Norwegian School of Veterinary Science

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Bioforsk

Effect of tick-borne fever on weight gain in sheep

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Ticks (*Ixodes ricinus*)…

Photo Lise Grøva

Photos Lise Grøva

...feed
on
sheep...

… and may transfer disease.

Photo Lise Grøva

Background

- Losses and welfare challenges for grazing sheep in Norway:
  - Blow-flies
  - Alveld (photosensitivity disease related to grazing *Narthecium ossifragum (L.)*)
  - Predators
  - **Tick-borne fever (TBF) (Norwegian: sjodogg)**

- TBF is caused by the bacteria *Anaplasma phagocytophilum* transmitted by the tick (*Ixodes ricinus*)

- Clinics: high fever
- **Immunosuppression - secondary infections**

Background - continued

- Reduced growth and live weights : - 3,8 kg
- High losses of lambs: > 30%
- Estimated that 300 000 **lambs** are infected every year

- The occurrence of ticks seems to increase and spread:
  climate change, bush encroachment, increased number of deer…

- Lack of preventive measures other than acaricides (pour-on), clearing bush, drain wet areas, remove hosts and early infection on lambs

- Risk of ticks becoming resistant to acaricides

Aims :

1. The extent of production losses to TBF in Norwegian sheep farming

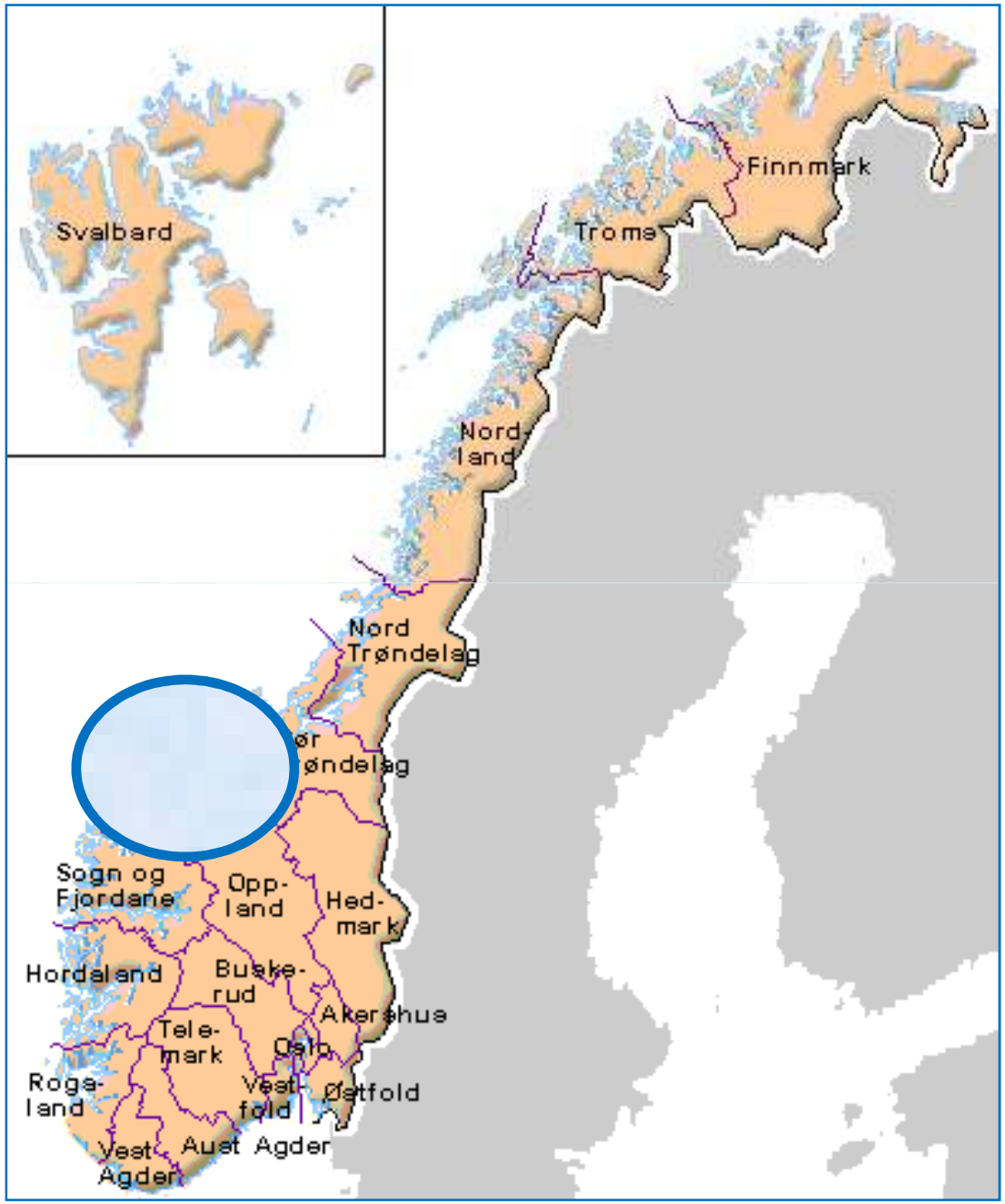
2. A best possible time and condition for lambs to develop immunity on tick infested pasture

3. A) Compare breed difference in resistance to TBF
   B) Estimate heritability of survival on tick infested pastures.

Photo Kari Grøva

1 Production losses - method

- Blood sampling autumn 2007:
  974 lambs from 12 flocks
- Blood sampling autumn 2008:
  246 lambs from 3 flocks
- Total 1220 blood samples from lambs



One ram circle
(Coastal area
of Mid Norway;
Sunndal, Todal og
Ålvundeid)

Method - continued

- Serum analysed for antibodies
- Data from the National Sheep Recording System (weaning weight, age, sex, rearing rank, father, age of dam)
- Compare infected and non-infected lambs by Anova (Proc mixed in SAS)

Photo Steffen Adler

Weight difference?

- **Information from 1220 lambs in the Norwegian National Sheep Recording Scheme including autumn live weight at mean age of 137 days**

- **Analysis of variance (Proc mixed in SAS)**
- **Model**

  Autumn live weight =

  fixed effects: **lamb age, infection, age dam, sex, type birth-rearing combination**

  random effects: **year, flock*year, mother(flock year), sex(flock year), birth-rearing combination(flock year)**

Heterogen varianse for sex was taken into account.

All variables are class variables except lamb age.

Result

- Infected lambs in 11 out of 12 herds in 2007
- > 50 % of samples positive in 8 herds in 2007

- 55 % of the 1220 samples were positive

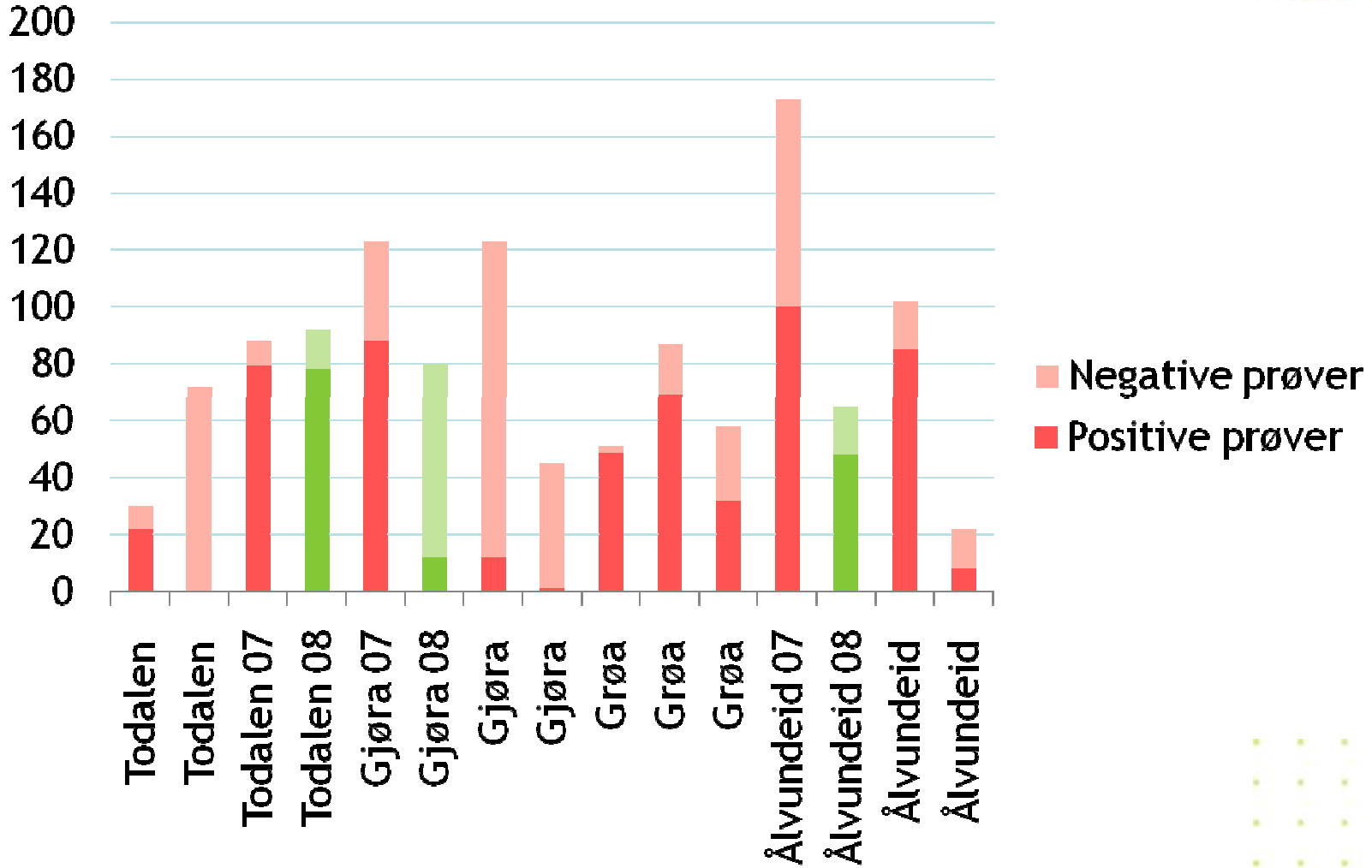
⇨ Infection is widespread

- Supported by previous mapping of infections in 2008 in 35 flocks in the Møre and Romsal county, documenting infections in all 35 flocks

Tabell 1. Percentage of lambs positive for A. phagocytophilum

Farm/area	Total number samples	Percent positive samples
Todalen	30	**73**
Todalen	72	**0**
Todalen	88 (92)*	**90 (84)***
Gjøra	123 (80)*	**72 (15)***
Gjøra	123	**10**
Gjøra	45	**2**
Grøa	51	**96**
Grøa	87	**79**
Grøa	58	**55**
Ålvundeid	173 (74)*	**58 (65)***
Ålvundeid	102	**83**
Ålvundeid	22	**36**
Totalt	974 (246)*	**56 (56%)**

* Figures in (brackets) are figures from 2008.


200
180
160
140
120
100
80
60
40
20
0
Todalen
Todalen
Todalen 07
Todalen 08
Gjøra 07
Gjøra 08
Gjøra
Gjøra
Grøa
Grøa
Grøa
Ålvundeid 07
Ålvundeid 08
Ålvundeid
Ålvundeid
Negative prøver
Positive prøver

Results

- Questionaire:

Observation of ticks on pasture?	2/12 farmers said NO
% infected on these farms:	10%, 96%
Use of acaricides?	8/12 farmers said YES
% infected on these farms:	0 – 90%

Altitude (m.a.s.l.) of spring, summer and autumn pasture?
Transport to or grazing on to summer pasture?
Age of lambs let out on pasture?

Lamb losses in the 12 herds were between 0 – 36%

Results

- **1,34 kg** (± 0.4335) **or 3%** lower autumn live weight of antigen positive than antigen negative animals.
- Significant difference, $p < 0.01$

Discussion and conclusion

- Infected lambs in flocks where farmers did not suspect ticks to be prevalent
- A reduction in mean body weight of infected lambs of **1,34 kg** less than expected, but significant
- Some flocks with infected animals have high losses, others don't…
- Several variants of *Anaplasma phagocytophilum* eksist, but blood analyses in the present study did not distinguish between these
- Different variants of *Anaplasma phagocytophilum* has shown to give variable clinical signs, and probably different effects on growth ….

Resources in the project

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- Ingrid Olesen
  Statistics, genetic analysis of survival

- Snorre Stuen
  Tick-borne fever, sheep and infection biology

- Håvard Steinshamn
  Project leader

- Lise Grøva
  PhD student

- Mike Stear, University of Glasgow, Scotland

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Thank you

Photo: Kari Grøva