

Community and commercial outreach on rat lungworm (edited from org version)

Jim Hollyer

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What I will cover

- What our farm food safety coaching program does
- The pathogens and problems we see
- Rat lungworm – So what?
- What we are doing about it

Coaching – University of HI

- Started in 2000
- In line with “Good Agricultural Practices” or GAPs which are becoming the standard for many commercial farms in US and elsewhere
 - Pesticides
 - Pathogens
 - Worker hygiene
 - Water quality
- Successes and resistance

Auditing – HI Dept of Ag

Just look in the wash bucket

RLW – So what?

Summary of reported notifiable foodborne illness cases in Hawaii, 2005-2010.

DISEASE/YEAR	2005	2006	2007	2008	2009	2010
Total Resident Population, July 1st est., 2005-2010 [^]	1,259,147	1,269,228	1,269,796	1,280,001	1,288,285	1,300,086
Angiostrongyliasis, cantonensis (Rat Lungworm)	7	2	2	7	8	9
Campylobacteriosis *	559	589	531	657	548	734
Cryptosporidiosis	1	5	6	2	1	1
E. coli 0157:H7	13	19	40	13	11	29
Enterococcus, vancomycin resist	44	119	190	174	147	143
Fish poisoning, ciguatera *	26	25	17	32	12	3
Fish poisoning, scombroid *	55	38	23	30	28	28
Listeriosis	2	4	7	3	4	8
Norovirus	N/R	N/R	N/R	370	323	375
Salmonellosis	290	265	314	269	338	335
Shigellosis	35	45	72	46	49	50

Notes: [^] Population Estimates Program, Population Division, U.S. Bureau of the Census, Washington, DC 20233

* A non-notifiable disease or condition but for which the Centers for Disease control & Prevention and the Hawaii Dept. of Health maintain surveillance. N/R stands for "not reportable".

Source: retrieved from <http://hawaii.gov/health/about/about/pr/NETSS.html>

Here's what! 6.5 Million Visitors





RESTAURANTS

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OF
HONOLULU**

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and be
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HONOLULU'S
BEST
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Juicy juice

Summer drinks with your local produce

MARGOT SEETO

JUL 21, 2010 | [SHARE](#) [f](#) [t](#) [e](#) [...](#)



It's the season that has us sweating seconds after stepping out of the shower and making embarrassingly weird-shaped wet spots on the backs of our shirts. But any excuse to cool down with a cold drink is welcome. Last year, the *Weekly* shared some of its favorite hot-weather-friendly drinks from around the world. This summer, keep it healthy with concoctions made from local produce (and sans the alcohol). If you're tired of eating papaya chunks for breakfast everyday, or aren't sure what to do with that last bit of leafy greens, here are some refreshing ways to drink your fruits and veggies. Hit up those farmers markets and have some bonding time with your blender for throwback good time to when smoothies were all the rage.

Pit Farms avocado smoothie



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Another case

My Round In The Ring With Ratlungworm

By Grace Purusha

Since my now infamous 'Round in the Ring with Ratlungworm Disease,' the greatest gift of all for me is being alive. Knowing the pathway to restore health, if it escapes or is snatched away, is next up for valuable gifts.

Ratlungworm is a rat-born disease, where slugs carry larvae and worms lurking in rat poop onto the vegetables they crawl over. Once accidentally ingested, these find their way into your spinal fluid through your meninges and cause a very high level of inflammation in the central nervous system. There's excruciating full body pain, burning, itching and nausea. It is a self-limiting disease of five weeks until all larvae die from starvation. There is no medicine that removes this from your body.

What's the key lesson? Find a way to keep slugs out of your veggie garden. Soak and brush all vegetables with your choice of food-based hydrogen peroxide, grapefruit seed extract, or vegetable disinfectant.

To experience the fear and flutter of watching my life force diminish and temporarily disappear, was incomparably humbling. As I witnessed myself hit bottom, completely flattened, I promised myself that if I was ever to walk the beach again



without pain in my body, I would never again question the purpose of my life: to simply enjoy being alive.

During all stages of the illness, I watched

and learned. Although immersed in the progressive horrors, I noticed particular personality energetics, patterns, pitfalls, common tracks of fear and doubt, and attempts to circumvent the moment's discomfort. Very insightful clues were revealed about me and my life, and about how I lived it.

I have always believed that "illness is a blessing," as there is usually enough information contained in the difficulties to identify the habits that if corrected would bring forth what was lost in their absence. We not only regain what was lost, but also often produce longed-for improvements. As I started to recover, the recognized lessons and opportunities for awakening were endless. The softening and cracking of my psychic shells exposed my deeper self to me. One night, a voice spoke to me saying, "We have chosen to accelerate your movement forward. You may not enjoy the way we've chosen, but it's going to be quite effective. When complete, you'll understand and be grateful."

Out of the wreckage of my fried nervous system emerged a heightened sensitivity and compassion toward each moment, person, choice, and feeling, with an inescapable desire to honor what would bring the most ease, because I had to. Honoring my new sensitive awareness, a new clarity of values emerged. The "reset" button had



No cases in the commercial
market (or school garden) – yet!

More on school gardens

The background of the slide features a bright yellow sky at the top, which transitions into a dark green, textured area representing foliage or a garden. The overall aesthetic is clean and nature-oriented.

Food Safety News

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Food Industry May Face More Criminal Charges

BY HELENA BOTTEMILLER | OCT 29, 2010

According to a leading criminal defense attorney, the food industry may be about to face a substantial increase in criminal investigations related to food recalls and outbreaks. "There's a tremendous pressure on the FDA to increase the criminal prosecutions of foodborne..."

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Minnesota Links More Illnesses to Raw Milk

BY MARY ROTHSCHILD | OCT 29, 2010



Minnesota state health officials said Thursday that seven more illnesses have been linked to raw dairy products from the Hartmann dairy farm. Hartmann's farm was implicated as the source of an outbreak...

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Vermont Veal Scandal Figure Pleads 'No Contest'

BY HELENA BOTTEMILLER | OCT 29, 2010

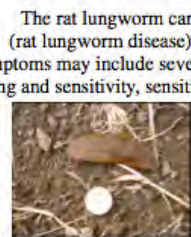


Frank Perretta, owner of a now Bushway Packing slaughterhouse in Vermont has pleaded no contest to animal cruelty charges, approximately one year after stomach-churning undercover footage was released by the...

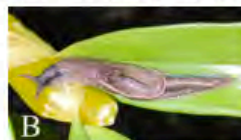
[Discuss \(0\)](#) | [Share](#)

How do people know?

What is ^{Slideshow} rat Lungworm Disease?



Cuban Slug



Semi Slug

The rat lungworm can cause a disease called angiostrongyliasis (rat lungworm disease) which can affect the brain and spinal cord. Symptoms may include severe headache, stiffness of the neck and back, skin tingling and sensitivity, sensitivity to light, hallucinations, nausea and vomiting.

Foods such as raw produce, raw or undercooked snails, freshwater prawns, crabs and frogs can be contaminated by an unseen parasite *Angiostrongylus cantonensis* (rat lungworm). Fish do not spread this parasite. The rat lungworm is found most often in snails and slugs and has also been found in the flatworm. The worm infects rats, which pass the parasite to snails, slugs, freshwater prawns, crabs and frogs, not humans.



Baby Semi Slug on nickel



Giant African Snail

Prevention

DO NOT eat raw foods contaminated with the slime* from snails or slugs or visible snail or slugs. **WASH PRODUCE** completely and boil snails, freshwater prawns, crabs, and frogs for **AT LEAST 3-5 MINUTES**. Do not handle snails and slugs with bare hands. Apply slug bait to eliminate slugs from your garden. Cover your catchment tanks to prevent slugs and snails from having access. Controlling rodents can also help control the rat lungworm. *If you think you may have angiostrongyliasis, see your health care provider and let him/her know of your exposures.*

*Scientists are not sure whether exposure to slime can make you sick.

For more information call the Hawai'i District Health Office Disease Investigations office: 808-933-0912 or see CDC website: <http://www.dpd.cdc.gov/DPDs/HTML/Angiostrongyliasis.htm>



Hawai'i State Department of Health
Disease Investigation Branch
Chiyoee L. Fukino, Director of Health
Linda Langle, Governor of Hawai'i

January 29, 2009

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We provide access to our activities without regard to race, color, national origin, language, age, sex, gender identity or expression, sexual orientation, religion, or disability. If you have a problem, please contact the Disease Investigation Branch without delay if it is a problem. You may also contact our departmental Alternative Dispute Office at Box 3378, Honolulu, HI 96811-3378, or at 588-6633 (voiceonly).

How do people know?



DEPARTMENT OF HEALTH
Hawaii District Health Office

News Release

NEIL ABERCROMBIE
GOVERNOR

LORETTA FUDDY, A.C.S.W., M.P.H.
DIRECTOR
Phone: (808) 586-4410
Fax: (808) 586-4444

For Immediate Release: May 25, 2011

11-035

DOH URGES HAWAII RESIDENTS TO TAKE PRECAUTIONS TO PREVENT RAT LUNGWORM DISEASE

HILO -- The Hawaii State Department of Health (DOH) is reminding the public to be aware of angiostrongyliasis (rat lungworm). DOH has identified 4 probable cases of illness in 2011, and all were residents of the Big Island.

The department is cautioning the public to wash produce thoroughly, clean food preparation areas, and keep foreign items out of children's mouths to prevent unwanted exposure to pesticides, bacteria, and parasites such as *Angiostrongylus cantonensis* or rat lungworm.

Being proactive



**College of Tropical Agriculture
and Human Resources**
University of Hawai'i at Mānoa

Food Safety and Technology
Mar. 2009
FST-35

Avoid Contracting Angiostrongyliasis (Rat Lungworm Infection): Wash Fresh Fruits and Vegetables Before Eating!

Aurora A. Saulo

Extension Specialist in Food Technology, Department of Tropical Plant and Soil Sciences

Human angiostrongyliasis is an infection caused by a nematode parasite of rats. The tiny parasitic roundworm *Angiostrongylus cantonensis* (pronounced an-gee-o-stron-guh-luss can-tun-en-sis) is commonly called the rat lungworm. The mature, adult form of the nematode is found only in rats. The immature forms (larvae) are passed in the feces of infected rats and can

displacing the Cuban slug, *Veronicella cubensis*, are known to carry the infective larvae. The semi-slug has a tendency to climb structures and deposit its feces. It is established in commercial papaya plantations and is considered a pest of lettuce and papaya in home gardens. Contamination of produce by one of these animals is believed to have caused the recent incidences of angio-

Being proactive



**College of Tropical Agriculture
and Human Resources**
University of Hawai'i at Mānoa

Food Safety and Technology
Jan. 2010
FST-39

Best On-Farm Food Safety Practices: Reducing Risks Associated with Rat Lungworm Infection and Human Eosinophilic Meningitis

James R. Hollyer,¹ Vanessa A. Troegner,¹ Robert H. Cowie,² Robert G. Hollingsworth,³
Lynn C. Nakamura-Tengan,⁴ Luisa F. Castro,⁵ and Arlene E. Buchholz⁶

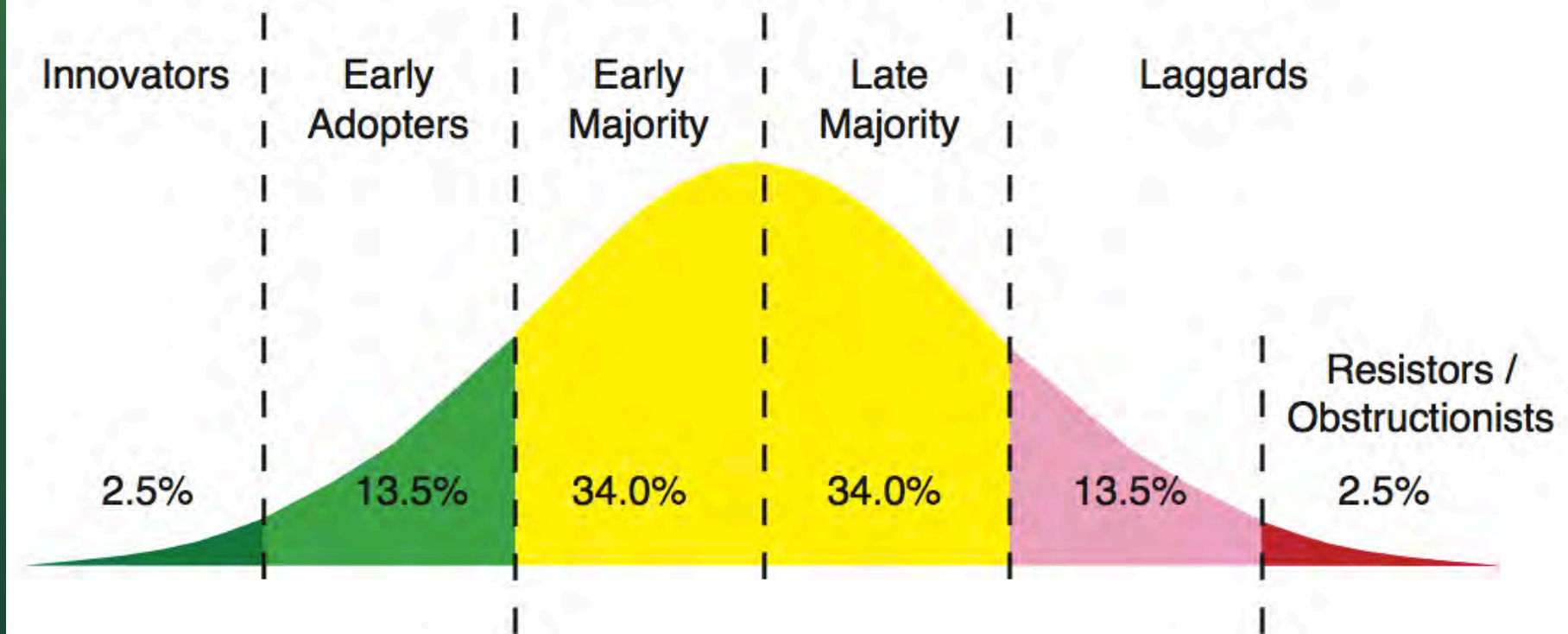
¹CTAHR Agricultural Development in the American Pacific Project, ²Pacific Biosciences Research Center, UH Mānoa, ³USDA-ARS Pacific Basin Agricultural Research Center—Tropical Crops and Commodities, ⁴CTAHR Department of Human Nutrition, Food and Animal Sciences, ⁵CTAHR Department of Natural Resources and Environmental Management, ⁶Office of Public Health Studies, UH Mānoa

Recent cases of eosinophilic meningitis have drawn attention to a foodborne parasitic infection that occurs in Hawai'i, the Pacific Islands, southern and eastern Asia, and elsewhere. In late 2008, the Hawai'i Depart-

This information is primarily for commercial growers so that they can reduce the risk factors for rat lungworm contamination of their produce. The medical information presented is based on current medical knowledge and science-based literature, and it is not intended to be a substitute for a medical evaluation by

Behavioral change – or not

E. M. Roger's Innovation Adoption Curve
as Applied to Farm Food Safety Coaching



Got wash water?



Addressing unknowns

Table 2. List of possible sanitizers and target host species (those known to carry RLW based on previous research).

Possible sanitizer list	Possible target species (RLW hosts)
Arch Chemical's Cal-Hypo	<i>Achatina fulica</i> (giant African snail)
BEI 12.5% ag sanitizer (Pioneer)	<i>Laevicaulis alte</i> (leather leaf slug)
Chiquita's FreshRinse	<i>Veronicella cubensis</i> (Cuban slug)
Clorox bleach	<i>Parmarion martensi</i> ('semi-slug')
Citrus Magic Veggie Wash	<i>Cyclotropis</i> sp. (no common name)
Ecolab's Tsunami 100 (hydrogen peroxide)	<i>Cornu aspersum</i> (brown garden snail)
Environne Fruit & Vegetable Wash	<i>Pomacea canaliculata</i> (apple snail)
Fit (licensed from U Georgia)	<i>Arion</i> spp. (roundback slugs)
SafeOx's Chlorine Dioxide	Philomycid spp. (mantle slugs)
Spectrum or similar (FMC)	<i>Deroceras laeve</i> (marsh slug)
Super Chlor	<i>Deroceras reticulatum</i> (grey garden slug)
Vermont Soap - Organic Produce Wash (Produce Magic)	<i>Lehmannia valentiana</i> (three band garden slug)
	Flatworms (various species)

“The label is the law”



Directions for Use: It is a violation of Federal law to use this product in a manner inconsistent with the labeling.

PRECAUTIONARY STATEMENTS: HAZARDS TO HUMANS AND DOMESTIC ANIMALS.

DANGER: CORROSIVE. May cause severe irritation or damage to eyes and skin. Harmful if swallowed. Protect eyes when handling. For prolonged use, wear gloves. Wash after contact with product. Avoid breathing vapors and use only in a well-ventilated area.

FIRST AID: IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.

IF ON SKIN OR CLOTHING: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. **IF SWALLOWED:** Call a poison control center or doctor for treatment advice. Have person sip a glassful of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person. Call a poison control center or doctor immediately for further treatment advice. Have the product container or label with you when calling a poison control center or doctor or going for treatment. Clorox Information Line: 1-800-252-2200.

NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage.

PHYSICAL OR CHEMICAL HAZARDS: Product contains a strong oxidizer. Always flush drains before and after use. Do not use or mix with other household chemicals such as toilet bowl cleaners, rust removers, acids or products containing ammonia. To do so will release hazardous, irritating gases. Prolonged contact with metal may cause pitting or discoloration.

STORAGE AND DISPOSAL: Store away from children. Reclose cap tightly after each use. Store this product upright in a cool, dry area away from direct sunlight and heat to avoid deterioration. Offer empty container for recycling, if recycling is not available. Recycle container in trash.

Not harmful to septic systems. Contains no phosphorus.

See back of container for more information.

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Modo de Empleo: El uso de este producto de una manera distinta a la especificada en esta etiqueta constituye una violación a la ley federal.

DECLARACIONES PREVENTIVAS: RIESGOS PARA LOS SERES HUMANOS Y ANIMALES DOMESTICOS.

PELIGRO: CORROSIVO. Puede causar irritación o daño a los ojos y a la piel. Dañino si se ingiere. Proteja los ojos durante la manipulación. Para uso prolongado, utilice guantes. Lávese las manos con agua abundante después de usar el producto. Evite inhalar los vapores y evite inhalarlo en su área de ventilación.

PRIMEROS AUXILIOS: SI EN LOS OJOS: Mantenga los ojos abiertos y enjuague con agua lentamente, con cuidado, por 15-20 minutos. Si se usan lentes de contacto, retirelos después de los primeros 5 minutos, luego continúe enjuagando los ojos.

SI EN LA PIEL O LA ROPA: Quite la ropa contaminada. Enjuague inmediatamente la piel con abundante agua.

SI SE INGERE: Lávese a un médico o a un centro de control de envenenamientos para obtener más tratamiento. Si la persona puede tragar, haga que beba un vaso de agua. No induzca el vómito a menos que así se lo indique un médico o un centro de control de envenenamientos. No administre nada por vía oral a una persona que haya perdido el conocimiento. Llame a un médico o a un centro de control de envenenamientos para obtener más asesoramiento sobre el tratamiento. Cuando llame a un centro de control de envenenamientos, así se lo indique un médico o un centro de control de envenenamientos, lleve el producto con usted para obtener más asesoramiento sobre el tratamiento. Cuando llame a un centro de control de envenenamientos, lleve el producto con usted para obtener más asesoramiento sobre el tratamiento. Cuando llame a un centro de control de envenenamientos, lleve el producto con usted para obtener más asesoramiento sobre el tratamiento.

NOTA PARA EL MÉDICO: Probable daño a las mucosas puede contraindicar el uso de lavado gástrico.

RIESGOS FÍSICOS O QUÍMICOS: El producto contiene un fuerte oxidante. Siempre desfogue los drenajes antes y después de usarlo. No lo mezcle con otros productos de limpieza. Evite mezclarlo con otros productos de limpieza que contengan lejía, amoníaco, ácidos o productos que contengan lejía. El uso prolongado puede causar irritación o daño a la piel.

ALMACENAMIENTO Y ELIMINACIÓN: Almacénelo lejos de los niños. Cierre bien la tapa después de cada uso. Almacénelo en un lugar fresco y seco, alejado de la luz solar directa y del calor excesivo. Recicle el envase vacío para que sea reciclado. Si se puede reciclar, recicle el envase vacío para que sea reciclado. Si se puede reciclar, recicle el envase vacío para que sea reciclado. Si se puede reciclar, recicle el envase vacío para que sea reciclado.

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A word about some natural pest managers

