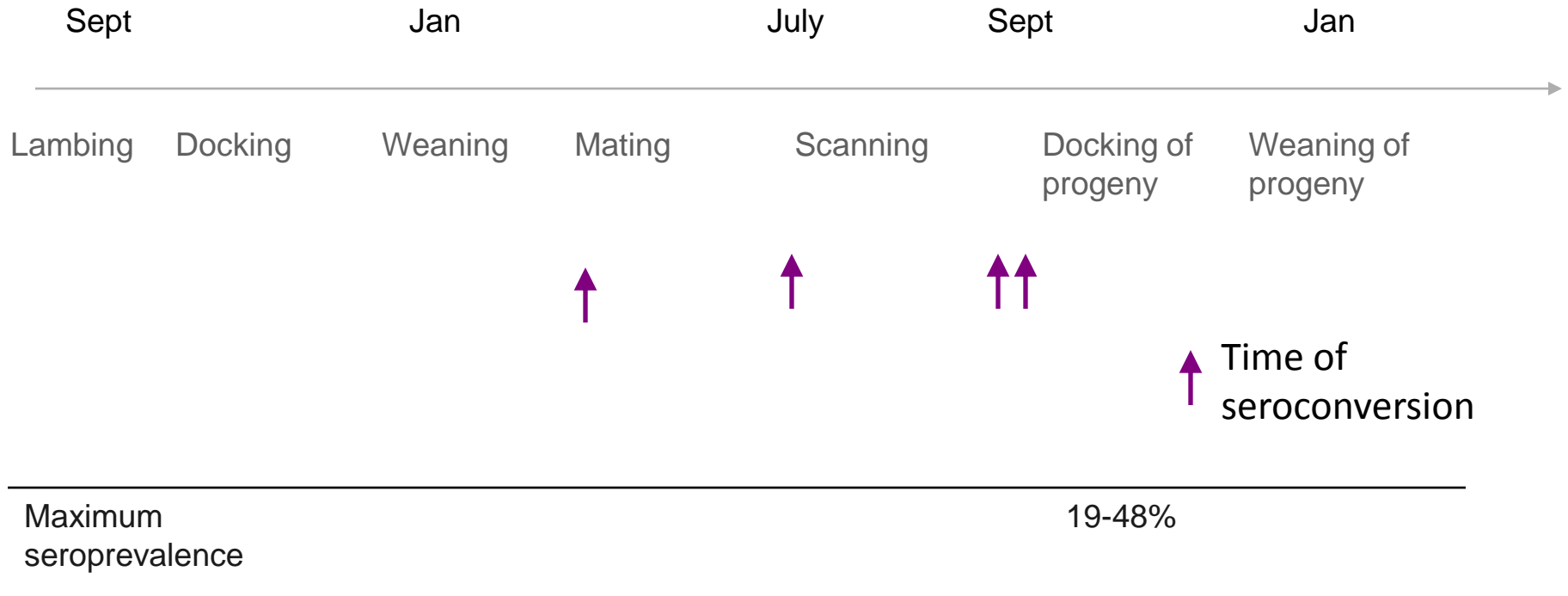
Hoggets mating: 6 farms

2-tooth mating: 2 farms

MAT on control animals

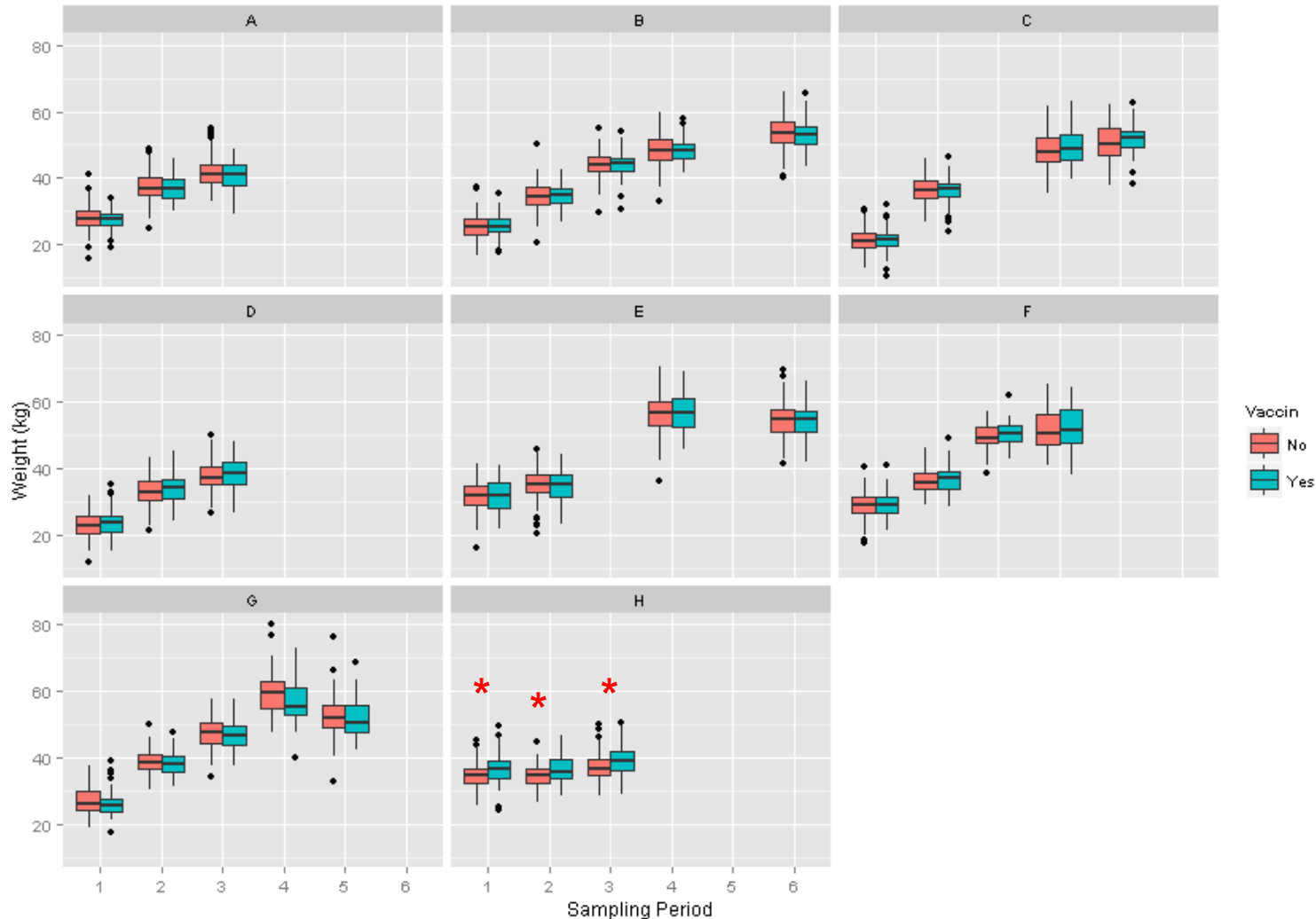


Pomona seroconversion



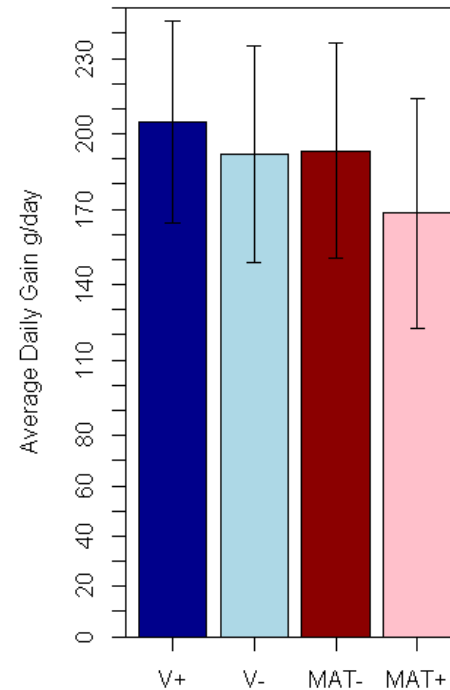
Cut-off 1:48

Analysis by farm - growth

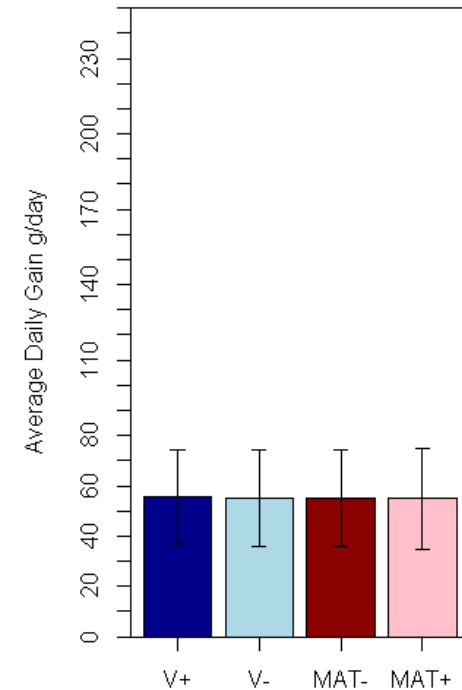


Farm F: early seroconversion

- Early challenge
 - 1 farm → up to **19g/day**
 - Corrected by vaccination
- Later growth effects not observed
- No reproductive effects observed



Period 1

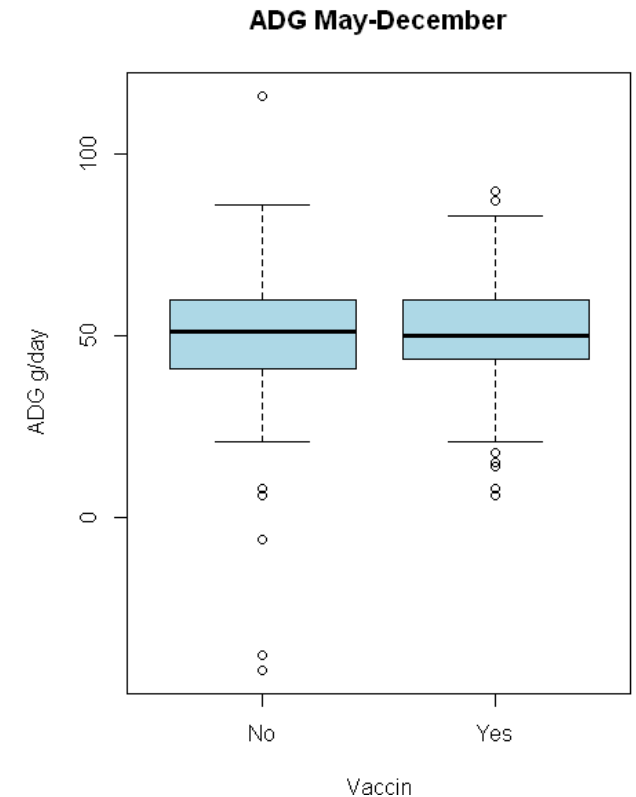


Period 2

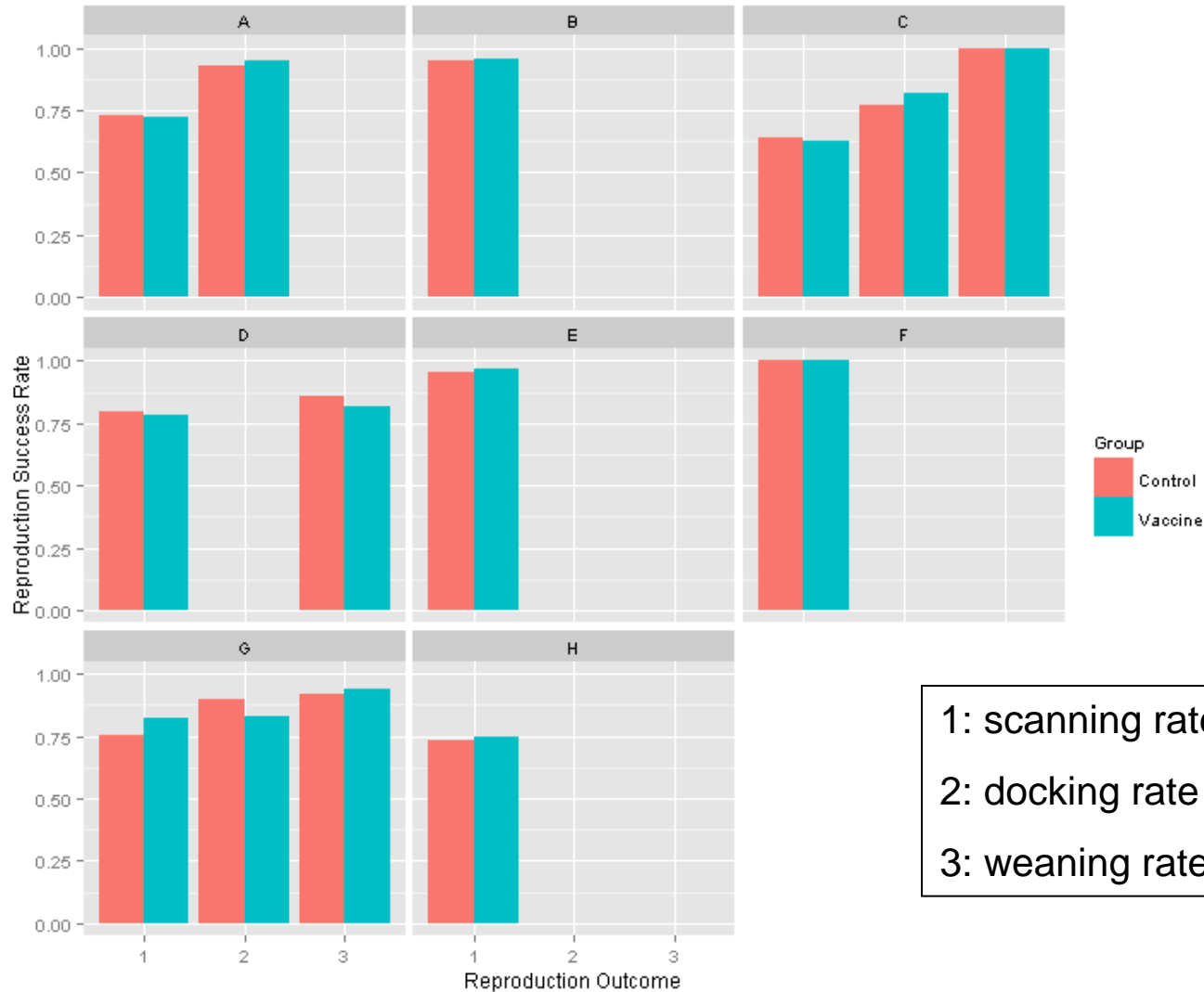
Cut-off for MAT+ 1:768

Farm C: late seroconversion

- Seroconversion May - December
 - Hardjo 5% → 97%
 - Pomona 13% → 43%
- Average Daily Gain May-December
 - Vaccinated 49.9 g/day
 - Control 49.5 g/day



Analysis by farm: reproduction



Models

- Multilevel linear and logistic regression models
- Relation between weight/growth/reproduction and vaccine status
- Adjusted for Farm, Pregnant, Mating weight, Age, correlation within sheep
- Interaction factor Farm*Vaccin
 - Effect of vaccine depends on prevalence
- Vaccine coefficient not significant

Shedding prevalence

- Random subsample in each farm
- On the day of annual booster or later
 - d217-632
- Real time PCR on urine
- Shedding prevalence in control group
 - One farm negative
 - Overall 49%
 - 11-88% in 7 farms

Vaccine efficacy on shedding

- 4 vaccinated shedding
 - 1 possibly already infected (farm F)
 - 3 in the same farm (farm H)
 - Cross contamination?
 - Trial conduct?
 - (Other serovar?)

- Vaccine efficacy
 - 88.5% [70.4-95.5%]
 - (96.2% [73.4-99.5%])

	PCR+	PCR-
Vac+	4	72
Vac-	44	46

Provisional conclusions (in NZ)

- Growth deficiency due to Hardjo?
 - **Yes, if exposed early**
 - No if exposed later
 - Reproduction deficiency due to Hardjo (and Pomona)?
 - No
-
- Host adaptation of serovar Hardjo?
 - Long term effects?

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Thank you

