



UNIVERSITY OF HAWAII SYSTEM

Legislative Testimony

Testimony Presented Before the
Senate Committee on Ways and Means
April 4, 2018 at 10:30 a.m.

By Carolyn Ma, PharmD, BCOP
DEAN

UH Hilo - Daniel K. Inouye College of Pharmacy

HB 474 HD1 SD1 – RELATING TO RAT LUNGWORM DISEASE

Chair Dela Cruz, Vice Chair Keith-Agaran, and members of the committee:

My name is Carolyn Ma, and I am the Dean for the UH Hilo Daniel K. Inouye College of Pharmacy (DKICP). As designated lead for UH Hilo and on behalf of Interim Chancellor Marcia Sakai, the University of Hawai'i at Hilo fully supports this bill that will address the control and treatment of Rat Lung Worm (RLW) Disease. We do, however, respectfully request for amendments to this draft, specifically on page 3, to remove lines 9-11 which reads:

“provided that the appropriation shall be matched on a dollar-for-dollar basis between the State and anticipated sources of funding, including private sources and federal research grants.”

UH Hilo's DKICP has both a basic science researcher and a pharmacy practice (pharmacist) faculty on the RLW Working Group.

A most recent study (in publication) has shown that Hawai'i Island has the highest *Angiostrongylus cantonensis* infection rates in rats (94%) and in mollusks (*Parmarion martensi*, semi-slugs 77%) in the country and the increase in human infection appears linked to the arrival of semi-slugs. A baseline recent study was conducted on Kauai between March-May 2017 and tested for the presence of *Angiostrongylus cantonensis* (Rat Lungworm), of which 17.2% of semi-slugs tested positive. Our basic science researcher has been active in conducting valuable research.

1. Jarvi lab has developed a 'death assay' to distinguish live from dead larvae. Continued study in this area will help complete studies determine how effective commercially available vegetable washes or other solutions are at killing infective RLW larvae.
2. Simulated catchment water systems have been initially conducted to test two different size filters in an attempt to filter out infective larvae. However, tests have shown that larvae can still travel or move around certain size filters. Continued evaluation of the possibility of RLW transmission in water is necessary by conducting laboratory and household catchment studies to optimize maintenance

and treatment design that prevents RLW larvae entering household and agricultural water supplies.

3. A pilot study has been completed to determine if a blood-based test can help to diagnose RLW, rather than the current diagnosed procedure of a spinal tap. Continued study of protein isolates from infected rats will help to evaluate the reliability and validity of such a test.
4. The lab continues to develop ways of reducing larval burdens in rats. Vaccination study was unsuccessful under given conditions. Further study in possibly deworming rats may be a more appropriate strategy.

Our Pharmacy Practice faculty has been working with Dr. John Martell in performing a retrospective chart review to better understand the treatment scheme and outcomes of the 70+ cases of RLW that have occurred in Hawai'i. Funding would help to continue this investigation and further study to determine the most effective medical treatment for the various stages of RLW in humans, domesticated animals and farm livestock.

UH Hilo supports this bill if the passage does not replace or adversely impact priorities as indicated in our University of Hawai'i BOR Approved Supplemental Budget.

DAVID Y. IGE
GOVERNOR OF
HAWAII



SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

JEFFREY T. PEARSON, P.E.
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

Testimony of
SUZANNE D. CASE
Chairperson

Before the Senate Committee on
WAYS AND MEANS

Wednesday, April 4, 2018
10:30 AM
State Capitol, Conference Room 211

In consideration of
HOUSE BILL 474, HOUSE DRAFT 1, SENATE DRAFT 1
RELATING TO RAT LUNGWORM DISEASE

House Bill 474, House Draft 1, Senate Draft 1 proposes to appropriate funds to the University of Hawaii at Hilo to support research relating to rat lungworm disease. **The Department of Land and Natural Resources (Department) supports this measure provided that its passage does not replace or adversely impact priorities indicated in the Executive Supplemental Budget request.**

The Department recognizes the threat of rat lungworm disease and the lack of information on statewide distribution of the parasite *Angiostrongylus cantonensis* and its hosts. The Department also notes that the Hawaii Invasive Species Council (HISC), which is administered by the Department, received proposals for research and education to address this disease in Fiscal Years 16 and 17, but was unable to identify adequate resources to support all of the proposed efforts. Additional funding support for a more comprehensive research program, as described in this measure, would be strongly beneficial for the protection of public health and the local agricultural industry.

Thank you for the opportunity to comment on this measure.

DAVID Y. IGE
Governor

DOUGLAS S. CHIN
Lt. Governor



SCOTT E. ENRIGHT
Chairperson, Board of Agriculture

PHYLLIS SHIMABUKURO-GEISER
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawaii 96814-2512
Phone: (808) 973-9600 FAX: (808) 973-9613

**TESTIMONY OF SCOTT E. ENRIGHT
CHAIRPERSON, BOARD OF AGRICULTURE**

BEFORE THE SENATE COMMITTEE ON WAYS & MEANS

**APRIL 4, 2018
10:30 A.M.
CONFERENCE ROOM 211**

**HOUSE BILL NO. 474 HD1 SD1
RELATING TO RAT LUNGWORM DISEASE**

Chairperson Dela Cruz and Members of the Committee:

Thank you for the opportunity to testify on House Bill No. 474 HD1 SD1, relating to rat lungworm disease. The Department supports the intent of this measure and defers to the University of Hawaii on carrying out the bill's mandates and appropriations.

Rat lungworm disease is a serious and relatively new pathogen to plague the consumption of fresh produce grown in the islands. There is a great need to conduct research into the biology of the carriers of the disease, the ways in which it can be spread, outreach to the public in understanding the condition, and methods that can be employed to control and/or contain it.

Thank you for the opportunity to testify on this measure.



Harry Kim
Mayor



Wil Okabe
Managing Director

Barbara J. Kossow
Deputy Managing Director

County of Hawai'i
Office of the Mayor

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April 2, 2018

Senator Donovan M. Dela Cruz, Chair
Committee on Ways and Means
Hawai'i State Capitol, Room 211
Honolulu, HI 96813

Senator Gilbert S.C. Keith-Agaran, Vice-Chair
Committee on Ways and Means
Hawai'i State Capitol, Room 211
Honolulu, HI 96813

Dear Chair Dela Cruz, Vice-Chair Keith-Agaran, and Committee Members:

Re: HB 474, HD 1, SD 1 Relating to Rat Lungworm Disease
Hearing Date: 04/04/2018 – 10:30 am; Conference Room 211

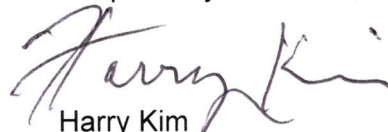
Thank you for this opportunity to testify in support of funding for activities aimed at the prevention and eradication of rat lungworm disease. Until those goals have been achieved, a third worthy aim of the bill, clearly reflected in the amendments (although not specified in the preamble) is better treatment for those who fall victim to this illness.

The Daniel K. Inouye College of Pharmacy at the University of Hawai'i at Hilo established the Hawai'i Island rat lungworm disease working group. It has been conducting research and educational outreach on the disease for the past four years, and it is my understanding that it has been doing very valuable work.

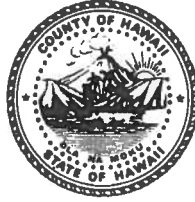
Apparently the impact of this disease has been different in Hawai'i than on the mainland, with unusually severe consequences reported for Hawai'i victims. Therefore, the funding of local research is uniquely important.

If UH-Hilo feels that the requirement of 1:1 matching funds is realistic, I urge you to support a generous appropriation to deal with this dreadful disease.

Respectfully submitted,


Harry Kim
Mayor, County of Hawai'i

DRU MAMO KANUHA
Council Member
District 7, Central Kona



PHONE: (808) 323-4267
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EMAIL: dru.kanuha@hawaiicounty.gov

HAWAI'I COUNTY COUNCIL

West Hawai'i Civic Center 74-5044 Ane Keohokālole Highway, Kailua-Kona, Hawaii 96740

April 2, 2018

TESTIMONY OF DRU KANUHA
COUNCIL MEMBER, HAWAI'I COUNTY COUNCIL
ON HB 474 HD 1 SD 1, RELATING TO RAT LUNGWORM DISEASE
Committee on Ways and Means
Wednesday, April 4, 2018
10:30 a.m.
Conference Room 211

Aloha Chair Dela Cruz and Members of the Committee:

I thank you for the opportunity to testify in **support** of HB 474 HD 1 SD 1, relating to rat lung worm disease. My testimony is submitted in my individual capacity as a member of the Hawai'i County Council and Chair of Governmental Relations and Economic Development Committee.

The purpose of this measure is to appropriate funds to the University of Hawai'i at Hilo for testing, studies, outreach, research, and other activities related to the prevention and eradication of rat lungworm disease.

The Daniel K. Inouye College of Pharmacy at U.H. Hilo established the Hawai'i Island Rat Lungworm Disease working group. It has been conducting research and educational outreach on the disease for the past four years and have been doing valuable work. Impact of rat lung worm disease has been different in Hawai'i than on the mainland, and with unusual severe consequences reported for Hawai'i victims including crippling chronic disability and claiming of lives. Funding of local research is very important for us, and will allow education, prevention, and possible long term treatment guidelines for this disease for local residents, and visitors alike.

For the reasons stated above, I urge the Committee on Ways and Means to support this measure as well. Should you have any questions, please feel free to contact me at (808) 323-4267.

Mahalo for your consideration.

Dru Kanuha
Council Member, Hawai'i County Council



**HUI MEMBER
ORGANIZATIONS:**

Farm to Keiki
(Preschool/ECE)

FoodCorps Hawai'i

Grow Some Good

Hawai'i Association of
Independent Schools
(HAIS)

'Iolani School/O'ahu Farm
to School Network

Kamehameha Schools

Kōkua Hawai'i Foundation

Mala'ai: Culinary Gardens
of Waimea Middle School

Mālama Kaua'i/Kaua'i
School Garden Network

Maui School Garden
Network

Pacific Resources for
Education and Learning
(PREL)

Sustainable Molokai/
Molokai School Garden
Network

The Kohala Center/Hawai'i
Island School Garden
Network

Date: April 2, 2018
To: The Honorable Donovan Dela Cruz, Chair
The Honorable Gilbert Keith-Agaran, Vice Chair
Members of the Senate Committee on Ways and Means
From: Lydi Bernal, Coordinator, Hawai'i Farm to School Hui
Hawai'i Public Health Institute (HIPHI)
Re: SUPPORT for HB474 HD1 SD1, Relating to Rat Lungworm Disease
Hearing: April 4, 2018 at 10:30am in Conference Room 211

Thank you for the opportunity to testify in **support of HB474 HD1 SD1**, which appropriates funds to the University of Hawai'i at Hilo for testing, studies, outreach, research, and other activities related to the prevention and eradication of rat lungworm disease.

Rat Lungworm Disease (RLWD) is a serious issue for Hawai'i. The RLWD research and education work of the University of Hawai'i at Hilo College of Pharmacy is pioneering in the state and internationally, and fully deserving of expedited state-level support.

The Hawai'i Farm to School Hui stands ready to assist with educational outreach to Hawaii's students and schools. We have created a School Garden Safety Manual that includes information on RLWD and we continue to host workshops around the state to bring this information to educators. The manual, poster, school garden safety video, and RLWD activity book (published by University of Hawai'i at Hilo College of Pharmacy) are available for free download online at www.farmtoschoolhui.org.

The Hawai'i Farm to School Hui is also actively working to support the dissemination of a series of RLWD lesson plans that have recently been published by the University of Hawai'i at Hilo College of Pharmacy in order to involve students, Grades 5-8, as citizen scientists and partners in education on the subject of RLWD in Hawai'i. The lessons are available for free download at <http://pharmacy.uhh.hawaii.edu/rlw/lessonplans.php>.

HB474 HD1 SD1 provides critical support for RLWD research and outreach. We respectfully ask you to pass this measure out of committee.

Me Ke Aloha,

Lydi Bernal
Coordinator, Hawai'i Farm to School Hui, HIPHI

The **Hawai'i Farm to School Hui** is a statewide network whose mission is to strengthen Hawaii's farm to school movement by supporting our island networks in the areas of capacity building, resource development and sharing, professional development, and policy development and advocacy. The Hui is comprised of five island-level networks, community organizations and schools, and representatives from the Hawai'i Departments of Agriculture, Education, and Health and the University of Hawai'i. The Hui formed in 2010 and became a program of the Hawai'i Public Health Institute (HIPHI) in 2017.

HB-474-SD-1

Submitted on: 4/2/2018 8:26:01 AM

Testimony for WAM on 4/4/2018 10:30:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Elena Cabatu	Testifying for Hilo Medical Center	Support	No

Comments:

Hilo Medical Center fully supports HB474 HD1 SD1.

HB-474-SD-1

Submitted on: 4/2/2018 12:18:36 PM

Testimony for WAM on 4/4/2018 10:30:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Nancy Redfeather	Testifying for Ka Ohana O Na Pua	Support	No

Comments:

Mahalo for your continued support for this very important Bill. Community education and outreach such as HDOH is doing this year is important, but so is research. We need a blood test for RLWD that can be done HERE on Hawai'i Island and can be done quickly and without the spinal tap which is invasive and painful. This invasive species problem has many sides to it, and this bill represents the very important research side, and without it, public education can only do so much.

Mahalo for your support!



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April 4, 2018

HEARING BEFORE THE
SENATE COMMITTEE ON WAYS AND MEANS

**TESTIMONY ON HB 474, HD1, SD1
RELATING TO INVASIVE SPECIES**

Room 211
10:30 AM

Aloha Chair Dela Cruz, Vice Chair Keith-Agaran, and Members of the Committee:

I am Randy Cabral, President of the Hawaii Farm Bureau (HFB). Organized since 1948, the HFB is comprised of 1,900 farm family members statewide, and serves as Hawaii's voice of agriculture to protect, advocate and advance the social, economic and educational interests of our diverse agricultural community.

The Hawaii Farm Bureau supports, with comments, HB 474, HD1, SD1, which appropriates funds to the University of Hawaii at Hilo for testing, studies, outreach, research, and other activities related to the prevention and eradication of rat lungworm disease.

Providing safe and wholesome food is a priority for the Farm Bureau and its members. Unfortunately, not enough is currently known about Rat Lungworm Disease, or angiostrongyliasis, to fully protect the public. For example, although we know that people in Hawaii can get the disease by eating food contaminated by the larval stage of *A. cantonensis* worms found in raw or undercooked snails or slugs, and we know that people have also become infected by eating raw produce that contains a small infected snail or slug, or part of one, it is *not* known whether even just the slime left by infected snails and slugs is able to cause infection.

This is critical information since the disease can cause a rare type of meningitis (eosinophilic meningitis) that is extremely painful, debilitating, and can be deadly. Because there is no specific treatment for the disease, patients are only given supportive therapy and pain medication.

As more people are encouraged to grow their own food in backyard gardens, and school gardens are becoming more prevalent, the risk of being infected with this disease increases. Nutritionists advise the public to eat plenty of fresh leafy

However, without knowing enough about the transmission of rat lungworm disease, this advice may be risky in areas infested by snails and slugs, unless proper preventative measures are taken. The public needs to know what pre-consumption measures will prevent transmission. Backyard gardeners and others who may not practice pest management to effectively control snails and slugs, or those who purchase greens from these sources, may be particularly at risk.

HFB supports funding of the University of Hawaii at Hilo for research related to the rat lungworm disease, however, we prefer the language in HB 2104, which proposes a comprehensive and collaborative strategy for the prevention and eradication of rat lungworm disease.

Thank you for the opportunity to provide testimony on this measure.



Strong Support for HB474 HD1 SD1 Relating to Rat Lungworm Disease

Date: April 2, 2018
To: Senate Committee on Ways and Means
From: Debbie Millikan, Coordinator, Oahu Farm to School Network
Re: STRONG SUPPORT for HB474 HD1SD1
Relating to Rat Lungworm Disease
Hearing: April 4, 2018 at 10:30am at Capitol Room 211

Dear Members of the Senate Committee on Ways & Means:

I am writing in **STRONG SUPPORT of HB474 HD1 SD1** which appropriates funds to the University of Hawaii at Hilo for testing, studies, outreach, research, and other activities related to the prevention and eradication of rat lungworm disease.

Founded in 2012 and coordinated through 'Iolani School and Pacific Resources for Education and Learning (PREL), OFSN works to strengthen and connect farm to school programs on O'ahu by building the network of service providers and producing professional development and policy advocacy opportunities for stakeholders. This bill will continue to strengthen our partnership with the researchers and education leaders at UH Hilo in addressing the important issue of rat lungworm disease and its prevalence in school gardens across Hawaii. OFSN is in strong support of this bill.

Thank you for allowing this opportunity to submit testimony. I respectfully ask you to pass this measure out of committee.

Mahalo,

Debbie S. Millikan

Debbie Millikan, Coordinator, Oahu Farm to School Network

HB-474-SD-1

Submitted on: 4/3/2018 3:33:51 AM

Testimony for WAM on 4/4/2018 10:30:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Melodie Aduja	Testifying for Oahu County Committee on Legislative Priorities of the Democratic Party of Hawai'i	Support	No

Comments:

Date: March 30, 2018

To: The Honorable Donovan Dela Cruz, Chair
The Honorable Gilbert Keith-Agaran Vice Chair
Members of the Senate Committee on Ways and Means

Re: **SUPPORT for HB474 HD1 SD1**, Relating to Rat Lung Worm Disease

Hrg: April 4, 2018 at 10:30 AM at Conference Room 211

Respected Members of the Senate Committee on Ways and Means,

As a concerned parent and healthcare professional, I am writing in strong **SUPPORT of HB474 HD1 SD1** that will appropriate funds to the University of Hawaii at Hilo for testing, studies, outreach, research, and other activities related to the prevention and eradication of rat lungworm (RLW) disease.

Our current knowledge of RLW disease in Hawai'i is due in large part to the ongoing investigations and outreach of researchers at the Daniel K Inouye College of Pharmacy and UH Hilo. This highly motivated group has outlined plans for additional research and public outreach to better test for, prevent, diagnose and treat this potentially devastating disease. Their efforts deserve and require immediate funding to prevent further delays in addressing the personal and public health consequences of the spread of RLW disease throughout the state.

I strongly **support HB474 HD1 SD1** and respectfully ask you to pass this measure out of committee.

Many thanks for your consideration,

Forrest Batz, PharmD
Keaau, HI

HB-474-SD-1

Submitted on: 3/31/2018 12:23:11 AM

Testimony for WAM on 4/4/2018 10:30:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Marcella Alohalani Boido	Individual	Support	No

Comments:

Respectfully, I offer my personal opinion here. This disease is terrifying. Personally, I have stopped eating any greens grown in Hawaii. I regret that, but my life and health come first.

I support this measure, with a single amendment.

On p. 3, beginning on line 9, I would strike this section:

~~that the appropriation shall be matched on a dollar-for-dollar basis between the State and anticipated sources of funding, including private sources and federal research grants; provided~~

further that

Doing this research should not be dependent on finding matching funds. It is Hawaii's population and guests whose health is at stake. Hawaii's reputation, too. While additional funds from other sources would be lovely, we should not hold this necessary and extremely important research hostage in this way.

If my relatives and friends on the Big Island get sick, I can assure you, being told that it was because there were no matching funds is not going to find favor with me.

If we want sustainable agriculture, then funding this research should be a clear and obvious way to support that goal.

Put Hawaii's health first.

Thank you.

Marcella Alohalani Boido, M. A.

Honolulu, Hawaii 96826

HB-474-SD-1

Submitted on: 3/31/2018 8:03:10 AM

Testimony for WAM on 4/4/2018 10:30:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Lisa Kaluna	Individual	Support	No

Comments:

Aloha,

I am writing in support of HB2506 for funding to be directed to the UH Hilo Daniel K. Inouye College of Pharmacy Rat Lungworm Research Lab under the direction of Dr. Susan Jarvi. To be clear, my support is solely for the funding to go to this institution and no other research, educational, or health institution.

On a personal note, my husband was born and raised in the Puna district. Most of our family and closest friends live in East Hawaii. EVERYONE we know that lives here, knows someone who contracted a very severe case of RLWD. People are scared and they are taking drastic measures to try and protect themselves and their families. Self diagnosing and subsequent self medicating with drugs from local farm supply stores is more common than you can imagine (no we don't advocate for this, but we regularly hear stories). As Hawaii State Legislatures, if do not personally know a victim of RLWD (a severe case), please take the time to find and talk with someone about their experience and how it has altered their life before you cast your vote on this bill. While there are many mild and moderate cases that do fully recover, the devastation people face who contract a very severe case is horrific. We cannot let our people and our community suffer like this. I would not wish this disease on my worst enemy. Please, do not wait until this disease comes knocking on your doorstep. Please vote in support for funding Rat Lungworm Research at the UH Hilo Daniel K. Inouye College of Pharmacy.

Thank you for your time and consideration,

Lisa M. Kaluna

HB-474-SD-1

Submitted on: 4/1/2018 10:37:34 AM

Testimony for WAM on 4/4/2018 10:30:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Susan J. Wurtzburg	Individual	Support	No

Comments:

More research is needed on this serious issue for all Hawaii residents and visitors.

Sincerely,

Susan J. Wurtzburg, Ph.D.

HB-474-SD-1

Submitted on: 4/2/2018 11:25:53 AM

Testimony for WAM on 4/4/2018 10:30:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
La'akea Kaufman	Individual	Support	No

Comments:

As a school garden educator, I believe funding for research and education on Rat Lungworm disease is long overdue and this bill must be passed immediately!

HB-474-SD-1

Submitted on: 4/2/2018 1:27:51 PM

Testimony for WAM on 4/4/2018 10:30:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
M. Kathleen Howe	Individual	Support	No

Comments:

I support HB 474, which supplies funding to UH Hilo for research on rat lungworm disease. UH Hilo has led the research on rat lungworm and rat lungworm disease since 2011 in Hawaii, and this important research needs to be continued. Please support and pass HB 474.

HB-474-SD-1

Submitted on: 4/2/2018 2:41:55 PM

Testimony for WAM on 4/4/2018 10:30:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Deborah Ward	Individual	Support	No

Comments:

Aloha e lawmakers,

My son nearly died of this disease ten years ago and he suffers from lasting neuropathy as a result. We were very fortunate to have an out of state ER doctor recognize the signs and test for the eosinophils in the spinal fluid. The extreme severe pain lasted for several weeks and my son had to be nursed 24/7.

Today he works in a restaurant today, which until recently did not take lettuce washing seriously, until the owner was sued. Ten years ago til now, very little attention has been paid by the DOH, or anyone on Oahu including legislators, because this was a "Big Island issue".

As the semi-slug expands its range, EVERY island will be subject to this hideous disease. Please vote in favor of the research we need to identify the strains, the washing techniques, and most especially a potential vaccine that may be helpful! The DOH has dragged its feet. Please fund the UHH Pharmacy School in their ground-breaking efforts. Help Hawaii become a leader in the field of prevention!!!!

HB-474-SD-1

Submitted on: 4/2/2018 6:01:25 PM

Testimony for WAM on 4/4/2018 10:30:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Benton Kealii Pang, Ph.D.	Individual	Support	No

Comments:

Testimony Presented Before the Senate Committee on Ways and Means.

Wed April 4 2018 10:30 AM

HB474 - RELATING TO RAT LUNGWORM DISEASE

Chair Dela Cruz and members of the WAM committee

My name is Dr. Susan Jarvi and I am a Professor in the Department of Pharmaceutical Sciences at the University of Hawaii at Hilo, Daniel K. Inouye College of Pharmacy. My lab has been the lead in rat lungworm education and research for the past 6 years in the state. I am speaking as a concerned individual in strong support of HB 474 Relating to Rat Lungworm Disease (RLWD).

Hawaii is the epicenter for RLWD (angiostrongyliasis) in the United States, and is among the most serious threats to human health of all diseases carried by wildlife in Hawaii. Most infections are presumed to be due to the ingestion of infected slugs or snails on fresh produce or possibly from untreated catchment water (see Howe and Jarvi ,2017; Jarvi et al., 2018 for review). The nematode reproduces in rats and develops in slugs and snails. Although most human cases have originated in east Hawaii Island, there have been cases reported on all of the major Hawaiian Islands, including a recent outbreak on Maui. Why so many cases originate on Hawaii Island is unclear and a better understanding of disease transmission, basic biology, diagnostics, treatment, and long term effects is needed. Thus, funding is requested to address these issues.

My lab recently completed a study to isolate adult RLW from the hearts and lungs of rats to harvest worms to isolate the proteins needed to develop a blood-based diagnostic and also to estimate infection rates in rats trapped in the Hilo area (Jarvi et al., 2017). Of 545 rats captured, ~94% of them were positive for RLW parasites. This is the highest reported rate in the country and likely the world. Hawaii has likely been exporting RLW with rats jumping on and off ships. During this experiment we observed that older black rats appear to have a mechanism to limit development of larvae to reproducing adults. This was not seen in the young black rats or the Polynesian rats of any age. This means that in the management of rats, killing large numbers of black rats might result in more young black rats moving into that vacated area, which might actually increase transmission. Another option is to determine the effectiveness of deworming rats to reduce transmission. With adequate funding, this could be done in collaboration with USDA-APHIS and others.

Funding is also needed to determine which approved vegetable washes or solutions are most effective at killing larvae so people can better wash their produce, and continue to eat local and fresh produce safely. East Hawaii has the highest use of catchment water in the state. We need to know if the infective stage of the larvae can be detected in catchment water and the best practices for treating catchment water. We have already demonstrated that infective stage RLW larvae can live in rainwater for many weeks. We also would like to test the effectiveness of UV light as used in catchment systems on killing RLW parasites. Lastly, we are testing multiple anti-parasitic drugs on different stages of RLW larvae that develop in humans. All of these studies require an assay to be able to determine that the larvae are truly dead and therefore not infective.

We have worked out a differential staining method that appears to distinguish live from dead larvae but we now need to validate this assay in rats. We received \$16,000 in contingency funding from the Hawaii County Council to pay a technician for 2 months and buy supplies and rats to run this trial with USDA-APHIS. Additional funding is requested to then run the other three studies.

We have completed an antibody-based study to estimate exposure to RLW in 435 volunteers most from east Hawaii Island with our Thailand collaborators (Jarvi et al., submitted). We are currently in the process of isolating proteins from Hawaii isolates of RLW to use as antigen in another diagnostic study. Funding is needed to expand this serological study to include multiple areas on Hawaii Island, as well as statewide. We have successfully detected RLW DNA in the blood of infected rats (Jarvi et al., 2015). We request funding to continue to investigate other avenues for diagnosis of angiostrongyliasis.

RLWD impacts the people of Hawaii and its visitors, it impacts public health as a global emerging infectious disease, it impacts agriculture through the loss of public confidence in locally grown produce, and it puts food self-sufficiency and food security (especially with the Farm to School Bill) for all of Hawaii at risk. RLWD has already caused multiple deaths; many victims suffer long-term disability

Our research group has already built a strong research and educational foundation with which to carry out these studies. Our lab has submitted 30 grant proposals including 12 federal grants but have yet to receive federal funds. Likely the main reason for lack of federal support for rat lungworm research is lack of education about this disease. Many reviewers and agencies have never heard of it and don't consider it seriously. This is a considerable issue to overcome. We are now poised to provide the research and curriculum-based educational efforts needed to truly begin to prevent rat lungworm disease in Hawaii and elsewhere. The state of Hawaii needs to take immediate action. Collaboration between UHH, UHM, DOH, DLNR, DOA and the Task Force is needed to develop a statewide plan for effective control of RLW parasites. Please support HB474 with full, necessary funding.

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