

Failure to report poultry deaths should be addressed and has several possible explanations. Farmers are accustomed to common yearly poultry deaths, which are not reported. In the absence of an official compensation statement, farmers may fear income loss from massive poultry culling.

Our results emphasize the need for more accurate information about transmission risks, notification requirements, safer behavior and practices, and compensation for losses. Focus also needs to be placed on building capacity in the veterinary system (10). These issues should be integrated in the Laos National Avian Influenza Control and Pandemic Preparedness Plan (2006–2010).

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References

1. Boltz DA, Douangngneun B, Sinthasack S, Phommachanh P, Rolston S, Chen H, et al. H5N1 influenza viruses in Lao People's Democratic Republic. *Emerg Infect Dis.* 2006;10:1593–4.
2. Witt CJ, Malone JL. A veterinarian's experience of the spring 2004 avian influenza outbreak in Laos. *Lancet Infect Dis.* 2005;5:143–5.
3. World Health Organization. Avian influenza update no. 56: 15 August 2006. [cited 2007 Apr 18]. Available from <http://www.wpro.who.int/NR/rdonlyres/13C8C409-2438-4426-A5E3-7339564D1731/0/AIWeekly56WPRO.pdf>
4. Food and Agriculture Organization. Epidemiology of H5N1 influenza in Asia and implications for regional control. [cited 2007 Apr 18]. Available from <http://www.fao.org/ag/againfo/subjects/documents/ai/HPAI-Masseyreport.pdf>
5. National Statistical Centre. Lao statistical yearbook 2003. Vientiane (Lao PDR): Committee for Planning and Cooperation; 2004.
6. Vong S, Coghlan B, Mardy S, Holl D, Seng H, Ly S, et al. Low frequency of poultry-to-human H5N1 virus transmission, southern Cambodia, 2005. *Emerg Infect Dis.* 2006;10:1542–8.
7. Takeuchi MT. Avian influenza risk communication, Thailand. *Emerg Infect Dis.* 2006;12:1172–3.
8. Food and Agriculture Organization. Live-stock report 2006. Rome, 2006. [cited 2007 Apr 18]. Available from <http://www.fao.org/docrep/009/a0255e/a0255e00.htm>
9. US Department of Agriculture. Laos poultry and products: avian influenza 2005. Report no. LA5001. [cited 2007 Apr 18]. Available from <http://www.fas.usda.gov/gainfiles/200503/146119131.doc>
10. World Organization for Animal Health. Laos 2002, veterinarians and technical personnel. [cited 2007 Apr 18]. Available from http://www.oie.int/hs2/gi_veto_pays.asp?c_pays=106&annee=2002

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Letters

Letters commenting on recent articles as well as letters reporting cases, outbreaks, or original research are welcome. Letters commenting on articles should contain no more than 300 words and 5 references; they are more likely to be published if submitted within 4 weeks of the original article's publication. Letters reporting cases, outbreaks, or original research should contain no more than 800 words and 10 references. They may have one Figure or Table and should not be divided into sections. All letters should contain material not previously published and include a word count.

Norovirus GII.4 Strains and Outbreaks, Australia

To the Editor: Viral gastroenteritis affects millions of people of all ages worldwide, and some seasonality has been observed in outbreak occurrences (1–3). During early 2006 in New South Wales (NSW), a marked increase in outbreaks of gastroenteritis occurred (Figure): 155 outbreaks were reported during the first 5 months compared with 88 outbreaks during 2005. During the first 5 months of 2006, the Enteric Pathogens Laboratory–South Eastern Area Laboratory Services (EPL-SEALS) recorded an increase in norovirus in stool samples, detected by using an enzyme immunoassay (IDEIA Norovirus, DakoCytomation, Cambridgeshire, UK). From January through May 2006, the proportion of samples positive for norovirus increased successively: 0/47 (0%), 1/73 (1.4%), 5/169 (3.0%), 8/106 (7.5%), and 93/413 (22.5%). This trend followed the increasing reports of outbreaks made to the NSW Department of Health (Figure). In May, the rate of norovirus detection (22.5%) was significantly greater than that of any other pathogen (Fisher exact test, $p < 0.0001$), including intestinal parasites, foodborne bacterial pathogens (*Salmonella*, *Shigella*, and *Campylobacter*), and enteric viruses (rotavirus, adenovirus, and astrovirus).

In April 2006, the NSW Department of Health Public Health Real-time Emergency Department Surveillance System (PHREDSS) detected a significant increase in visits for gastroenteritis. This system records cases in real time for each visit to an emergency department from patient demographic information and syndromes diagnosed according to the International Classification of Diseases, version 9, Clinical Modification (ICD-9-CM) (4). Information collected came

from a population of >4 million persons, predominantly in the Greater Sydney metropolitan region. During April and May 2006, >8,000 visits for vomiting and diarrhea were recorded in PHREDSS, which is \approx 3,000 above the average number of cases for this period for the previous 5 years. During this 8-week period, reports of clinically diagnosed outbreaks in institutional settings also increased; 129 outbreaks affected >3,485 persons. This number of outbreaks is the highest ever reported in the April–May (autumn) period for this region since data for outbreaks (mainly from aged-care facilities, hospitals, childcare centers, and schools) were collected by NSW Department of Health in 2004. Furthermore, laboratories detected norovirus in 37 (28.7%) of 129 outbreaks investigated by public health authorities.

The stool samples examined by EPL-SEALS in May 2006 were from patients treated in public hospitals and nursing homes within the Eastern Sydney and Illawarra regions as well as referred samples from private laboratories serving the Greater Sydney region. Sequencing of a random selection of 15 positive samples representative of the diverse location of case-patients indicated that 10 (66.7%) of 15 were GII.4 genotype. The nucleotide sequence of 266 bp of the N terminus of the capsid gene

closely resembled (98%) the sequence of Farmington Hills virus and was 100% identical over the same region to norovirus Rhyl440. The remaining positive strains belonged to GII.3 (4 of 15) and GII.12 (1 of 15). The latter strain, designated Schwerin virus, was previously isolated in outbreaks in Germany during 2000. Two of these sequenced samples were from nursing home outbreaks and typed as GII.3 and GII.4. The association with outbreaks of the remaining 13 sequenced samples is uncertain.

Norovirus epidemics occurred throughout the world in 2002 (5) and 2004 (6) and were characterized by the large number of persons affected, multiple routes of transmission, and persistence of endemicity despite rigorous control efforts. In Australia from 1997 to 2000, a period of high activity occurred, dominated by the GII.4 epidemic strain designated U.S. 95/96 (7). Farmington Hills virus was responsible for subsequent outbreaks in Sydney in 2002 and followed a decline in norovirus outbreaks during 2001. After the 2002 outbreaks in Australia, a period of low norovirus activity persisted before the 2004 emergence of another GII.4 variant, designated Hunter virus (3), which predominated in outbreaks in nursing homes and hospitals. More than 400 outbreaks affecting >15,000 persons occurred

in NSW during 2004 (8). The Hunter virus was subsequently determined to be the etiologic agent in hundreds of outbreaks occurring in Holland (9), New Zealand (Gail Greening, pers. comm.), Taiwan, and Japan.

The occurrence of norovirus epidemics in the Australian autumn (March–May) contradicts the perception that the disease is strongly associated with the winter season, when the incidence of respiratory infections increases (2). Indeed, other norovirus outbreaks have previously been reported in the summer season (1,3). The alternating trend of high and low incidence of outbreaks (Figure) may be related to several factors, some of which may have been implicated in these outbreaks. Such factors include development of herd immunity to the dominating strain, which is short-term; emergence of an epidemic strain with no herd immunity; increased genomic variation due to point mutation or recombination (10); or other mechanisms.

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References

1. Lopman BA, Reacher M, Gallimore C, Adak GK, Gray JJ, Brown DWG. A summertime peak of “winter vomiting disease.” Surveillance of norovirus in England and Wales, 1995 to 2002. *BMC Public Health*. 2003;3:13.
2. Mounts AW, Ando T, Koopmans M, Breessee JS, Noel J, Glass RI. Cold weather seasonality of gastroenteritis associated with Norwalk-like viruses. *J Infect Dis*. 2000;181:S284–7.

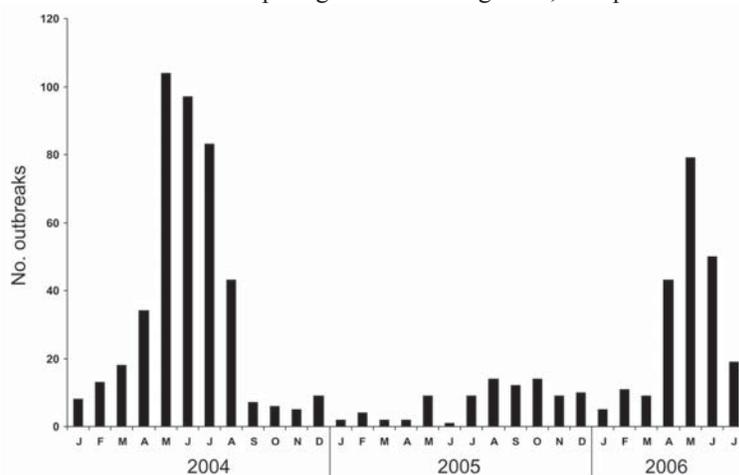


Figure. Number of outbreaks reported to the New South Wales Department of Health, January 2004–July 2006.

3. Miyoshi T, Uchino K, Matsuo M, Ikeda Y, Yoshida H, Sibata H, et al. Characteristics of norovirus outbreaks during a non-epidemic season. *Jpn J Infect Dis*. 2006;59:140–1.
4. Muscatello DJ, Churches T, Kaldor J, Zheng W, Chiu C, Correll P, et al. An automated, broad-based, near real-time public health surveillance system using presentations to hospital emergency departments in New South Wales, Australia. *BMC Public Health*. 2005;5:141.
5. Widdowson M-A, Cramer EH, Hadley L, Bresee JS, Beard RS, Bulens SN, et al. Outbreaks of acute gastroenteritis on cruise ships and on land: identification of a predominant circulating strain of norovirus—United States, 2002. *J Infect Dis*. 2004;190:27–36.
6. Bull RA, Tu ET, McIver CJ, Rawlinson WD, White PA. Emergence of a new norovirus genotype II.4 variant associated with global outbreaks of gastroenteritis. *J Clin Microbiol*. 2006;44:327–33.
7. White PA, Hansman GS, Li A, Dable J, Isaacs M, Ferson M, et al. Norwalk-like virus 95/96-US strain is a major cause gastroenteritis outbreaks in Australia. *J Med Virol*. 2002;68:113–8.
8. Telfer B, Munnich S. OzFoodnet—enhancing foodborne disease surveillance across Australia. In: Annual report. Sydney (Australia): New South Wales and Hunter Area Health Service; 2005.
9. Kroneman A, Vennema H, van Duynhoven Y, Duizer E, Koopmans M. High number of norovirus outbreaks associated with GGII.4 variant in The Netherlands and elsewhere: does this herald a worldwide increase? *Euro Surveill*. 2004;8(52).
10. Bull RA, Hansman GS, Clancy LE, Tanaka MM, Rawlinson WD, White PA. Norovirus recombination in ORF1/ORF2 overlap. *Emerg Infect Dis*. 2005;11:1079–85.

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Echinostoma malayanum Infection, the Philippines

To the Editor: In 2002, the Department of Health-Provincial Health Team (DOH-PHT) of Surigao del Norte reported 102 cases of fasciolid-like infections in the municipality of Santa Monica, Siargao Island, the Philippines. The reports were based on characteristic large operculate eggs having been found in routine stool examinations conducted during schistosomiasis surveys. *Fasciola hepatica* infection was the initial diagnosis considered. In 2005, a collaborative team from DOH-PHT, the National Institutes of Health, the University of the Philippines Manila, and the Local Government Unit/Rural Health Unit conducted a field investigation to determine the cumulative prevalence of intestinal helminthic infections in adult patients whose conditions had been previously diagnosed as fasciolid-like infection and to determine the causative species of trematode.

The study group consisted of 70 adult patients from the *barangay* (local government unit of 50–100 families) of Libertad, for whom fasciolid infections had been noted on previous surveys. Researchers confirmed infections and collected adult trematodes for species identification. All patients underwent bowel preparation with bisacodyl (Dulcolax) 10-mg tablets (2 tablets taken immediately after a meal on night before deworming), followed by praziquantel (25 mg/kg in 2 doses 4 h apart), and 30-g magnesium sulfate granules, dissolved in 1 cup of milk, given 1 h after the second dose of praziquantel. Stools were processed by using the Kato-Katz method (1) and examined microscopically by medical technologists from the Diagnostic Parasitology Laboratory, College of Public Health, University of the Philippines Manila, for intestinal helminth

ova. In addition, a clinical history was taken and a complete physical examination was conducted for each patient volunteer after stool submission. Eating preferences and habits were specifically noted.

The research was approved by the Department of Health Center for Health Development of the Caraga region. Informed consent was obtained before procedures were done and treatment was given to infected patients.

Cumulative prevalence for soil-transmitted helminth infections among the 70 patients was 51.4%. Prevalence according to species was *Trichuris* spp. 42.9%, *Ascaris* spp. 17.1%, and hookworm spp. 1.4%. *Schistosoma japonicum* infection rate was 10%. Stool samples from 8 (11.4%) patients had large (120–130 $\mu\text{m} \times 80$ –90 μm), brownish, operculated eggs; 3 had a total of 13 adult flukes. Microscopy showed small leaflike flukes 8–9 mm long and 2.5–3.5 mm wide. After the organisms were processed and stained with aceto-carmin and fast green stains, diagnostic features of *Echinostoma malayanum* (Leiper 1911) were noted. Adult trematodes were within known species size range (5–10 mm \times 2.5–3.0 mm) and had elongated bodies and bluntly rounded ends. The ventral sucker (acetabulum) was prominent and larger than the anterior oral sucker. Paired testes were deeply branched and positioned high in the posterior half of the body, extending above the midplane with a single anterior globular ovary. The uterus was entirely anterior to the ovary, and vitellaria (glands) were abundant along both lateral portions of the worm, ending just posterior to the esophagus. The oral sucker had a horseshoe-shaped anterior collar with 43 circumoral spines, which differentiates this species from *E. ilocanum* (49–51 collar spines), another trematode species endemic to the Philippines.

In terms of eating habits, patients reported that fish were commonly eaten raw, after being dipped in a salt