

NOTE

RESISTANCE OF CHINOOK SALMON
(Oncorhynchus tshawytscha)
FINGERLINGS EXPERIMENTALLY INFECTED WITH
VIRAL HEMORRHAGIC SEPTICEMIA VIRUS

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Viral Hemorrhagic Septicemia (V.H.S.) is an infectious and contagious disease of rainbow trout (*Salmo gairdneri*) which produces muscular hemorrhagic lesions and necrosis of the hematopoietic system in infected fish. At least 40 % of French commercial fish farms are affected by V.H.S. giving rise to very considerable annual economic losses.

Previous work has shown that brown trout (*Salmo trutta*) and Coho salmon (*Oncorhynchus kisutch*) are resistant to V.H.S. (de KINKELIN et al. 1974). To further our understanding of the susceptible host range of this disease the effect of exposure to V.H.S. has been studied in chinook salmon compared with the susceptible species, the rainbow trout.

Rainbow trout and chinook salmon fingerlings (mean length 6 cm) were divided into control and infected groups. The infected fish (10 rainbow trout, 7 chinook salmon) were injected intraperitoneally with 0.2 ml STOKER medium containing 10^4 plaque forming units (p.f.u.) of the virus of V.H.S. strain 07/71, serotype I (VESTERGARD-JORGENSEN 1972). The controls (8 rainbow trout, 6 chinook salmon) were injected with the same volume of virus free STOKER medium. Prior to injection, all fish were anaesthetized in a solution of 100 ppm tricaine metanesulphate (MS-222).

To evaluate the course of the disease, two criteria were used : the incidence of mortality and a quantitative analysis of dead and sacrificed fish for the presence of virus. One fish from each infected group was sacrificed on days 2, 4 and 15 post injection. The spleen and kidney were carefully dissected and

weighed, ground in a mortar and diluted in EARLES medium. These viral extracts were then inoculated into Fathead Minnow (GRAVELL and MALSBERGER 1965) cell cultures according to previously described methods (de KINKELIN et SCHERRER 1970).

At the conclusion of the experiment, all fish were sacrificed and analysed for V.H.S. virus.

The water temperature of the fish tanks was maintained at $13 \pm 1^{\circ}\text{C}$.

Results of viral analyses and mortalities in these two species following exposure to V.H.S. are presented in table 1. No mortality occurred and no virus was isolated in chinook salmon. In comparison, rainbow trout displayed heavy mortalities and virus was detected on days 2, 4, 5 and 8 in both sacrificed and dead trout. Highest viral yields occurred 4 to 5 days post infection. Viral analyses on fish sacrificed at the conclusion of the experiment were all negative.

These present findings suggest that chinook salmon fingerlings are refractory to V.H.S. This may be a common feature in the *Oncorhynchus* genus as the Coho salmon has also been shown to be resistant. However as susceptibility to virus could be age dependant, caution must be taken in extrapolating these results to cover other age groups of chinook salmon. Nethertheless prior to undertaking this experiment, the behaviour of chinook salmon of up to 15 cm length exposed to a natural infection of V.H.S. was observed in the same fish farm which had been used to check Coho salmon susceptibility (de KINKELIN et al. 1974). No viral associated losses were recorded in ponds or cages placed downstream from infected rainbow trout ponds.

SUMMARY

This work compares the susceptibility of chinook salmon (*Oncorhynchus tshawytscha*) and rainbow trout (*Salmo gairdneri*) fingerlings injected with the virus of Viral Hemorrhagic Septicemia.

In chinook salmon, no deaths occurred and no virus could be isolated. In contrast, high viral titres were found in rainbow trout amongst which there was a heavy mortality.

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SEPTICEMIE HEMORRAGIQUE VIRALE :
RESISTANCE DU SAUMON CHINOOK
(Oncorhynchus tshawytscha)
A L'INFECTION EXPERIMENTALE

RESUME

Dans le cadre du développement d'un plan national de prophylaxie sanitaire, des recherches ont été entreprises pour éprouver la sensibilité des différentes espèces de salmonidés à l'infection par le virus de la Septicémie Hémorragique Virale (S.H.V.).

Le comportement du saumon chinook (*Oncorhynchus tshawytscha*) a été examiné et cet animal s'est révélé réfractaire à l'infection expérimentale réalisée par l'injection intrapéritonéale de 10^4 unités formant plaque (u.f.p.) par animal d'un poids moyen de 2 g. Aucune mortalité n'est survenue chez les saumons et le virus n'a pas été isolé chez les animaux sacrifiés en fin d'expérience (t. I). Inversement les truites arc-en-ciel servant de témoins sensibles ont présenté une mortalité associée à l'isolement viral.

Le petit nombre des animaux d'expérience s'explique par le fait qu'un faible effectif venait d'être introduit en France, mais l'observation de ces animaux placés dans des conditions naturelles d'infection, comme au cours des essais antérieurs pratiqués avec le Coho (de KINKELIN, LE BERRE et MEURILLON 1974), a conduit au même résultat que l'inoculation du virus. Le saumon Chinook peut donc être considéré comme réfractaire à la S.H.V.

TABLE I

Results of infection experiments in 10 rainbow trout and 7 chinook salmon fingerlings infected intraperitoneally with 10^4 plaque forming units (p.f.u.) of V.H.S. virus compared with non infected controls (8 rainbow trout, 6 chinook salmon).
Results are expressed in p.f.u./g organ

TABEAU I

Résultats des infections expérimentales effectuées par inoculation de 10 truitelles arc-en-ciel et 7 saumons chinook avec 10^4 unités formant plaque (u.f.p.) de virus de la S.H.V. (serotype I)

Les résultats sont exprimés en u.f.p./g d'organe

Day post infection Jours suivant l'infection	CHINOOK SALMON				RAINBOW TROUT			
	INFECTED INFECTE		CONTROL TEMOIN		INFECTED INFECTE		CONTROL TEMOIN	
	Number of mortalities Nombre de morts	Quantity of virus isolated /g Quantité de virus isolé/g	Number of mortalities Nombre de morts	Quantity of virus isolated /g Quantité de virus isolé/g	Number of mortalities Nombre de morts	Quantity of virus isolated /g Quantité de virus isolé/g	Number of mortalities Nombre de morts	Quantity of virus isolated /g Quantité de virus isolé/g
1	(1)	0			(1)	11×10^3		
2								
3	(1)	0			(1)	5.8×10^7		
4					3	11×10^6		
5								
6					1	0		
7					1	8×10^2		
8					1	0		
9								
10								
11								
12								
13								
14	(1)	0	(6)	0	(1)	0	(8)	0
15								

() sacrificed fish () animaux sacrifiés