

Susceptibility of sea trout post-smolts to SAV3 and PRV1

**PD TriNation meeting & CMS workshop
Bergen, 13.-15. March 2018**

Kvamme, B. O.^a

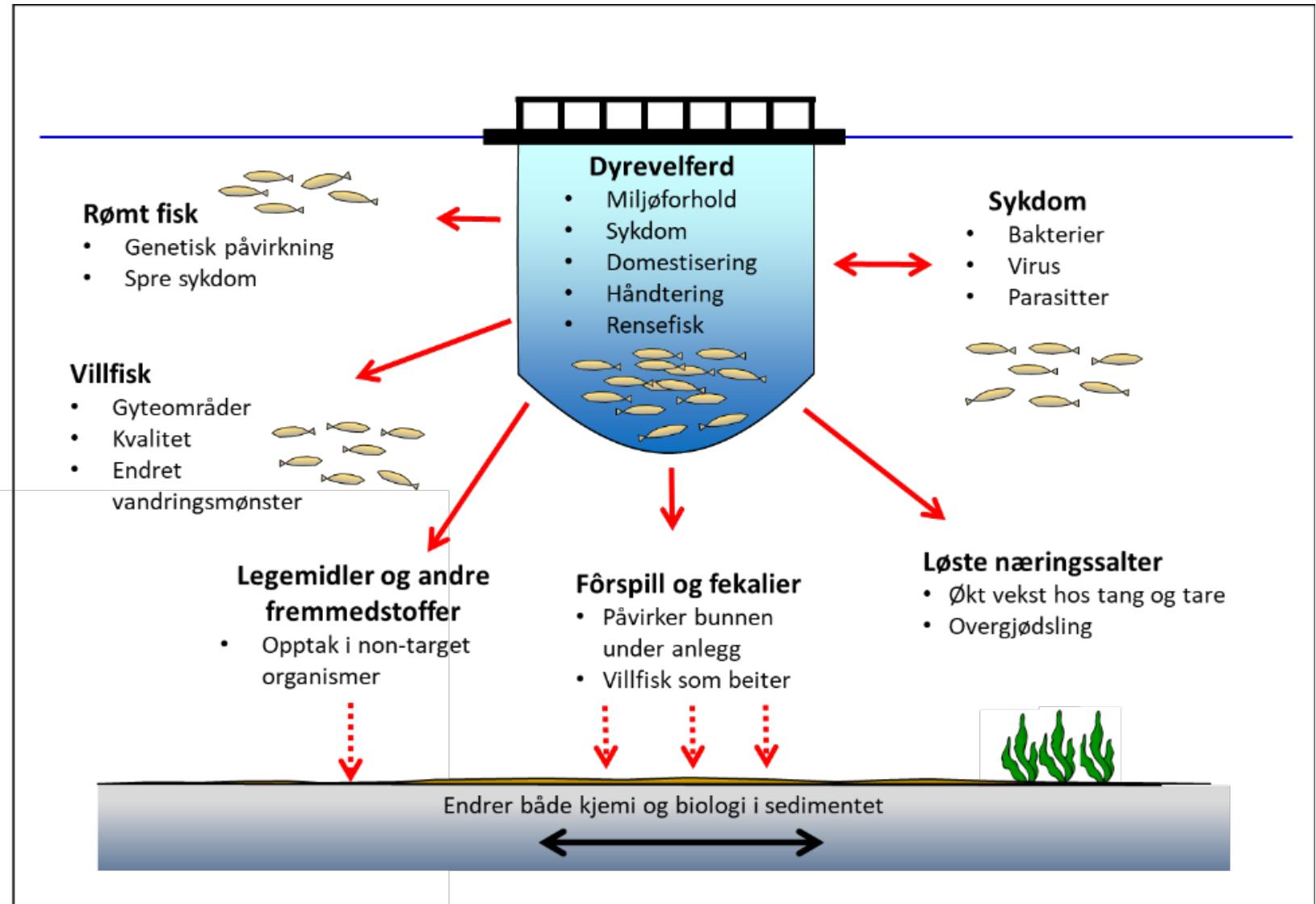
Patel, S.^{a,b}, Karlsbakk, E.^{a,c}, Dahle, M.^d, Mæhle, S.^a, Nordbø, J.^a, Fiksdal, I.^a and
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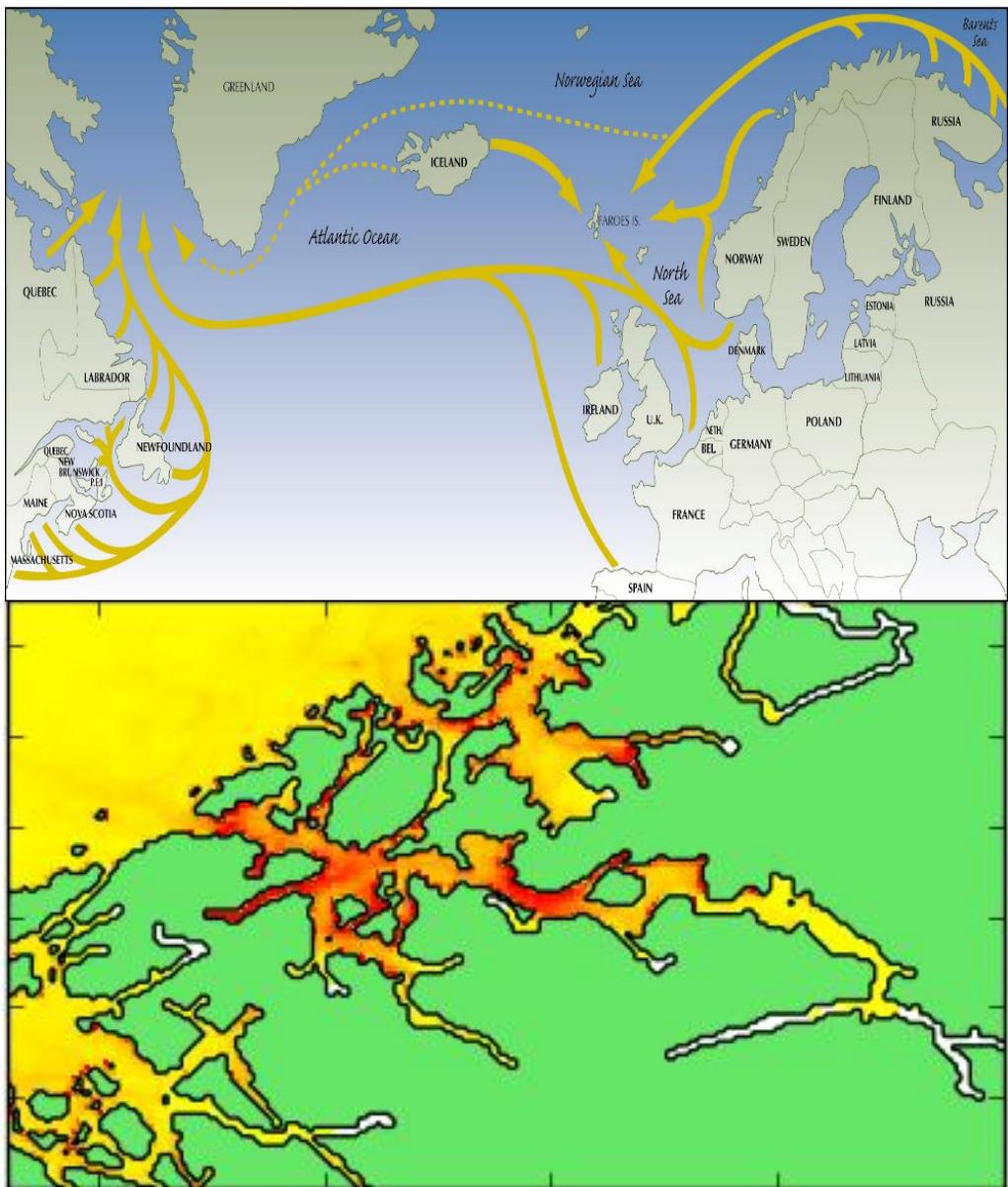
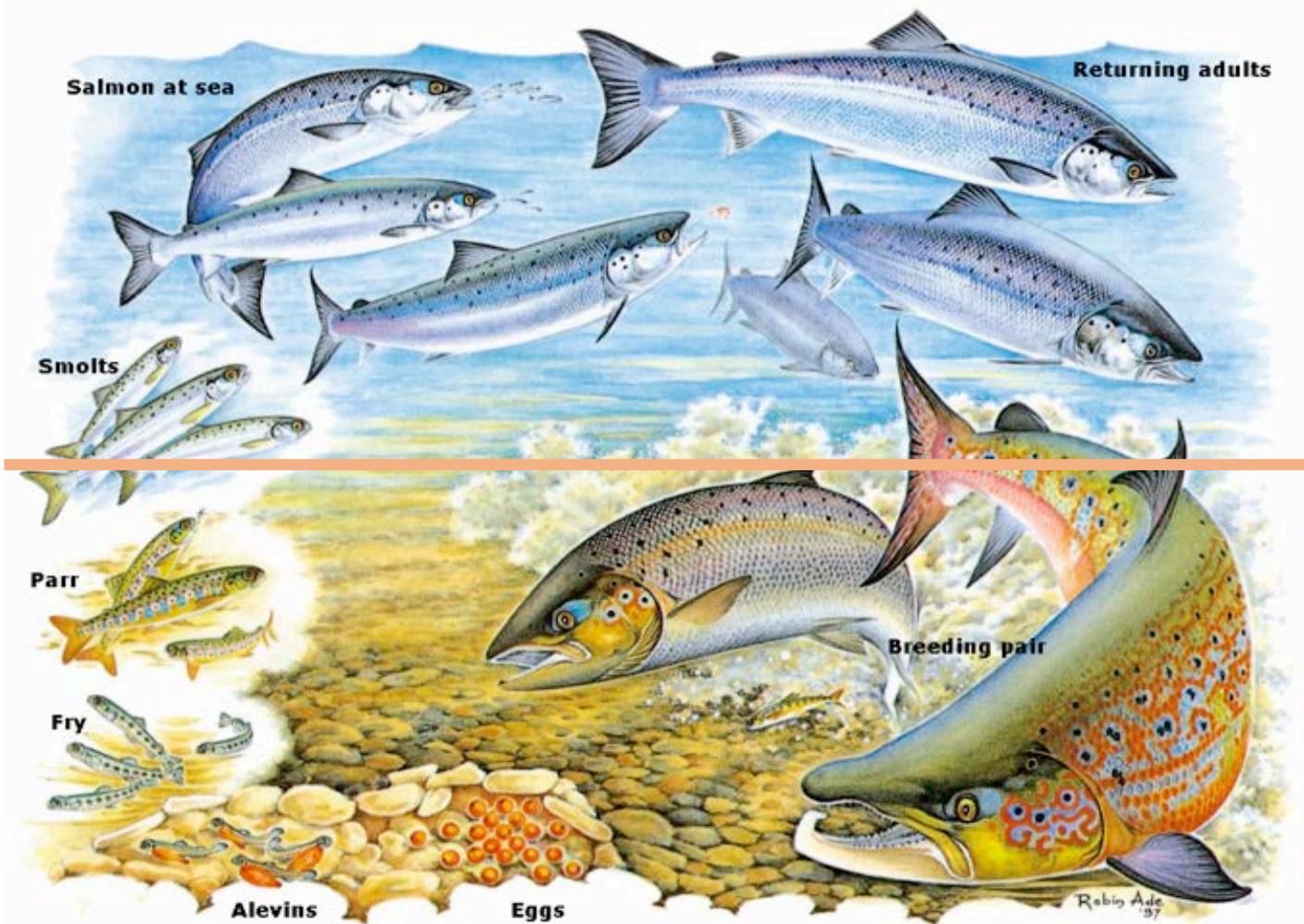


Environmental risks factors

Risikorapport
norsk fiskeoppdrett
2018



Complex and varied life history



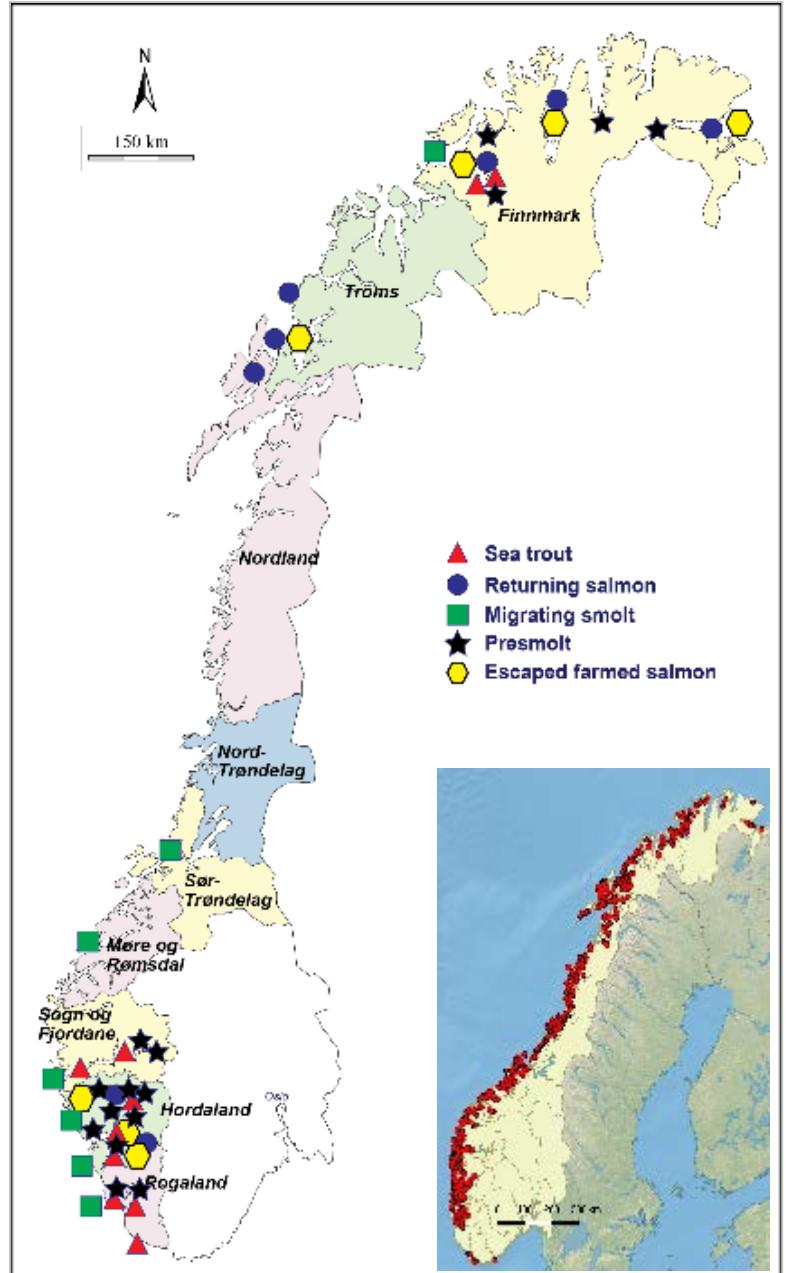
Viral diseases in Norwegian fish farming

- Pancreas disease (PD): SAV
- Heart and skeletal muscle inflammation (HSMI): PRV
- Infectious salmon anaemia (ISA): ISAV
- Infectious pancreatic necrosis (IPN): IPNV
- Cardiomyopathy Syndrome (CMS): PMCV

Disease	2012	2013	2014	2015	2016
PD	137	99	142	137	138
HSMI	142	134	181	135*	101*
ISA	1	2	10	10	15
CMS	74	89	100	107	105*
IPN	119	56	48	30*	27*
Total	473	380	481	419	386



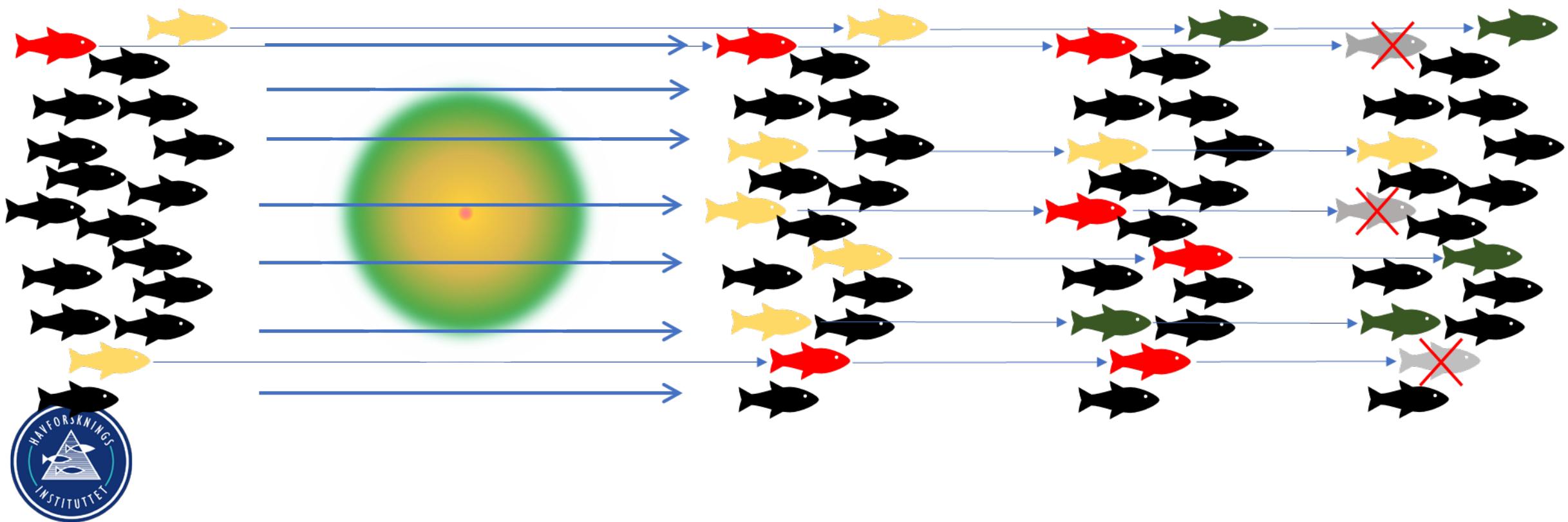
Survey of virus in wild fish



Samlingslokaliteter (år)	Antall fisk	Prevalens (%)				
		SAV	PRV	ILAV	IPNV	PMCV
Sjørret						
Finnmark (2012)	69	0	0	-	-	-
Sogn og Fjordane (2012)	100	0	0	-	-	-
Hordaland (2011-2013)	426	0	0	-	-	-
Rogaland (2011-2013)	248	0	4,4	-	-	-
Tilbakevandrende laks						
Nord-Norge (2012)	377	0	8	7 ^a	-	-
Osterfjorden (2012-2014)	682	0	15	0	-	-
Etnefjorden (2015)	364	0	7 ^d	1 ^b	-	3
Stamlaks/Gytelaks						
Daleelva (2012)	47	0	5	-	-	-
Daleelva (2017)	48	0	-	0	0	6
Etneelva (2017)	48	0	-	0	0	0
Utvandrende smolt						
Sognefjorden (2012-2014)	148	0	6	-	-	-
Osterfjorden (2012-2014)	375	0	5	-	-	-
Hardangerfjorden (2012-2015)	148	0	2	0	0	-
Juvenile laksefisk						
Vestre Jakobselv (2016)	208	0	0	0	0	0
Oselva (2014-2014)	333	0	3	0	0	-
Etneelva (2014)	85 ^c	0	0	0	0	-
Eid fjordvassdraget (2014)	176	0,5	-	0	0	2
Uskedalelva (2017)	91	0	-	0	0	32
Smolt fra vaktbur						
Hardangerfjorden (2015)	55	0	-	0	-	-
Bjørmafjorden (2015)	70	0	-	0	-	-
Rømt Laks						
Nord-Norge (2010)	42	0	86	5 ^a	-	-
Hardangerfjorden (2012)	58	98	100	1 ^a	-	0
Etneelva (2014)	129	12	79	1 ^a	-	-
Etneelva (2016)	16	44	69	-	-	19
Pukkellaks						
Etneelva (2017)	40	0	-	5 ^b	0	0

- ikke testet, a: ILAV HPRO, b: ukjent HPR, c: 36 sjørret og 49 laks, d: 54 testet

Outcomes of exposure and infections



Experimental setup

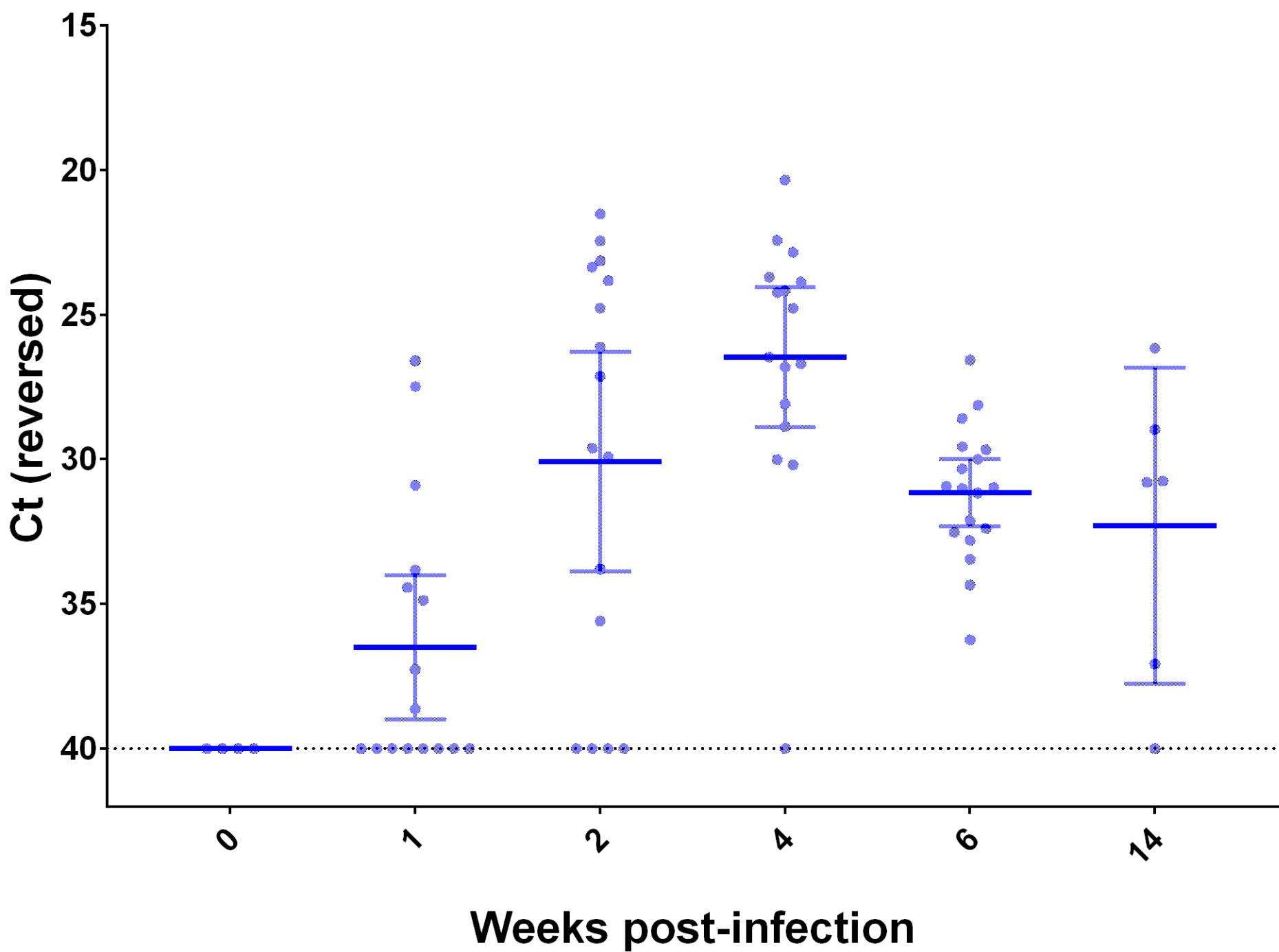
- SAV3
 - Cohab Trout + Salmon (i.m.)
 - Bath salmon
 - Bath Trout
 - Injection Trout
 - Control
- Sampling for qPCR + Histology
 - 0, 1, 2, 4, 6,14 wpi
 - qPCR – Heart
 - Histology – Heart and Pancreas
- PRV1
 - Cohab Trout+Salmon (i.p.)
 - Cohab Salmon+Salmon (i.p.)
 - Injection Trout
 - Injection Salmon
 - Control
- Sampling qPCR + Histology
 - 0, 2, 4, 8, 10, 19 wpi
 - qPCR – Spleen
 - Histology – Heart



SAV3

Salmon

Bath



SAV3

Trout

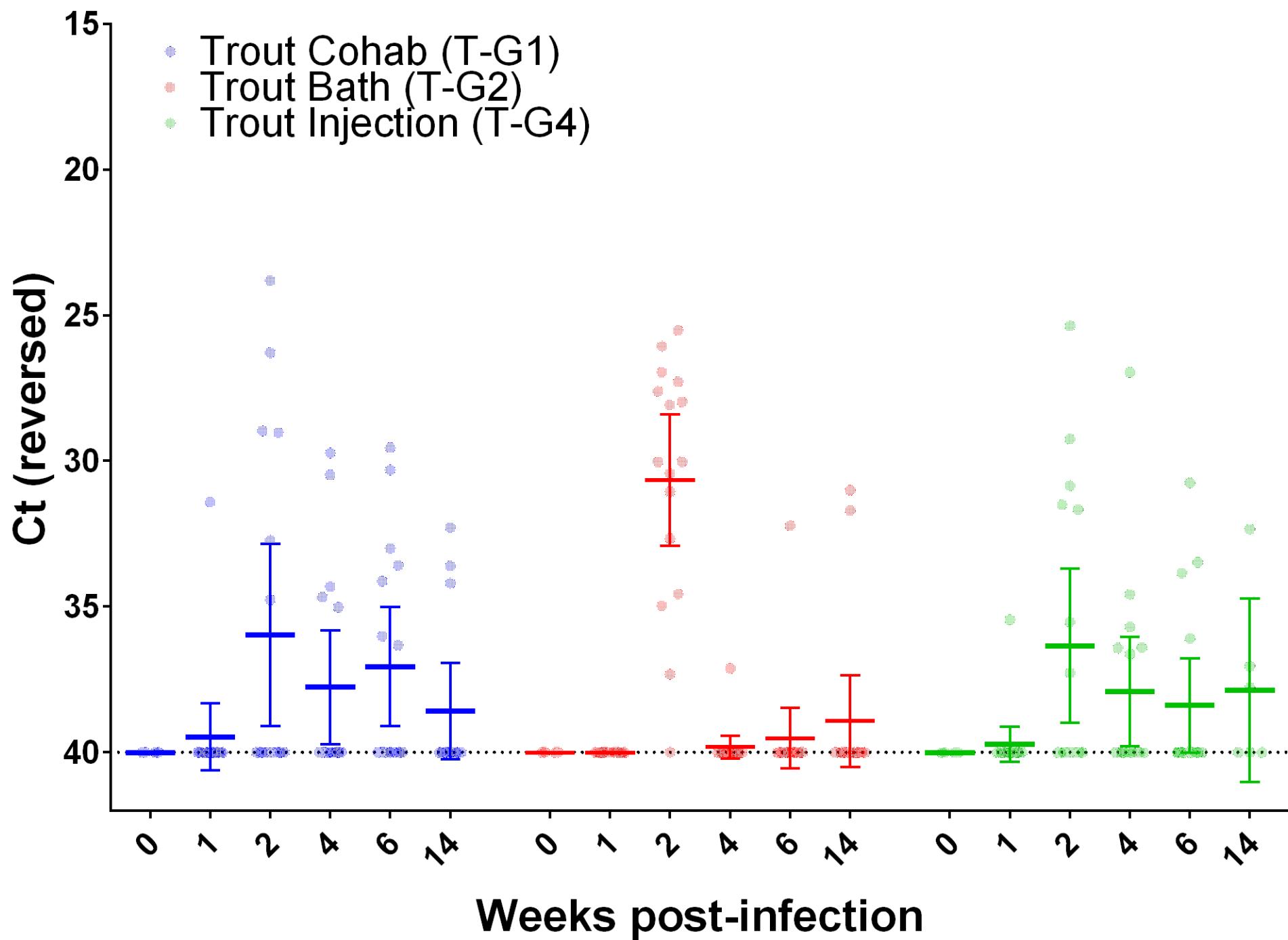
Co-hab

vs

Bath

vs

Injection

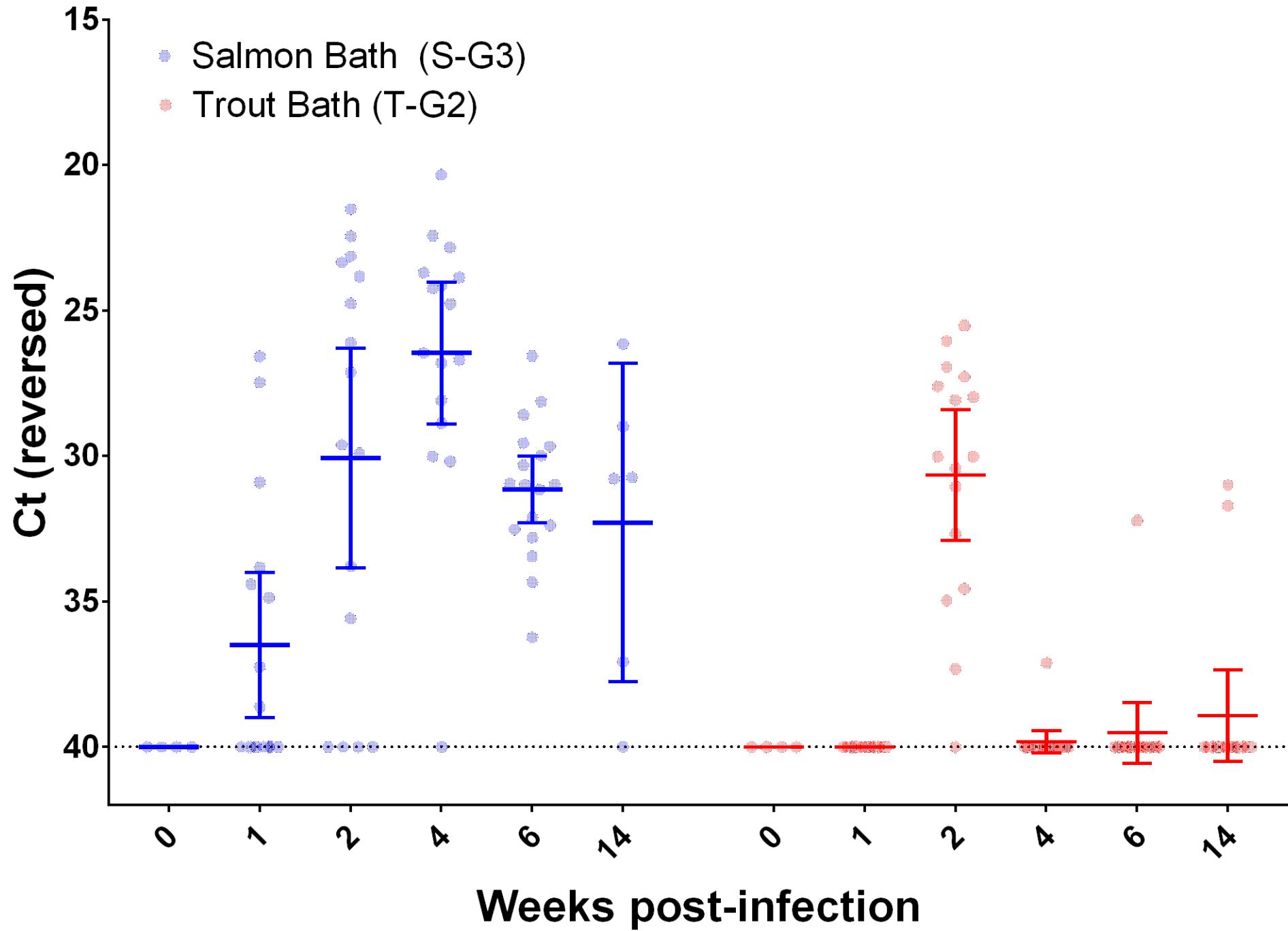




SAV3

Bath

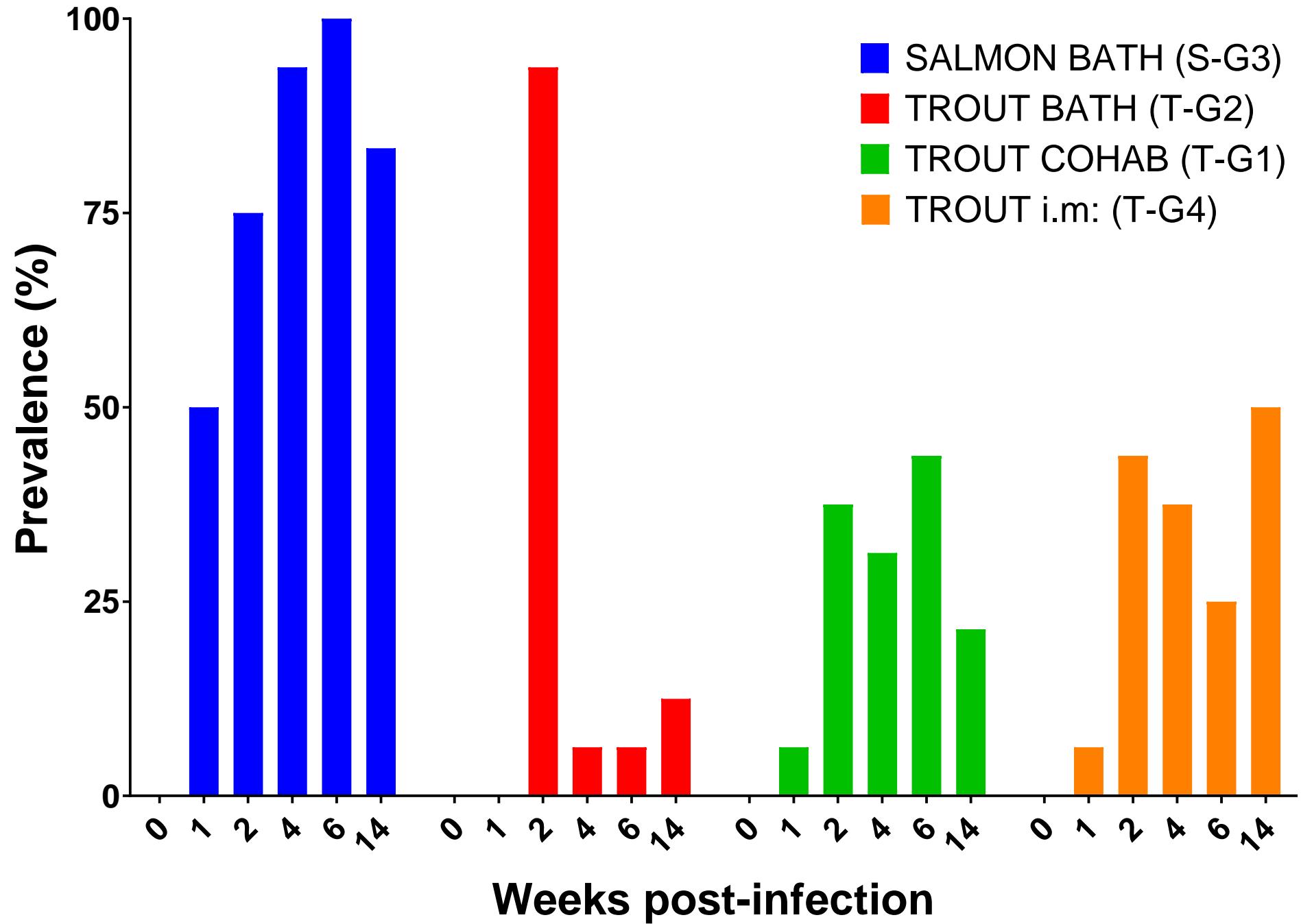
Salmon
vs
Trout



SAV3

Prevalence

All groups

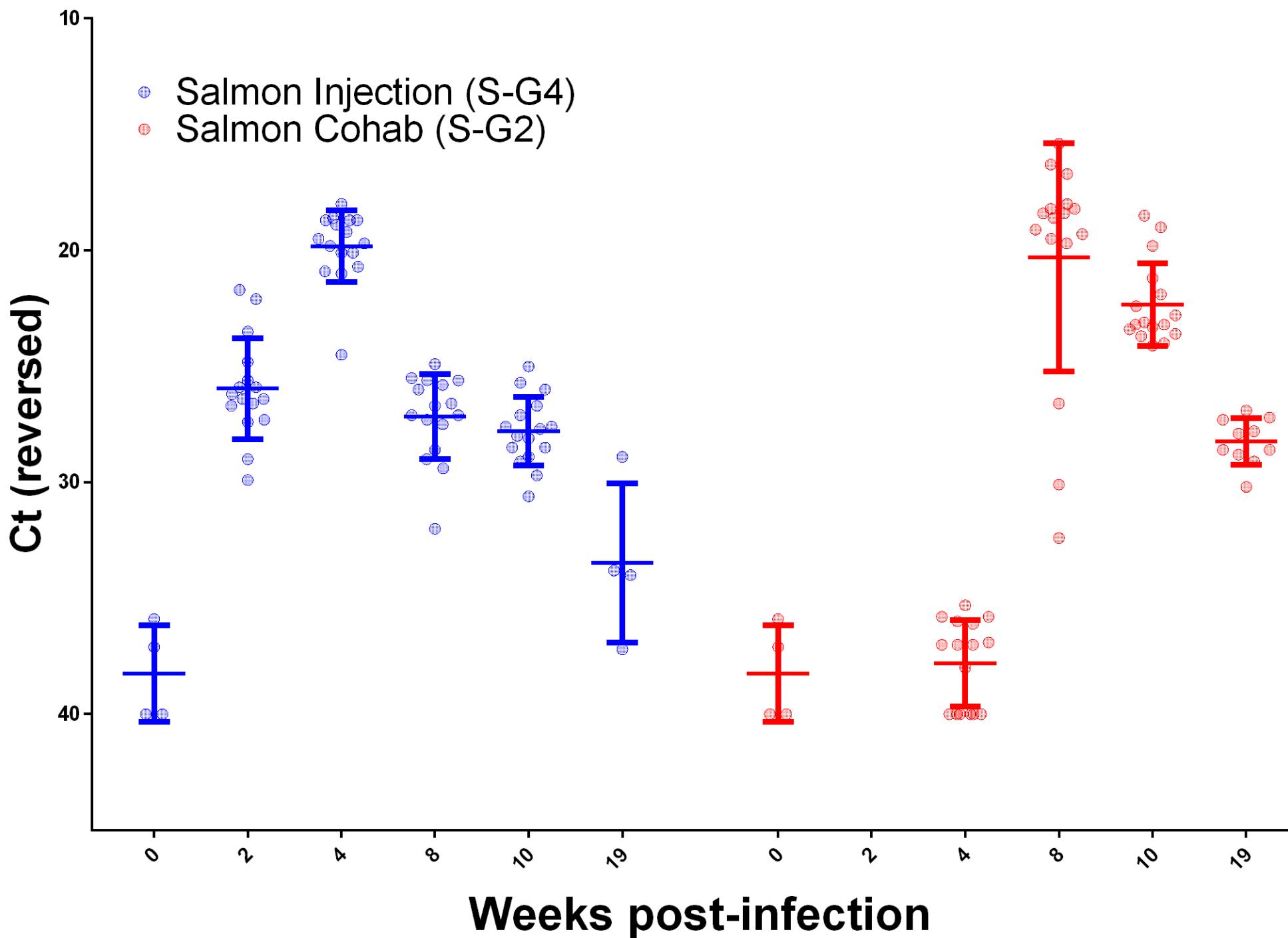


SAV3 - Histology scoring

- Histology not finished yet, but preliminary scoring has been done.
- Both Salmon and Trout from 6 wpi and 14 wpi has been scored

Group	Average Pancreas Score	Average Heart Score	N
Trout Cohab (T-G1)	0	0.2	6
Trout Bath (T-G2)	0	0	2
Salmon Bath (S-G3)	2,7	2.3	9
Trout Inj. (T-G4)	0.3	0.3	3
Control (S-T-G5)	0	0	4

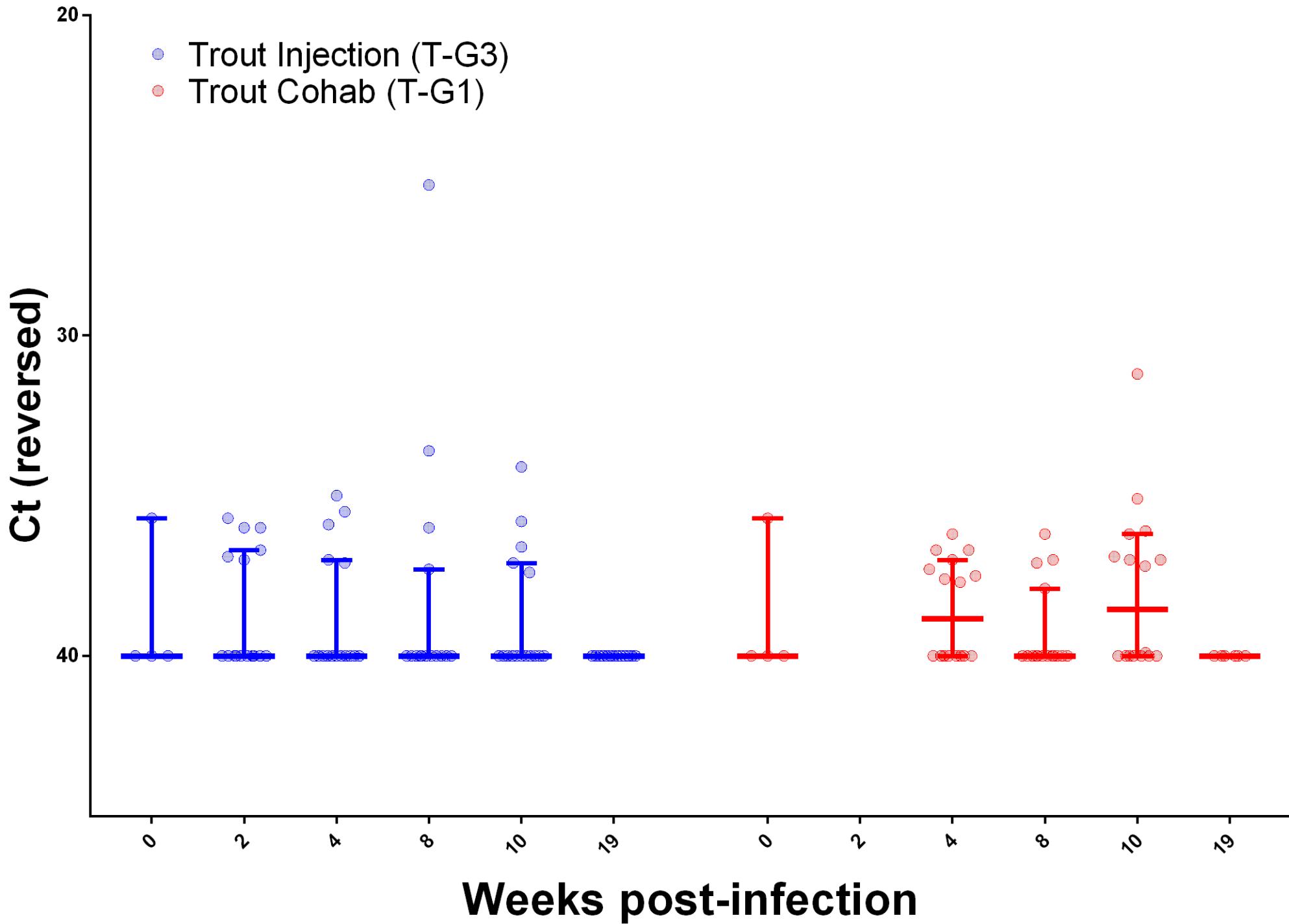
PRV1
Salmon
Injection
vs
Cohab



PRV1

Trout

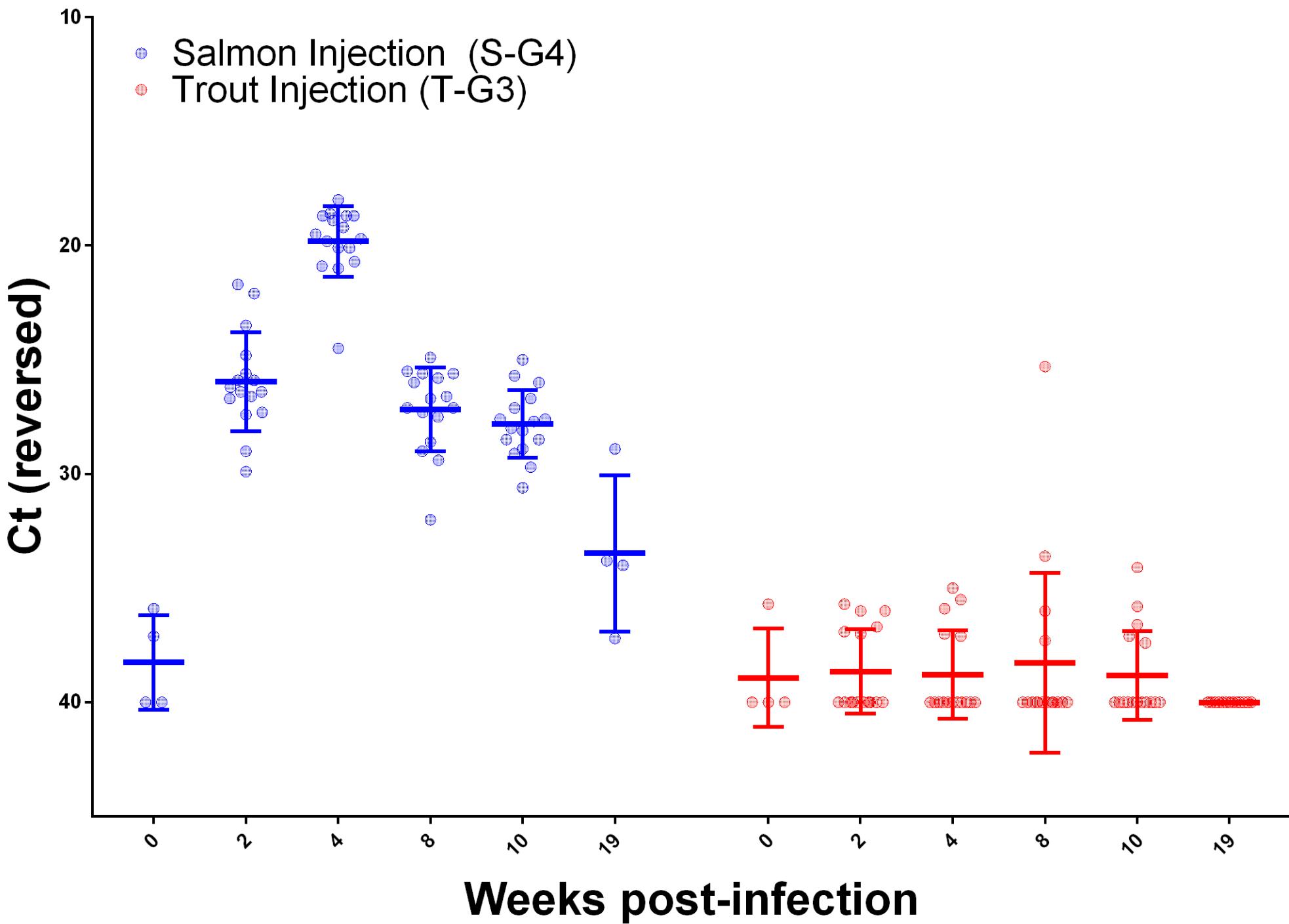
Injection
vs
cohab



PRV1

Injection

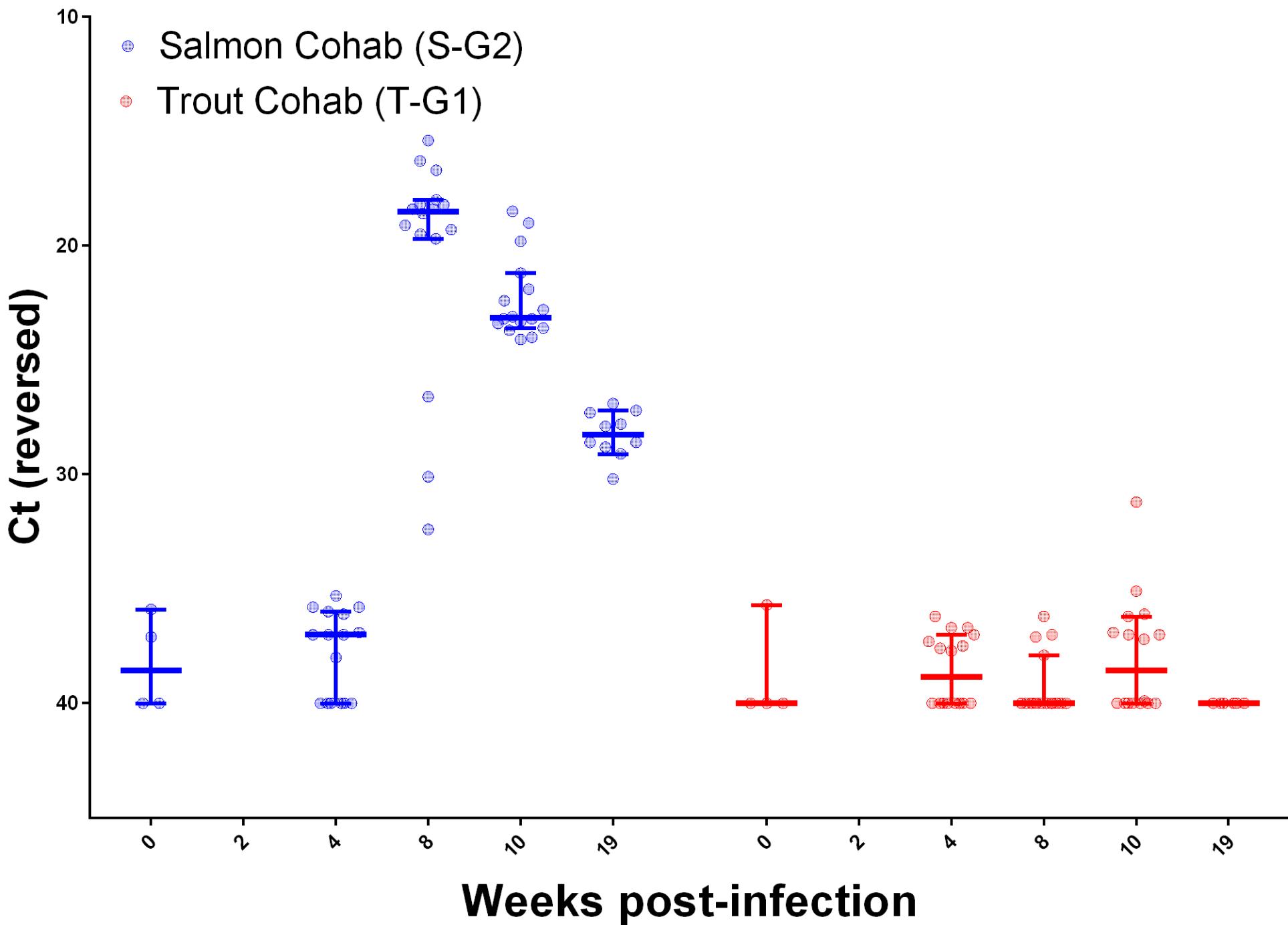
Salmon
vs
Trout



PRV1

Cohab

Salmon
vs
Trout

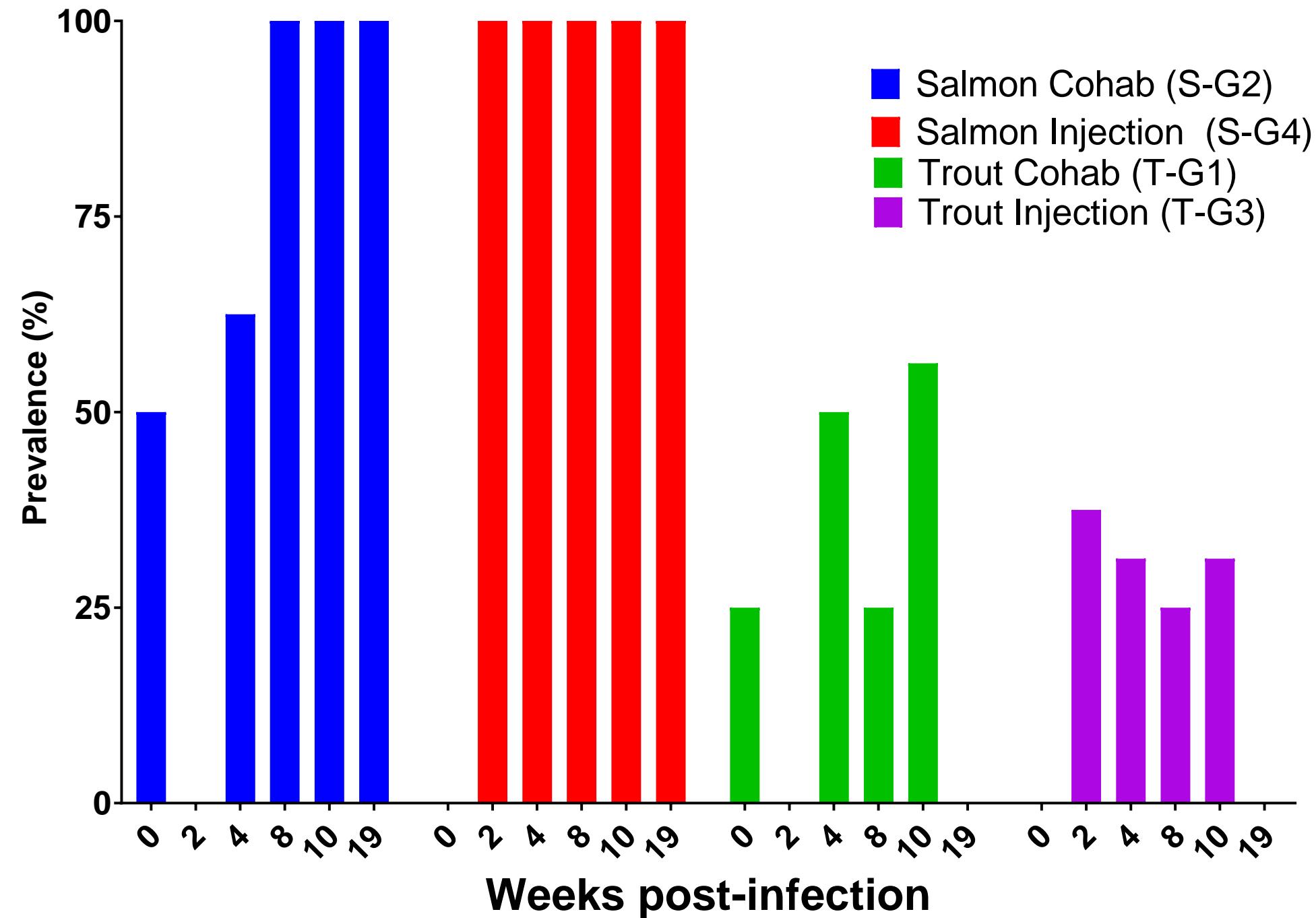




PRV1

Prevalence

All groups



Main conclusions

- Trout post-smolts appear less susceptible to SAV3 than salmon
- Trout post-smolts appears to not develop PD
- Trout post-smolts appear much less susceptible to PRV1 than salmon
- Preliminary - Trout is not expected to have developed HSMI in this study



Impact of the results

- complements and corroborates results and conclusion from IMR's wild fish surveys
- supports our risk assessment for SAV3 and PRV1
- Will reduce the uncertainty of future management decisions



Thanks for your attention....

- Sonal Patel
- Abdullah Madhun
- Stig Mæhle
- Håkon Berg-Rollnes
- Enrique Garcia
- Ingrid Fiksdal
- Maria Dahle (VI)
- Egil Karlsbakk
- Cecilie Skår
- Joachim Nordbø
- Tom Hansen
- Per Gunnar Fjelldal
- Ivar Helge Matre

