Spring Viraemia of Carp in the United States Impact Worksheet July 17, 2002

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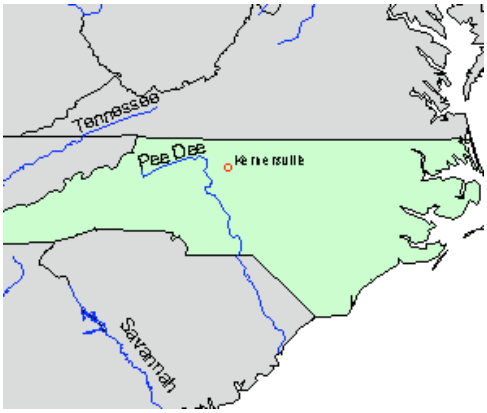
Summary:

The first identification of spring viraemia of carp (SVC) in the US has been made in a koi hatchery in Kernersville, North Carolina. SVC is a disease of several species of cyprinid fishes caused by *Rhabdovirus carpio.*

Cyprinid fishes are produced as food fish, ornamental fish (koi and goldfish) and baitfish. In 1998 in the US, 59 facilities produced food carp, 115 produced koi, 65 produced ornamental goldfish, and 34 produced feeder goldfish. The total value of farm sales was $21.2 million. The US exported $1.8 million worth of live carp in 2001, almost exclusively to Canada.

In response to the US SVC finding, all fish in the affected ponds have been slaughtered and the affected ponds have been drained. A surveillance program has been instituted and the hatchery has been placed under quarantine. The North Carolina Wildlife Commission has been contacted to test rivers and tributaries that receive effluent water from the hatchery. Several of the susceptible species have been reported in the wild in waters of west-central North Carolina .

How extensive is the situation?



The first identification of spring viraemia of carp (SVC) in the US has been made in a koi hatchery in Kernersville, North Carolina. Koi are a colored, ornamental strain of the common carp, *Cyprinus carpio*. SVC was first suspected in April 2002, when the hatchery experienced a 10% per week death rate in juvenile koi, which were being observed as part of a quality control program. Diagnostic samples were first sent to the University of Arkansas Pine Bluff Laboratory, an APHIS approved diagnostic laboratory, then forwarded to the OIE reference laboratory located in Weymouth, United Kingdom, where the diagnosis was confirmed on July 5, 2002 . The premises where infected fish were found consisted of 202 ponds divided among 6 locations. Infected fish were detected in a total of 4 ponds. Of 150,000 koi in the 4 ponds, 15,000 died and the remaining 135,000 were depopulated. The 4 affected ponds were drained.

The hatchery is no longer experiencing signs of SVC in any of the other ponds or processing facilities. A foreign animal disease investigation is underway, but the potential source of infection has not been identified. Samples from all remaining ponds are being sent to theUniversity of Arkansas Pine Bluff Laboratory. Tanks and equipment have been disinfected. A surveillance program has been instituted and the hatchery has been placed under quarantine. The North Carolina Wildlife Commission has been contacted to test rivers and tributaries that receive effluent water from the hatchery.

What Species are Susceptible to Spring Viraemia of Carp virus?

According to the OIE, susceptible host species of Spring Viraemia of Carp virus (SVCv) include cyprinid fishes, specifically the common carp (*Cyprinus carpio*), grass carp (*Ctenopharyngodon idellus*), silver carp (*Hypophthalmichthys molotrix*), bighead carp (*Aristichthys nobilis*), crucian carp (*Carassius carassius*), goldfish (*Carassius auratus*), tench (*Tinca tinca*), and sheatfish (*Silurus glanis*). SVC is on the OIE Fish Diseases Commission list of 'Diseases notifiable to the OIE' and it is also included on OIE's List B. SVC has previously been reported in western and eastern Europe and Israel.

What is Spring Viraemia of Carp?

Spring Viraemia of Carp is systemic, acute and highly contagious. SVC is caused by *Rhabdovirus carpio*, which is a typical bullet shaped virion about 60-90 nm wide and 90-180 nm long and which bears a regular surface array of glycoprotein spicules. The virus adsorbs to cellular plasma membranes and enters the cell by receptor-mediated endocytosis. The gill is the most common portal of entry. Infected cells develop cytoplasmic inclusion bodies and mature virions are released by budding from the plasma membrane. SVC is transmitted horizontally and by blood sucking parasites such as the carp louse (*Argulus foliaceus*) and leech (*Pisciola geometra*). SVC typically occurs when water temperatures are less than 18°C and is most common in the spring. At 20-22°C, infection occurs but clinical disease does not develop. When clinical disease is present, mortality ranges from 30 to 70%. Affected fish often seek slow moving water or lie on the bottom. As the disease progresses, fish become non responsive to external stimuli, sluggish, swim on their side and rest in abnormal positions. The skin becomes darkened and the belly swollen. Petechial and ecchymotic hemorrhages and exopthalmos are common and reflect viral predilection for endothelium, resulting vascular leakage and loss of fluid balance. Long, thick, mucoid casts may be observed from the vent. Successful treatment of infected fish has not been demonstrated. There is no approved vaccine for SVC in the US. Control measures include iodophore disinfection of eggs and periodic chemical and physical disinfection of ponds and equipment. Minimizing stress and overcrowding and sanitary disposal of dead fish are also recommended. Raising fish at a water temperature of 19-20° C has been suggested, but the cost of heating water in a temperate climate can be prohibitive.

Source: OIE Disease Information Report, Spring Viraemia of Carp and other Viral Diseases and Agents of Warm Water Fish by N. Fijan, USDA Area Veterinary Office in North Carolina .

What is the size of the carp/koi and the goldfish industries in the US and in North Carolina?

In 1998, the US had 39 facilities that produced carp as a food fish, with a total sales value of $1.3 million (Table 1). North Carolina had only 1 facility that produced stocker carp intended to be raised as food fish.

A total of 115 facilities produced koi in the US in 1998. The total sales value of these facilities was $3.9 million. Ornamental goldfish were produced in 65 facilities, with sales totaling $6.7 million. North Carolina had 6 facilities that produced koi, with a sales value of $137,000, and 3 facilities that produced ornamental goldfish, with undisclosed sales value.

Goldfish are also used as baitfish. Thirty-four (34) facilities produced feeder goldfish in the US in 1998, with sales totaling $9.3 million. North Carolina had 2 facilities that produced feeder goldfish.

Table 1: Number of facilities and value of sales for affected fish in the US and North Carolina, 1998

Type of fish	Number of facilities		Value of sales ($ million)	
	US total	NC	US total	NC
Food carp	39	1	1.3	-
Koi	115	6	3.9	0.137
Ornamental goldfish	65	3	6.7	-
Feeder goldfish	34	2	9.3	-

- = withheld to avoid disclosing data for individual farms

Source: USDA, NASS, 1998 Census of Aquaculture

What is the USA's place in the international market for affected fish?

The US produced 11,739 metric tons of carps, barbels, and other cyprinids in 1999, accounting for less than 0.1% of world production.

Source: United Nations FAO

What are the U.S. exports of affected fish?

The US exported live carp worth $1.8 million and $738,000 in 2001 and January through April 2002, respectively. These fish were exported almost exclusively to Canada, with only a minor sales value to Mexico in 2001. None of the live carp that were exported in 2002 or 2001 originated in North Carolina.[1] Goldfish export data are not available.

Table 2: US exports of live carp, 2001 and January-April 2002

Product	$ value (million)	
	2001	2002 (Jan-Apr)
Live carp	1.824	0.738

Source: World Trade Atlas

Are susceptible species found in the wild in west-central North Carolina?

In 2000, a review of the diversity and distribution of native freshwater fish of the southern United States, including those of the Pee Dee River basin, was published. Of the 662 native freshwater and diadromous fishes and 24 marine fishes listed, none were of the same genus as those listed as susceptible by the OIE to spring viraemia of carp.

Non-native susceptible fish have been detected in the waters of west-central North Carolina including the grass carp, common carp, goldfish, and tench. The overall size of the population of these non-native species within North Carolina is unknown.

Sources: USGS @ nas.er.usgs.gov/fishes/accounts, July 17, 2002;

Diversity, Distribution, and Conservation Status of the Native Freshwater Fishes of the Southern United States. Published in Fisheries, October 2000.

CEI's plans for follow up:

CEI will continue to monitor the situation but has no plans at this time to issue additional reports. If you seek more information or wish to comment on this worksheet, please reply to this message or contact Robert Harris at (970) 494-7327 or Christine Kopral at (970) 494-7325.

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[1] The state-specific export data report the state from which the export began its export journey. This is not necessarily the state in which the merchandise is produced.

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