

Effects of kelp meal on health and productivity of mink challenged with the Aleutian mink disease virus

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Introduction

- **Nova Scotia: >50% of ~ 2,000,000 mink pelts in Canada**
- **The problem: Aleutian mink disease virus (AMDV) ssDNA virus, 4801 bp**
- **Endemic in Nova Scotia**
- **Mortality and reduced performance**
- **No vaccine or a treatment**
- **Virus eradication**
 - Detection of antibodies against the virus by counter-immunoelectrophoresis (CIEP)
- **Since mid-1970s, little progress**



The big change

**Selection for increased tolerance to the disease symptoms.
The most significant change in the mink industry**

Nova Scotia ~ 1,000,000

USA ~ 1,300,000

The Netherlands ~ 700,000

and the number is increasing

Selection for tolerance:

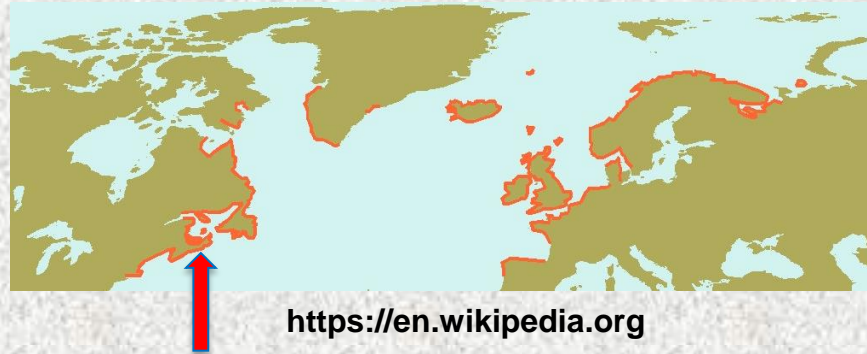
- High mortality and reduced reproductive performance for several years**
- Substances that can ease negative effects of infection are of particular interest to mink ranchers.**

Kelp: Ascophylum nodosum

Brown alga

Rockweed, Norwegian kelp, knotted kelp, knotted wrack

**Seaweed of northern
Atlantic Ocean**



<https://en.wikipedia.org>

NS: 8,600 km coastline

<http://www.inter.dfo-mpo.gc.ca/Maritimes/>

Kelp is abundant



<http://tidalorganics.com>

Objective

To evaluate kelp as a feed additive for improving health and reproduction of mink infected with AMDV



Materials and Methods

- **75 AMDV-free female black mink**
- **Inoculated intranasally with a spleen homogenate containing a local strain of the AMDV in Sep. 2013.**
- **Treatments : 0%, 0.75%, 1.5% kelp**

Feed preparation

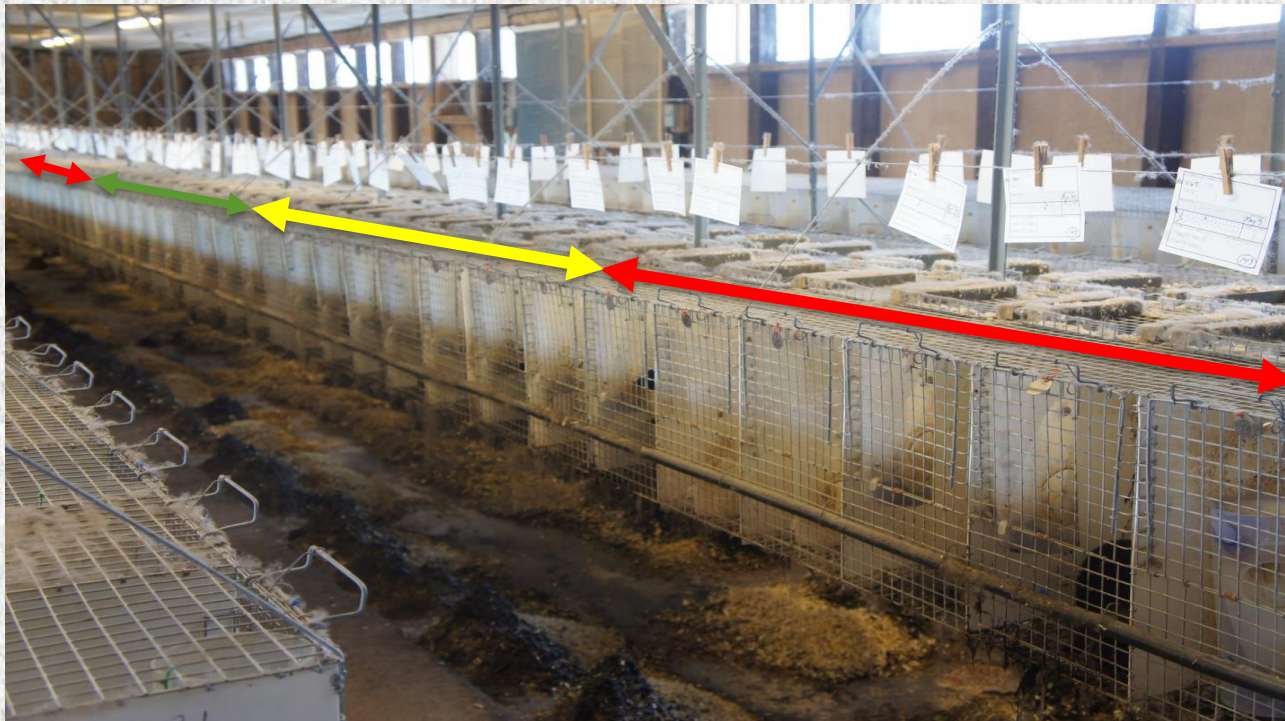
Attaching kelp powder to dry pellets

96.75% pellet + 2.5% flour + 0.75% kelp



Experimental design

Animals were housed in one row in two blocks.



Sampling

Days pi

2013

Sep. 9 Oct. 10 Nov. 5 Dec. 17

0 31 56 99

2014

Feb. 11 Sep. 11

155 367



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Measurements

- Daily health monitoring, mortality date
- Sero-conversion (CIEP)
- Antibody-titer: qELISA
- Viremia: PCR
- Serum total proteins (refractometer)
- Albumin:Globulin ratio (iodine agglutination test)
- Body weight
- Pelt defects (white hair fibers)
- Rectal temperature (31, 56, 99, 155)
- White blood cell counts (31 & 56)
 - Basophils, eosinophils, macrophages, neutrophils, lymphocytes, monocytes
- Histopathology

0, 31, 56,
99, 155,
367

Breeding

- **62 females each bred with 2 males (March 2 to 20, 2014)**
- **Each female was exposed to 2 males up to 6 times**
- **Mating results recorded (mated, held, tried, no response)**
- **Whelping: April 26-May 9, 2014**
- **Weaning: 5 to 6 weeks of age**

Data analysis

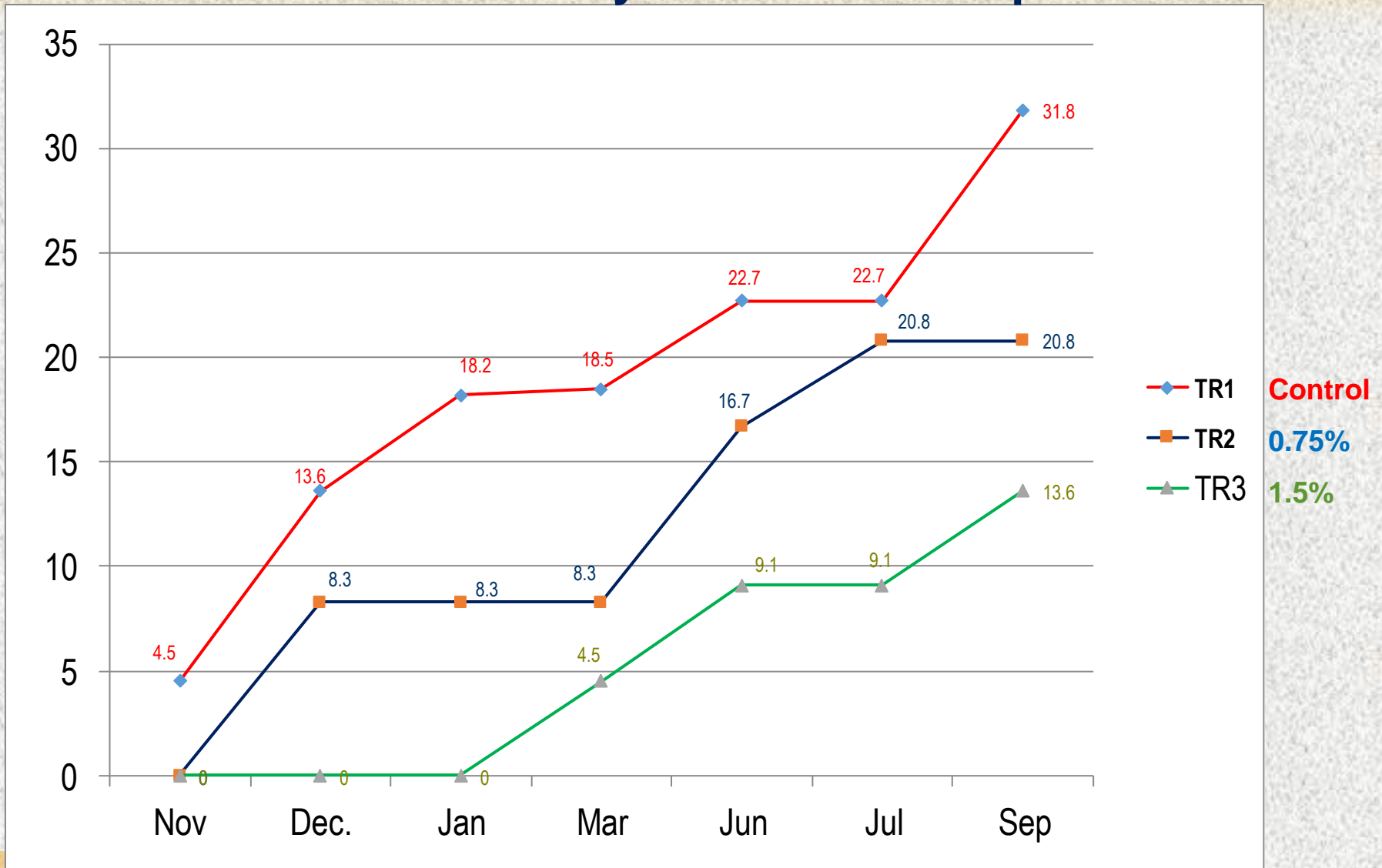
- **Statistical Analysis System (SAS)**
- **Reproductive performance: χ^2**
- **Mortality: Logistic regression (cumulative logit model)**
- **Mixed Model**

Results & Discussion

No significant effect of kelp feeding on

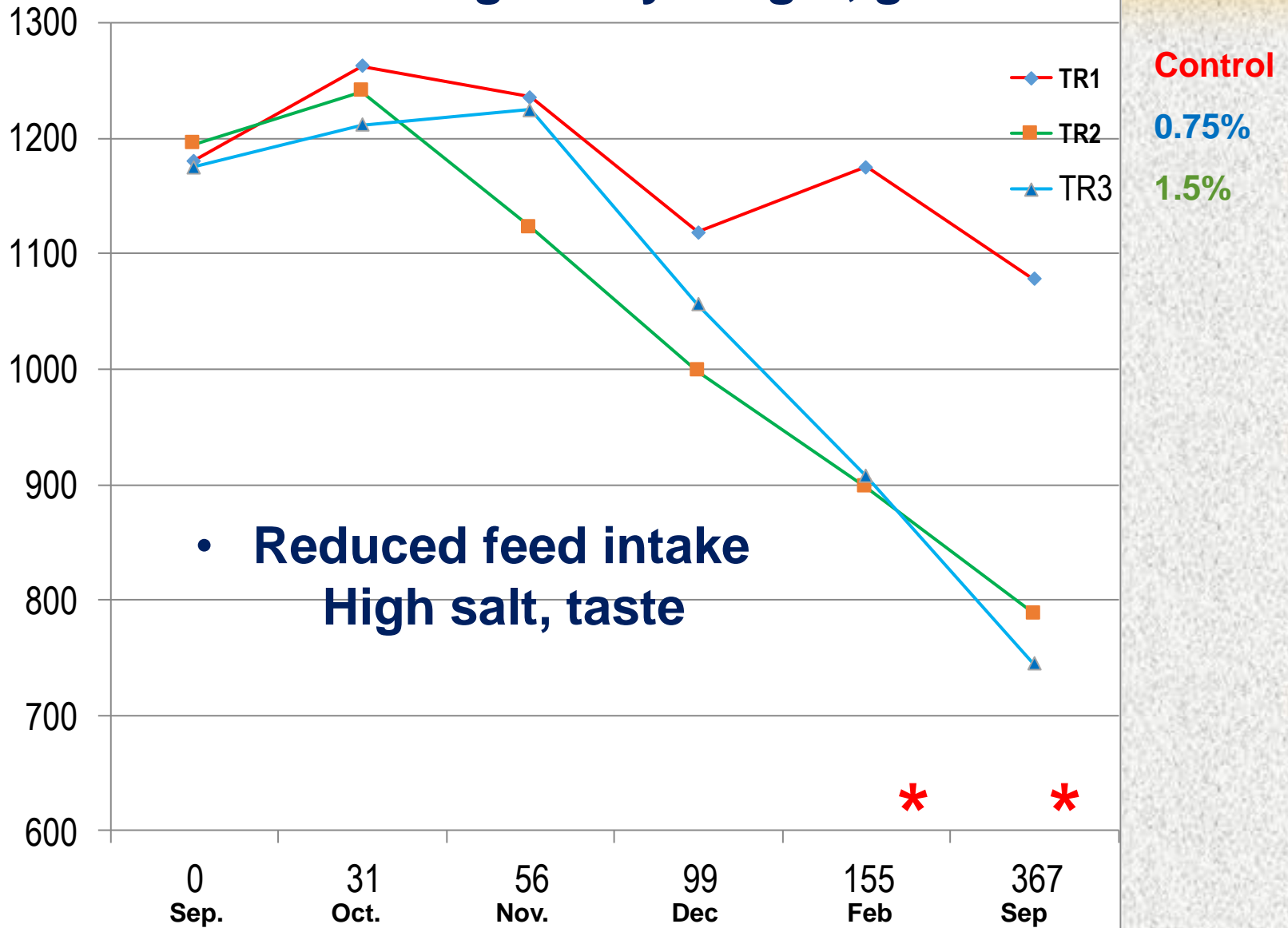
- **Antibody titer (qELISA)**
- **Viremia (PCR)**
- **Serum total proteins (refractometer)**
- **Albumin:Globulin ratio** (iodine agglutination test)
- **White blood cell types**
- **Rectal temperature**
- **Fur quality (white hair fibers)**

Cumulative % mortality: Nov. 2013 – Sep 2014



Not statistically significant

Average body weight, g



Reproductive performance

Measurement	Control	0.75% kelp	1.5% kelp	Pr
Females mated/exposed	15/18 (83.3%)	17/22 (77.3%)	19/22 (86.3%)	0.96
Females whelped/bred	12/15 (80.0%)	9/17 (52.9%)	17/19 (89.5%)	0.59
Females whelped/exposed	12/18 (66.7%)	9/22 (40.9%)	17/22 (77.3%)	0.44
Kits born alive/female exposed	32/18 (1.78)	23/22 (1.04)	114/22 (5.18)	0.00
Kits born alive/female whelped	32/12 (2.67)	23/9 (2.56)	114/17(6.70)	0.03
Kits weaned/born alive	20/32 (62.5%)	29/39 (74.4%)	78/114 (68.4%)	0.89
Kits weaned/ female exposed	20/18 (1.11)	29/22 (1.32)	78/22 (3.54)	0.00
Kits weaned/ female whelped	20/12 (1.67)	29/9 (3.22)	78/17 (4.59)	0.07

Conclusions

Feeding kelp to mink infected with AMDV

- **No significant effect on immune response parameters**
- **Tended to reduce mortality**
- **Reduced rate of gain**
- **Improved reproductive performance**

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