



ORANGUTAN CONSERVANCY

2011

**ORANGUTAN VETERINARY ADVISORY GROUP
WORKSHOP REPORT**



Photos provided by Raffaella Commitante, Steve Unwin and orangutan portraits by Wiwik Astutik (BOS Samboja Lestari)

Orangutan Conservancy 2011 Veterinary Workshop logo courtesy Amy Burgess

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Prepared with participants of the Orangutan Conservancy 2011, Orangutan Veterinary Advisory Group (OVAG) Workshop, Jogjakarta, Indonesia, 4-8 July 2011

R. Commitante, S. Unwin (Editors). Orangutan Conservancy (OC). 2011.

Orangutan Conservancy 2011 Orangutan Veterinary Advisory Group Workshop Report.

Additional copies of the *Orangutan Conservancy 2011 Veterinary Advisory Group Workshop Report* can be ordered through the Orangutan Conservancy, P.O. Box 513, 5001 Wilshire Blvd., #112, Los Angeles, California, 90036, USA., or go to our website at www.orangutan.com.



Orangutan Conservancy 2011 Orangutan Veterinary Advisory Group (OVAG) Workshop

July 4 – 8 2011

LPP Convention Hotel, Jogjakarta, South Central java, Indonesia

Participating Organizations:

Orangutan Conservancy, United States
Chester Zoo / NEZS, United Kingdom
Liverpool School of Tropical Medicine, United Kingdom
Murdoch University, Perth, Western Australia
Sumatran Orangutan Conservation Programme (SOCP), Medan, Indonesia
Borneo Orangutan Survival Foundation, Nyaru Menteng, Palangkaraya, Kalimantan, Indonesia
Borneo Orangutan Survival Foundation, Samboja Lestari, Samboja, Kalimantan, Indonesia
Orangutan Foundation International (OFI), Kalimantan, Indonesia
Orangutan Foundation United Kingdom (OFUK), Kalimantan, Indonesia
Syah Kuala University, Aceh, Sumatra, Indonesia
Gadjah Mada University, Jogjakarta, Indonesia
International Wildlife Rescue, Indonesia (GPOCP)
ABAXIS Europe, Germany
Bogor Agricultural University/Primate Center for Wildlife Studies (IPB/PSSP) Java, Indonesia
Putra University, Kuala Lumpur, Malaysia
Frankfurt Zoological Society/Jambi SOCP Orangutan Release Site, Sumatra, Indonesia

Supporting Organizations:

Orangutan Conservancy, United States
Chester Zoo/ NEZS, United Kingdom
American Association of Zoo Keepers (Birmingham, AL), United States
ABAXIS Europe, Germany
Cleveland Metroparks Zoo / Cleveland Zoological Society, United States
Murdoch University, Australia
Chembio Diagnostics, Inc., United States
Liverpool School of Tropical Medicine, United Kingdom

Hosted by:

**Gadjah Mada University, Fakultas Kedokteran Hewan,
Jogyakarta, Indonesia**





**Orangutan Conservancy 2011 Orangutan Veterinary Advisory Group (OVAG) Workshop
2011 OVAG Report**

TABLE OF CONTENTS

Section 1

Executive Summary

Budget

Section 2

Letter of Invitation

Agenda

Participants Contact List

Section 3

Proceedings

Section 4

Miscellaneous Notes

Section 5

Attachments



Orangutan Conservancy 2011 Orangutan Veterinary Advisory Group (OVAG) Workshop

2011 OVAG Report

July 4 - 8 , 2011



Section 1

Executive Summary

Collectively, they care for the largest captive population of orangutans in the world. Yet the handful of veterinarians and healthcare staff who work at orangutan rehabilitation centers across Sumatra and Borneo face nearly impossible odds, and often find themselves short of medicine, equipment, money, space, support staff and time.

But those same dedicated men and women do not lack for skill; or commitment. And that is why the Orangutan Conservancy was once again proud to be able to stage the Orangutan Conservancy (OC) 2011 Orangutan Veterinary Advisory Group (OC/OVAG) Workshop, held July 4 - 8 in Jogjakarta, Indonesia. The workshop series, which was inaugurated in 2009 in Borneo, gathered together the veterinary teams that work at the frontlines of the orangutan conservation crisis, and gave them a rare opportunity to hone skills, discuss issues and ideas, and renew friendships that could someday mean the difference between life and death for endangered apes in Southeast Asia.

Orangutans are in severe crisis. The largest of the great apes found in Asia, their natural range is limited to the islands of Borneo and Sumatra, and their rainforest homes are disappearing quickly. More than 80 percent of the orangutans' habitat has been destroyed over the last 20 years, and approximately only 60,000 orangutans are thought to exist. At the current rate of decline, experts believe that orangutans may become extinct in the wild within 25 years!

The primary threats to orangutans are illegal logging and habitat destruction, human encroachment, the conversion of rainforests to oil palm plantations, and the pet trade. As a result of such intense pressures, an extremely large number of orphaned orangutans exist in rehabilitation centers across Borneo and Sumatra. These orangutans – which number approximately 1,600 – arrive bearing a host of physical and emotional wounds, and require intense veterinary care to recover.

Now, more than ever, veterinarians in the field are under pressure due to the Indonesian government's mandate to release all captive orangutans within the next 5 to 7 years.

The orangutans that are judged fit to return to the wild will be reintroduced after a long, complex process, but an overwhelming majority will continue to reside in the rehabilitation centers.

The 2011 OC /OVAG Workshop focused on the many aspects of captive orangutan care, with a special emphasis on the detection and treatment of tuberculosis (TB) and parasites. A joint program between OC and Chembio Diagnostics Systems Inc. begun in 2010 was nearing completion. This collaboration provided PrimaTB STAT-PAK test kits to several of the facilities as part of a large-scale tuberculosis study covering great ape populations in Southeast Asia and Africa (with Pan African Sanctuary Alliance (PASA)). The PrimaTB STAT-PAK testing kits are considered useful in the detection of tuberculosis in primates, a severe respiratory disease that can prove deadly. Though the PrimaTB State-Pak has proven successful with monkeys, this joint study has proved less so when used with orangutans. For now, the best testing methods appear to be PCR and culture for TB surveillance in orangutans.

The OC /OVAG Workshop was sponsored by the Birmingham (U.S.) chapter of the American Association of Zoo Keepers(AAZK), which once again directed the proceeds of its annual Zoo Run to support the workshop. Other sponsors included a Cleveland Metroparks Zoo / Cleveland Zoological Society Asian Seed Grant, the Chester Zoo, and the Orangutan Conservancy, in association with the Liverpool School of Tropical Medicine, Chembio Diagnostics Systems Inc., Murdoch University, Abaxis (Europe) and the veterinary faculty of Gajah Mada University, Jogjakarta.

The OC 2011 Orangutan Veterinary Advisory Group Workshop included 36 participants from the orangutan rescue and rehabilitation centers in Indonesia and Malaysia, along with experts and facilitators from the United States, the United Kingdom, Malaysia, Australia, and Germany. The OC 2011 Orangutan Veterinary Advisory Group Workshop was designed and facilitated by Dr. Steve Unwin of the Chester Zoo, in partnership with Dr. Raffaella Commitante of OC, the same team that helped create the format from its inception in 2009.

In addition to presentations, practical demonstrations and roundtable discussions, the delegates made site visits to the veterinary faculty at Gajah Mada University, as well as visiting several well-known local attractions such as the Prambanan Temple and Malioboro shopping district and the Jogjakarta Animal Care Center which will be building a new orangutan Dome at their facility designed by Dr. Willie Smits.

The focus of the OC 2011 Veterinary Workshop, however, remained the practical sessions, presentations, roundtables, and break-out groups that make the workshop so valuable. There, veterinarians who often work alone under extreme duress got a chance to pose questions and tackle hypothetical scenarios that might otherwise get overlooked. They also established friendships and alliances that strengthened the orangutan conservation community as a whole. These friendships and alliances are carried over through the entire year. Participants stay in touch and contact each other frequently regarding issues they share as well as contacting outside experts who have now become their friends.

As with the past three workshops, the OVAG continued to tackle tough issues, such as euthanasia, laboratory politics, the veterinary aspects of eco-tourism, field diagnostics, and fundamentals of environmental enrichment, disease case studies and tuberculosis testing. In this way, the OC Veterinary Workshops have helped build a community of veterinary healthcare experts that stands strongest when it stands together.





Orangutan Conservancy 2011 Orangutan Veterinary Advisory Group (OVAG) Workshop

2011 OVAG Report

July 4 - 8 , 2011

Workshop Budget

ITEM	UNIT COST	TOTAL
Airfare (International)	\$ 2,000 x 4	\$8,000
Airfare (Domestic)	\$ 400 x 25	\$10,000
Accommodation	\$ 60 x 27 x 6 nights	\$9,720
Ground Transportation	\$ 500	\$500
Printing	\$ 300	\$300
TOTAL		\$28,520



Orangutan Conservancy 2011 Orangutan Veterinary Advisory Group (OVAG) Workshop

2011 OVAG Report

July 4 - 8 , 2011



Section 2

Official letter of Invitation



June 22, 2011

Honorary Patrons:
Dr. Jane Goodall
Dr. Edward O. Wilson
Dr. Suwanna Gauntlett
Djamaludin
Suryohadikusumo

Advisers:
Dr. Tim Laman
Dr. Mark Leighton
Dr. Amory B. Lovins
Dr. Cheryl Knott
Lori Perkins
Dr. Herman Rijksen
Dr. Anne Russon
Dr. Robert Shumaker
Dr. Wille Smits
Dr. Carel Van Schalk

Directors
Norm Rosen, Chair
Shirley Randolph
Dr. Anne Russon
Dr. Rob Shumaker
Dr. Raffaella Commitante
Barbara Shaw
Juanita Kemp

Officers:
Doug Cress
Linda Keenan
Julie Cash

Dr. drh, Bambang Sunianto, SU, M.Sc.
Fakultas Kedokteran Hewan, Universitas Gadjah Mada

**RE: Orangutan Conservancy Orangutan Veterinary Advisory Group Workshop 2011
Orangutan Conservancy Lokakarya Komunitas Dokter Herwan Orangutan 2011**

Dear Pak Sumianto:

I am hoping that you can join us for the opening session of the Orangutan Conservancy Orangutan Veterinary Advisory Group Workshop 2011 sponsored by the Orangutan Conservancy (OC), a United States not-for-profit organization and its Orangutan Crisis Coalition (OCC), and hosted by Fakultas Kedokteran Hewan, Universitas Gadjah Mada to be held at the LPP CONVENTION HOTEL, address : JL. Demangan Baru No. 8 Yogyakarta - Indonesia 55281.

This, our third workshop, will continue to bring together experts working closely with orangutans in Indonesia and Malaysia and in the international community to allow for the sharing of information and expertise, and the creation of long lasting friendships and contacts. It will be held:

July 4 – July 8, 2011

On the morning of the opening day, we would like you to join Dr Steve Unwin and myself for the opening comments at the LPP Convention Hotel (address above).

We thank you for your participation in allowing your staff to attend.

I hope to see you there.

Respectfully,

A handwritten signature in black ink that reads "Raffaella Commitante".

Raffaella Commitante, PhD
Director, Orangutan Conservancy

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Orangutan Conservancy 2011 Orangutan Veterinary Advisory Group (OVAG) Workshop

2011 OVAG Report

July 4 - 8 , 2011

AGENDA

Sunday, July 3

Delegate Arrival / Set Up of Sessions

Monday, July 4

08:00. Welcome to delegates (Pak Sumiarto, Steve Unwin and Raffaella Commitante)

09:00 Disease Risk Analysis for Primate Reintroduction Programmes, Part 2

Contingency Planning for Disease Risk Outbreaks / Updates (Steve Unwin)

10:30 Coffee/Tea

11:00 Ice Breaker Exercise (all delegates)

Nyaru Menteng example of DRA and Risk Assessments (Steve and Siska)

13:00 Lunch

14:00 Disease Risk Assessment Exercise and Wrap Up (all delegates)

15:30 Coffee/Tea

16:00 Clinical Practice/Tuberculosis Update (Steve, Siska Agus)

17:00 Hepatitis B (Pak Joko)

19:00 Dinner/Ice Breaker

Tuesday, July 5

08:00 Group Photo

08:30 Nutrition Basics (Andrea Fidgett)
09:30 Open Discussion on Current Dietary Situations in Rehab Centers (all delegates)
10:30 Coffee/Tea –
11:00 Bus to UGM (Gadah Mada University)
11:30 Clinical Practice – Radiographic Imaging (Steve - all delegates)
13:00 Lunch
14:00 Practicals / Diagnostics / Parasitology (Wendi Bailey)
17:00 Bus back to Hotel
17:30 Coffee/Tea
19:00 Dinner – Open Discussion (all delegates)

Wednesday, July 6

08:00 Parasites! (Reuben)
09:00 Parasites (Wendi)
11:00 Bus to Jogja Orangutan Center/Prambanan Temple and Malioboro (all delegates)
13:00 Lunch (at Jogja Orangutan Center)
19:00 Dinner

Thursday, July 7

08:00 Malnutrition (Andrea)
10:30 Coffee break
11:00 Sample Collecting (Joost Phillipa and Steve)
13:00 Lunch
14:00 Bus to UGM
Anesthetics, Blow Piping and Darting (Steve, Ali and all delegates)
Blood Gas Demonstration (Barbel)
Parasite Wrap-Up (Wendi)
15:00 Bus Back To Hotel
19:00 Dinner

Friday, July 8

08:00 Update: Where are We and Where do we need to be (Steve, all delegates)
09:00 Case Studies (Meriam fom NM and Yenny from SOCP)
10:00 Welfare Issues (Sumita)

Open Forum (all delegates)

11:00 Friday Praying Time / Lunch

14:00 Reporting Back: DRA and Wrap-Up (all delegates)

Evaluation of Workshop/Review

17:00 Overview of the past year/Next Year

19:00 Closing Dinner / Presentation of Certificates





Orangutan Conservancy 2011 Orangutan Veterinary Advisory Group (OVAG) Workshop

2011 OVAG Report

July 4 - 8 , 2011

Participant List:

	<u>Name</u>	<u>Affiliation</u>	<u>Email</u>
1	Dr. Raffaella Commitante	Orangutan Conservancy	rcommitante@gmail.com
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35	Drh Meriam Sirupang	BOS – Nyaru Menteng	meriam@orangutan.or.id





Orangutan Conservancy 2011 Orangutan Veterinary Advisory Group (OVAG) Workshop

2011 OVAG Report

July 4 - 8 , 2011



Section 3

Proceedings

Introduction

The OC/OVAG 2011 Workshop was officially opened by Professor Dr. drh. Bambang Sumiarto, Dean of Fakultas Kedokteran Hewan, Universitas Gajah Mada, Yogyakarta. Welcome and introductory remarks by Steve Unwin and Raffaella Commitante.

Introduction Overview:

Team Building exercise – participants divided onto 4 groups for this cooperative exercise. These groups were kept for the veterinary technical exercises through the workshop.

Participants introduced themselves to the group

Relevant documents and resources pertinent to what was being covered in the workshop were made available for participants to download on flash drives/computers. Examples of there can be found at the end of this report.

Veterinary participants will receive a certificate of participation as well as a separate certificate for knowledge exhibited regarding review of various veterinary procedures reviewed during this workshop.

Review of week's schedule (Steve Unwin)

Review of last year (Steve Unwin)

The Participants of OC/OVAG agree to the following:

- All ideas are valid
- Discussions are recorded visibly
- Everyone participates
- No-one dominates
- Participants listen to each other
- Participants treat each other with respect
- Differences are acknowledged not "worked"
- Time-frames are observed

It is expected that all participants have a good understanding of:

- Protocols that assist in managing a disease outbreak
- Assessing disease risk
- Basic nutritional principles
- Assessment and mitigation of malnutrition
- Radiographic safety
- Field anesthesia kits and their safety
- Primate parasitology
- New technologies available in diagnostics
- Welfare issues facing orangutans in their centers
- Where to locate papers/ expert advice

It is expected that all participants have basic training in and demonstrate skill in:

- Darting , anesthesia and intubation technique
- Basic radiology skills – taking and interpreting radiographs

- Identifying parasitic pathogens
- Highlighting diseases of concern for reintroduction
- Provide management advice on pathogen control
- Create a contingency plan for a disease outbreak

Everyone acknowledges that most centers are focusing on orangutan release plans. However, there will always be individuals that can never be released for a variety of reasons. Contingency planning and disease risk approaches must also be applied to un-releasable individuals as well.

Review of the Pan African sanctuary Alliance (PASA) program for the use of reintroduction as a conservation tool (available from the PASA AC on request). This program is based on the IUCN Reintroduction Guidelines to provide evidence that reintroduction can help contribute to global CBD targets.

Example:

IUCN guidelines – Initial reintroduction activity area: Environmental scan + site assessment. This (for example) increases the understanding of landscape condition and threats, which will help improve Government, NGO and community land management practices. This allows policy development that will intend to protect and enhance biodiversity and in turn provide a measurable contribution to global and national biodiversity conservation targets.

So even if you never release, by going through the IUCN reintroduction process, you are still making a contribution to conservation. Documenting the release process and protocols will allow for engagement in talks on many levels with many different people and organizations in any given area. This means that even if releases never happen, we are educating as we go through the process, as we have made a difference in our local communities which will help in the protection of wild life in that area – and so we have made a contribution to overall conservation.

In the course of a day’s work, it is easy to think the above has been addressed, but if we document, then we can prove that the above has been done. Documenting all efforts, whether positive or negative, also helps others in their release programs.

Summary from presentation: Disease Risk Analysis, contingency planning and outbreak training – Steve Unwin

Risk is the likelihood of the occurrence and the magnitude of the consequences (severity) of an adverse event – for this you need a vulnerable population and the possibility of exposure, to a particular hazard. That is, risk is a measure of the probability (likelihood) of harm and the severity of the impact of a hazard. In veterinary risk analyses, hazards are usually a pathogen (e.g virus) or a clinical sign (e.g pneumonia). Objective measurement and scientific repeatability are key features of risk evaluation.

There is often a large degree of uncertainty in deciding what is going to be a problem disease for your animals, and what may not be. Often information on disease risk and population health is scanty. By working through a risk analysis process, the aim is not only to highlight what we do know, or strongly suspect, but also where we need to focus our research efforts, to find out what we don’t know. Risk analysis is a formal procedure for estimating the likelihood and consequences of adverse effects occurring in a specific population, taking into consideration exposure to potential hazards and the nature of their effects. This includes the management (usually reduction) of the likelihood of exposure.

As facilities are being asked to release orangutans into the wild you will need to give a scientifically based answer to support your decision as to which individuals are suitable for release – on both a physical and psychological basis.

Thus, disease risk analysis is an animal management tool to assist projects preventing disease issues in the animals under their care, as well as dealing with disease issues more effectively when they do occur.

CBSG/IUCN will be providing an online open access resource on how to reintroduce by December 2011. ACTION: All OC participants will be told when this occurs (SU).

OC/OVAG vets are part of this resource (PASA vets will also be contributing). Thank you to participants who responded to the request for information from this group. OC/OVAG vets knowledge of orangutan reintroduction/rehabilitation is unique and extensive, and were thus identified as world authorities to contribute to the toolkit in the area of great ape disease risk analysis.

Review and improve on Defining Pathway Charts from last year (SU)

Group Discussion:

Drh. Citra tracked the spread of TB through the population of Samboja from 1998 through to 2010. What should be done with ex Tb and TB orangutans? **Once you treat Orangutans for TB they are considered unsuitable for release because of testing inaccuracies.**

Case study presentation (SU): Bovine Tuberculosis situation for lions in Kruger National Park.

Level of Bovine TB contracted by wild lions: transmission from one animal to another. Lions, as predators, eat infected buffalo, other pride members may have been infected, other lions outside pride can be infected – high probability of TB transmission. Of these various populations, about 20% are latent – of that 20%, 100% die. Unfortunately, we are unlikely to obtain this sort of quantifiable data for orangutans, so we must adopt a more cautionary approach to any data interpretation. The questions we want to answer are:

What is the probability that an infected animal will be released?

What would be the implications if even one orangutan is released with TB?

Aspects of this process reviewed:

- Review of Mapping the Pathway – where orangutans could potentially have contact with a disease. Examples were given from chimpanzee releases in Africa.
- Possibility and Probability Questions at each control point.
- Contingency planning – allows everyone to know what to do in the face of a disease outbreak – who to call and keep informed, where relevant information is kept, and how to manage disease spread. The contingency plan format used followed suggestions to break the chain of transmission in an outbreak.
- Disease Risk Assessment Tool kit will be downloaded to all participants – useful articles and resources dispensed electronically including the report from CBSG workshop in Auckland, New Zealand –Risk Management and Reduction
Link: <https://sites.google.com/site/cbsgdratoolkitreview/>
- An early draft risk assessment for tuberculosis from Nyaru Menteng using HACCP technique was presented by Drh. Siska Sulystio. Notes on this are presented below but the report was worked on during the workshop and in the weeks following. **A final version is available from Nyaru Menteng Vet Team.**

TASK: Participants divide into Working Groups

Each group must contain one manager or 'pretend manager' to work together on Draft Risk Assessment templates (DRA) and Contingency Plan Template: fill out the form from templates provided. (Notes were added for any changes or suggestions that could improve the usefulness of the template for each facility).

Disease Risk Analysis 2011 Rosalie Dench and Fransiska Sulisty – Fransiska Sulisty presenter

Nyaru Menteng (NM) was started in 1999, in Palangkaraya, KalTeng, Indonesia. Carrying capacity was 400 +/- but their current population is 622 orangutans. There are 189 orangutans ready to be released and an additional 183 should be ready in 2 years.

Defining the Problem:

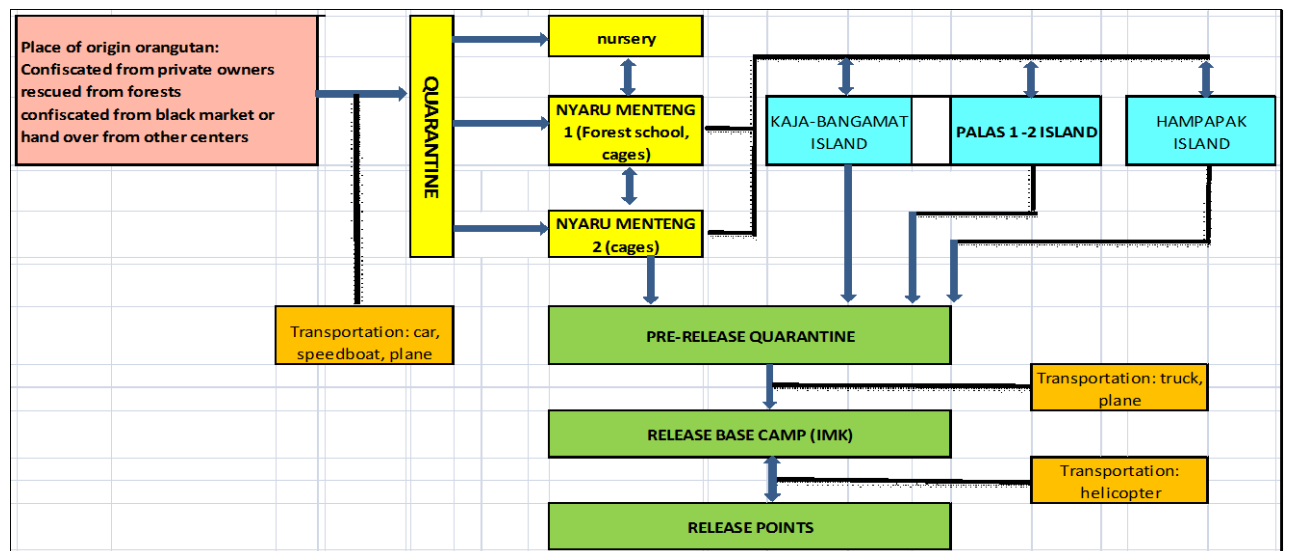
Overcrowding, poor cage facilities, poor nearby forest quality and poor welfare.

Several cases of TB – could potentially be a larger problem for the future?

Wild primate populations travel through the area such as macaques, leaf monkeys, gibbon, and orangutan.

Malaria, TB, and typhoid are endemic to area. Disease of particular concern is TB.

Mapping the pathway



Listing of disease hazards

NO	PENYAKIT	Tingkat Ancaman	Kemungkinan Terjadi Kontak	Kemungkinan Untuk rjangkiti	Kemungkinan Untuk Menular da Yang Lain	Akibat yang Ditimbulkan bila Saawa Terjangkit	ibatnya Terhadap Populasi Perkiraan Nilai Penting Bagi rgram	Kemungkinan Penularan dari anusia ke Primata	Kemungkinan Penularan antar anusia	Kemungkinan Penularan antar mata	Kemungkinan Penularan dari mata ke Manusia	Revisi Perkiraan Nilai Penting Bi Program	Sampel yang Dibutuhkan	Test yang Digunakan
1	Strongyloides	5	5	5	4	5	25	2	1	5	2	33	feses	mikroskopis
2	Mycobacterium Complex	5	3	3	3	3	22	2	2	2	2	30	sekresi pernapasan, darah	kultur, rapid test, TST, PCR, x-ray
3	Hookworm	4	4	4	4	3	21	1	1	3	2	28	feses	mikroskopis
4	Plasmodium	4	3	3	4	5	20	1	2	3	1	27	darah	mikroskopis
5	Salmonella typhi	2	3	3	4	2	16	2	2	2	1	23	darah, feses	serologi, kultur
6	Shigella	2	3	3	3	2	15	2	2	2	1	22	feses	mikroskopis
7	Influenza (orthomyxovirus)	2	3	3	4	2	15	2	2	2	1	22	sekresi pernapasan	serologi
8	Streptococcus	3	3	2	2	5	15	2	2	1	1	21	sekresi pernapasan	kultur
9	Haemophilus	3	3	2	2	5	15	2	2	1	1	21	sekresi pernapasan	kultur
10	Klebsiella	3	3	2	2	3	15	2	2	1	1	21	sekresi pernapasan	kultur
11	Pseudomonas	3	3	2	2	3	15	2	2	1	1	21	sekresi pernapasan	kultur
12	Pasteurella	3	3	2	2	3	15	2	2	1	1	21	sekresi pernapasan	kultur
13	Balantidium coli	2	4	3	2	2	14	0	0	3	1	18	feses	mikroskopis
14	Entamoeba	2	3	2	3	2	13	1	1	2	1	18	feses	mikroskopis
15	Whipworm	2	2	2	2	3	12	1	1	1	1	16	feses	mikroskopis
16	Pinworm	2	2	2	2	2	11	1	1	1	1	15	feses	mikroskopis
17	Taenia sp	2	2	2	2	2	11	1	1	1	1	15	feses	mikroskopis
18	Dengue Fever	2	2	2	1	1	9	1	2	1	1	14	darah	serologi
19	Clostridium	3	1	3	1	4	13	0	0	0	0	13		
20	Burkholderia pseudomallei	2	1	1	1	3	9	1	1	1	1	13	sekresi pernapasan, darah	kultur
21	Hepatitis B	1	1	1	1	1	6	1	2	0	0	9	darah	serologi
22	Hepatitis A	1	1	1	1	1	6	1	2	0	0	9	darah	serologi
23	Hepatitis C	1	1	1	1	1	6	1	2	0	0	9	darah	serologi
24	Herpes simpleks	1	1	1	1	1	6	1	2	0	0	9	darah	serologi
25	STLV													
26	SRV													
27	EMCV													
28	Candida													
29	Microsporium													
30	Dermatophytosis												kerokan kulit	

Hazard analysis and Critical Control Point (HACCP) plan provides a framework to assessing risks. HACCP was originally designed for meat hygiene – but allows for a logical framework which can be followed and can easily be adapted for purposes of reintroduction.

Target: producing orangutans that are free from TB through the NM Pathway.

TB HACCP NM – several steps followed to assess the pathway of TB in NM

Hazard identification

CONFISCATION/RESCUE

- Already infected with TB
 - from forest
 - from owner
 - from other centre
- Infection from rescue staff

QUARANTINE

- Failure to detect existing TB cases
 - active TB
 - latent TB
 - TB in incubation period when OU enters quarantine
- Infection of new OU from:
 - other OUs in quarantine
 - NM OUs with latent TB
 - wild monkeys
 - Staff
- Spread of TB from new arrival to other OUs at NM

TRANSPORT

- Infection from transport vehicle or transport cage

REHABILITATION

- Failure to detect TB cases in population:
 - latent cases
 - active cases
- Infection from:
 - NM OU with latent TB
 - NM OU with active TB
 - wild monkey
 - staff

ISLANDS

- Failure to detect TB cases in population:
 - latent cases
 - active cases
- Infection from:
 - NM OU with latent TB
 - NM OU with active TB
 - wild monkey
 - staff
 - Human population e.g. In village

PRE-RELEASE QUARANTINE

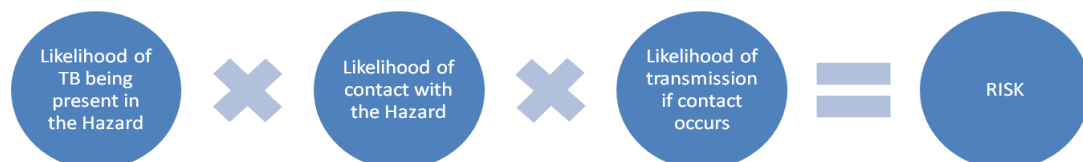
- Failure to detect existing TB cases
 - active TB
 - latent TB
 - TB in incubation period when OU enters quarantine
- Infection of new OU from:
 - other OUs in quarantine
 - NM OUs with latent TB
 - wild monkeys
 - Staff

RELEASE PROCESS

- Infection from transport vehicle and transport cage
- Infection from rescue staff

- *Incomplete: Other hazards will become apparent as the full details of these stages are finalized*

Qualitative Assessment Risk

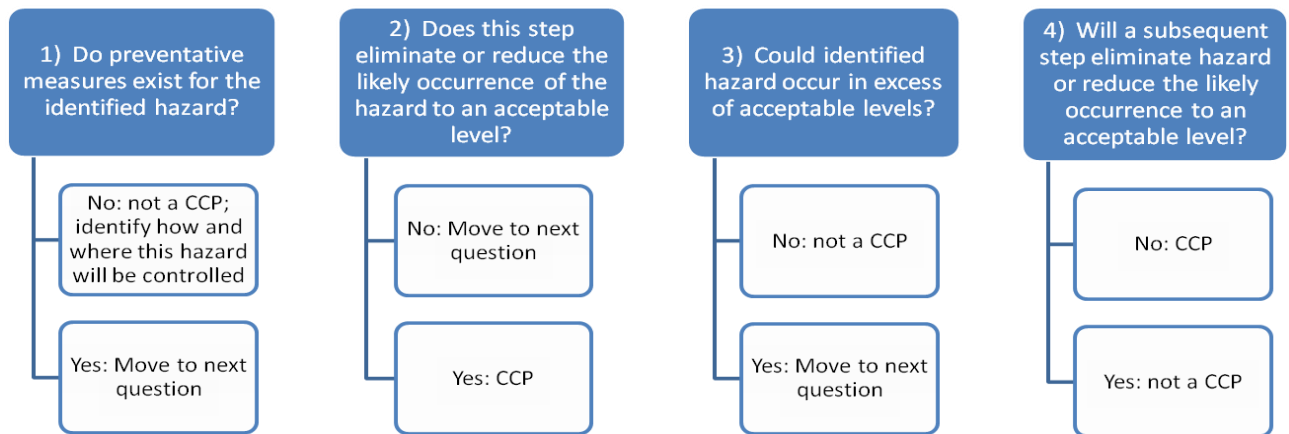


- Hazard-based risk assessment focuses on three factors:
- For TB, likelihood of transmission in different circumstances is difficult to assess...
 - ... So we have assumed this parameter to be equally high for all steps, and therefore have focused on the first two elements.

- For health screen elements, this doesn't apply; the risk of failing to detect TB is based on the sensitivity of the tests used.

Critical control point determination:

A point, step or procedure at which control can be applied so a pathogenic hazard can be prevented, eliminated or reduced to acceptable levels



HACCP and CCP Plan

- Going through the HACCP process has highlighted areas where we need to act.
 - SOP for accepting animals from other centres:
 - Pre-arrival testing for TB would enable us to place the animal into the appropriate facility on arrival (i.e. directly into TB isolation if results positive)
 - Set up new arrival quarantine facilities and biosecurity SOPs:
 - ✓ The current “Quarantine Area” set-up is not a quarantine, as the new arrivals are not isolated from the orangutans in the rehabilitation process.
 - ✓ We now have good quarantine facilities for infants that can be handled easily (up to 2 years old)
 - Consider the best way of testing for TB in quarantine:
 1. MOT + StatPak + IFN γ + x-ray
 - If clinical signs, add tracheal wash for culture +PCR
 2. If any result from these tests is positive, sedate again for tracheal wash for culture + PCR
 3. If x-ray positive, treat with antibiotics to see if there is an improvement
 4. After 8 weeks, repeat MOT + StatPak + IFN γ
 - And x-ray if it was positive before.
 - Set up a protocol for dealing with clinical cases that could potentially be TB:
 - Isolate all respiratory cases until we see whether they respond to antibiotics or not
 - Test with StatPak , IFN γ and x-ray
 - Consider how we would isolate several individuals at once if they were all coughing (limited by the facilities available)
 - Set up a TB isolation facility and biosecurity SOPs
 - TB isolation facilities and protocols have been developed and are now in use
 - Space limitations mean there are still some suspect TB animals outside the isolation facilities.

- Consider the hazards that are not being formally addressed and ways we could reduce the risk
 - SOPs for disinfection of transport cages and vehicles
 - SOPs relating to daily health observations of the orangutans on the islands
 - Wild monkeys
 - Electric fence around our TB isolation block so monkeys not picking up TB from our animals and spreading elsewhere
 - Consider testing local macaque population with StatPak?

The next move?

Once this process has been set up for one disease, it will make the process for other diseases of concern easier.

Simian retrovirus serotype (SRV-2) – Pak Joko (Bogor Vet School) presenter

There is a natural AIDS in macaque with seven serotypes which are not found in Africa or New World monkeys. It is also found in orangutan but with lower prevalence.

Simian T-lymphotropic virus (STLV) is found in orangutan with low viral loads. It follows a slow transmission process with close contact.

Simian Immune Deficiency virus (SIV) naturally affects African monkeys but in macaques it is fatal – the prevalence is unknown and there is no evidence for SIV in orangutan – although it has been tested using HIV kits which might not be adequate for orangutans.

Hep B in non-human primates:

Cross reactivity with human HBV: the first isolate was found in chimps. It occurs naturally in chimpanzees, gibbons, orangutans, gorillas and woolly monkeys.

Samples for this study were obtained from Nyaru Menteng, Samboja Lestari and COP (Center for Orangutan Protection).

TB Update – Steve, Siska and Agus presenters

Review of Paper by Dr. Chris Waltzer and Dr. Alex Lecu for Samboja TB Risk Assessment – their recommendations mirror what OC/OVAG participants have been discussing for the past 2 years (paper can be found in section 5).

NO single test meets all the requirements for determining TB status.

From Chembio StatPak makers: Rhesus macaques and green monkeys have the highest degree of testing accuracy combining skin test with the Stat Pak, but there was no evidence positive or negative for orangutans. This is what initiated the use of the Chembio Statpak in great apes to evaluate its effectiveness. Data analysis will begin now and continue to the next year. If it appears, after analysis of the data, that the StatPak is not useful for great apes, results will be published and Chembio will continue to support efforts to find an adequate testing method. Currently there is a lack of information on orangutan TB. (Papers were distributed to participants in the scientific resource section).

Results from Pan African Sanctuary Alliance (PASA) (SU)

Overall:

- Chimpanzees: N= 165
- Statpak positive – 9.6%
- TST positive – 4.8%
- TST + Statpak positive – 2.4%

- Confirmed TB (culture) – 1.8% = N=3. One positive to Mammalian Old Tuberculin, One positive to stat-pak, One positive to neither
- Bonobos: N= 40 – all negative to both TST and statpak

Preliminary results suggest Chembio stat-pak has helped identify a confirmed case. BUT there is also a case which was negative to both tests.

Specific examples from PASA presented: Sierra Leone, Cameroon, DR Congo.

Actions:

Response back to Chembio needs to be formulated by PASA and OVAG vets as statpak has not been as useful as was hoped. Urine based PCR does not historically work – but work continues on using urine PCR – but new methods and tests are coming out – at the moment PCR and culture are still the most reliable tests. Drh Citra is finishing up her master's thesis at Murdoch University on the use of the Chem Bio StatPak in 2 orangutan centers, one in Central Kalimantan and one in east Kalimantan. : SU to contact Chembio with collated information after the PASA vet meeting in November. This will allow OVAG delegates time to gather their data as well

TB and Samboja case studies.... Agus, presenter

OVAG StatPak testing:

Orangutan N=387

StatPak SL=20.4% NM= 7.1%

TST SL 72.6% NM

Confirmed no single test can establish presence of TB

TB and Nyaru menteng case studies.... Siska, presenter

NM: 305 orangutans tested –

303 not yet tested – AFB and culture all came back negative though there was some mycobacterium shedding

Questions generated by testing:

What is reliability of StatPak?

What test should be used to determine TB status of orangutan?

TB Group Discussion:

The situation is very confusing regarding testing.

StatPak worked successfully with other monkey species but not as well with Chimps and Orangutans.

Executive summary to go to Chembio that StatPak is not effective for great apes.

DISCUSSION - PCR and culture recommended for use:

Reuben: PCRs should have positive and negative controls – mention was made of the temperature of the culture -20 degrees is too cold for culture of most bacteria to grow, optimum is 4 degrees for culture to grow. Freezing should only be an option if long term storage is necessary – but again not optimum...Mycobacterium can last about 4 weeks frozen but culture success drops after about 2 weeks.

Joost: Sample storage is key in order to get accurate results – Confirmed positive serum samples should be stored to be used as controls.

- Rachmad: During attendance, the TB symposium at the German Primates Center at Gottingen last December, many participants (from companies and primate experts) had many opinions according to their research. TB is a very difficult disease to diagnose even with the many diagnostic test kits available (primagram, statpack, MoT, Tb antibodies, X-ray, AFB, Culture). The golden standard test is said to be culture BUT culture is very, very difficult to grow the *M.tuberculosis* and needs long time. At that symposium no conclusion was made. Opinions varied depending on where each participant worked. Some agreed that if a culture is positive, the management of the facility should suggest the government authority to have the animal euthanized. Each individual orangutan has its own history, so we don't know exactly where it came from, who was the poacher, who was the owner, or if it could have gotten diseases from other animals. That is why testing with the above methods is sometimes difficult. Field and laboratory situations are also very different. In a laboratory setting to test and challenge a new test kit, a lab has access to specific pathogen free monkeys where they have controls for positive and negative. As field vets, it is complicated to test, wait and isolate then re-check in 2 months, medicate, and re-check again, etc. If you are fairly certain that an orangutan is positive and the culture is positive, it might be best to euthanize those individuals rather than risk spreading the disease throughout the sanctuary.
- Citra: Epidemiologists agree that which test is not crucial as long as you know sensitivity and specificity of the test – Tests must be run until we can minimize the risk – using predictive values for probability and follow up tests, culture and PCR, we must run tests as many times as needed to get best possible results to determine a negative and a positive population – you can never be 100% sure – all you can do is minimize the risk.
- Sumita: Collecting samples and handling needs to be improved upon especially in field situations. We need to be sure that the sample will not be spoiled before analysis.
- Joko: A culture is needed to cultivate viable bacteria – if you have a long term frozen sample there will be no viable culture – we should consider not using frozen samples for culture. PCR is still the most sensitive and specific if we have the correct conditions and include positive and negative controls.
- Siska: At the time of testing, it was decided that they send the culture sample even though it was frozen for a long time. It is difficult testing hundreds of orangutan and getting a lab to do the work. We use a human facility and they use standardized procedures for humans, therefore proper getting positive and negative controls is difficult.
- Reuben: Maybe a solution might be to add a freezing mix or glycerol for long term freezing of samples?
- Joko: If an animal is suspected of being TB positive, what is the bio security hazard for humans? Especially during a necropsy for positive TB animals (directed to Agus at SL) – you need correct equipment to do necropsy on high risk diseases!
- Steve: What bio security measures were taken? If you have confirmed TB animals – take and store as much whole blood as possible as it can be confirmed and is useful information to keep on hand for the future.
- Sumita: What is in place/protocol to screen and increase safety of personnel?
- Yenny: Personnel are cleared before hiring and yearly tests are given – if there is any doubt, tests are given every 6 months. Visitors are also tested if they are staying long term,

they need to submit a clear medical record. Visitors that are just daily visitors do not get close enough to be a problem

Citra: Emaliodosis: drugs for this were non effective, but when individuals were treated with TB drugs, there was a much better response but we still need to test for this disease.

Joost: Do centers make it allow staff to work when they are feeling ill? Are they taken away from areas or can they continue working while ill, unknown to managers?

Anton: Staff can work as much as they want – it is up to them to decide if they are too ill to work.

Nita: The managers know when personnel go to the doctor – so they monitor illness among employees that went to a doctor or a hospital.

Steve: Example: conditions in the field for TB necropsy- sometimes the necropsy far outweighed the risk to humans especially if it can be done very fast.

Joost: Collecting positive serum from positive animals is key for future testing.

Steve: Does anyone have a serum bank? SL, SOCP, NM, and OFI, have a limited collection.

Hery: There are many methods of detection of TB in orangutans, among the methods mentioned StatPak TST has low sensitivity. If it is said that the golden standard is culture and PCR, why do not just use these two as the others are certainly quite expensive.

On another note, what is the level of HIV incidence in orangutan? Should there be concern for the staff and vets? Response: HIV in orangutans is very rare and may not even exist at all in orangutans.

Actions:

An executive summary of findings in the Chembio StatPak testing with request for suggestions to move forward: to be completed one month after this meeting.

Workshop business review:

All participants must fill out the evaluation sheet. It is best to fill it in as you go so you do not forget anything important!

Andrea asked the group from 1 to 10, how much they feel overwhelmed by the amount of information presented. The group response: 20

Andrea also reminded the group to fill out the form about orangutan feeding practices: what foods, what quantities, photos of food, etc.

Dr Andrea Fidgett (European NAG chair) – Nutrition presentation

People typically do not feel as if nutrition is a strong part of their studies until they are working and then they realize the import of proper nutrition in maintain animal health. The study of nutrition involves a lot of chemistry and most find it too difficult. Hopefully, this information will give some clarification on nutrition.

Today's session – the basics

While we cannot solve all the problems of orangutan nutrition –we can at least get a start on understanding it – the real knowledge of the orangutan lies within this group!

Proper Nutrition affects sea horses, frogs, elephants, etc. as nutrition affects reproduction among other vital body functions and has wide reaching implications to conservation.

Ex. What are the nutritional forces causing elephants to crop-raid?

Overview of digestion and nutrients:

What do you do? Do you keep diet records?

Nutrition is the process within organisms of taking in and absorbing nutrients. Diet is a regulation of foods (for medical or cosmetic purposes). Foods typically eaten are defined in these categories: carnivore, omnivore, herbivore, and frugivore.

Nutrition affects:

Health – reproduction – maintenance of normal behavior – welfare and success of recovery programs

(There is a free access website for nutrition information:

National Research Council: <http://www.nap.edu/openbook.php?isbn=0309069890>

For any species, we must know the following:

What to feed / How much / Why / Diets must be nutritionally adequate / Diets must be cost effective

Our Aim: to make diets better

Objectives for orangutan health and nutrition are very similar

Why make diets better?:

To maintain and improve health and welfare

To understand and enhance nutritional processes necessary for reproduction and longevity

To make evidence based captive management decisions

Unless and until captive management facilities are able to replicate the exact seasonal, temporal spatial and nutritional complexity of diets encountered in the wild, animals will be faced with choices they have not evolved to make.

Animals make the right choices when they have the right food available. We must provide the right foods!!!

Evolution of comparative nutrition:

Husbandry skill & stockmanship....applied nutritional science....multi-disciplinary approach

For most species we are still relying on husbandry skills & stockmanship – carried out by day to day practitioners

What we need to know:

What nutrients do they require? / What nutrients do they receive?

In the diet provided? / In the diet consumed? / In the diet assimilated?

Comparative or Conservation Nutrition

Anatomical components: mouth, lips, dentition: for orangutans, prehensile

Physiological components: metabolic rate, stage of life, enzyme systems...

We do not know about some species but we do have enough information on primates

Behavioral components:

Meal patterns / Palatability / Selectivity

There are animals that may have a particular preference for some foods

Nutrients:

From ingredients to nutrients

Food / Item

We have an appetite for energy, salt but not for nutrients

Ex. Eggs: 50 grams / Carrot: 70 grams / Banana: 115 grams

The above get converted to nutrient composition in terms of protein/fat/fiber/ash/carbohydrates

And WATER! The most important nutrient!!!

Sources: from foods they eat rather than drinking

How much is water?

<u>lettuce</u>	<u>carrots</u>	<u>potatoes</u>	<u>tomato</u>	<u>grape</u>	<u>apple</u>
96%	88%	79%	93%	83%	84%

Fruits and vegetables are high in water content and sugar! The balance is dry matter which is not so much

Dry matter:

Digestible – easy to digest carbs, fats and proteins

Fermentable only – not digestible – must have some adaptation to enable them to digest.

Indigestible – organic compounds such as lignin, inorganic compounds such as minerals (but necessary) neither provides energy

Vertebrate digestive Gut

The simplest is a stomach and a tube. There are many digestive strategies for primates:

Insectivores /Herbivores/folivores/

Energy:

Body's fuel, measured in calories

Basal metabolic rate (BMR): daily energy requirements for a body at rest

Energy: maintenance, growth & reproduction which varies with individual animals – but the amount of food would vary dependent upon whether an animal is maintaining, growing (young), or reproducing

Carbs: 4 kcal/gram

Simple: sugars and starches – very digestible

Complex – hemicelluloses, cellulose, pectin, gums, and chitin – varied digestibility

Proteins: 4 to 5 kcal/gram (carnivores)

Nitrogenous compounds – amino acids – the actual nutrient

Feed: crude protein / microbial: does not apply to orangutan

Bound protein:

browse – lignin, secondary compounds

insects (with hard shells), chitin

Vitamins – fat soluble: vitamins A, D, E and K (can become toxic if stored from overuse/
water soluble: B and C – are not stored in body so difficult to be stored and can cause deficiency

Minerals: inorganic and essential, macrominerals Ca, P, Mg, K, Na, Cl, S / microminerals: Mn, Fe, Zn, Cu, Co, Mo, I, Se

Fats: 9 kcal/gram

Human foods – adequate substituted for non-human primates?

Plant composition / Cell contents / Sugars, starches etc.,

Orangutan stomach has an adaptation for digesting fibers whereas they are mostly being fed sugar and starches!!!!

Figs: wild figs on 3 continents had 8 x calcium in the wild fruits versus domestic figs

Fig trees in the forest are calcium stores

Nutrient requirement models:

Diet Book for Non-human primates as a reference resource – will be provided as a PDF to all participants!!!

Requirement models have limitations – but there are recommendations that can be made

Group discussion:

In terms of a single orangutan:

What items do you feed?

What quantity is fed?

What is the feeding schedule?

Is information documented?
How?
What is the single most diet concern?

Availability of foods can be low because of climate change and food costs
Working with local communities to supply the centers
How many of you keep diet records?
White boards to keep diet information – useful especially if diets change
Weighing food is good so you have a good idea of exactly what is being fed out
There is diet and nutrition Management software available
Animal Feeding Programme broken down per species and age groups and sex

Radiography (at UGM Animal Hospital) –Steve Unwin and Ali Kelsall

It is a good image?
Does it help to tell a diagnostic story?
Has it been taken safely for animal and humans?

Practical discussion and radiograph viewing conducted at the university.

Radiography Safety and Basics of imaging:

There is natural radiation which is not hazardous that is absorbed by the body.
In the clinical sense – radiation is used to form an image – rays travel in straight lines, have a short wavelength, high frequency, etc.
As a result we are producing radiation at a higher dosage and there are dangers.
There can be cellular damage (death of cells).
Inverse square law – the further you go the safer you will be
Be behind lead, glass or concrete if you are within a 3 meter zone
Wear aprons – be sure they are not damaged!
Control area – main beam zone and within 2 meters of primary beam – signs clearly posted
Each machine is different – so get to know your machine – make clear useful notes of each radiograph that will help you with the next one

Parasites: Reuben Sharma

Parasites that affect both wild and captive orangutans:
4 species of protozoa and many that remain unidentified
A survey done in Peninsula Malaysia (zoos) and East Malaysia (captive and wild) with samples collected from:
Primary forest / degraded forest / semi captive and captive (sampling groups)
Sample size was not large but enough to give a general overview of the parasites that might be found.
In wild populations in primary forest – there is a low level of parasite load. In logged forest the numbers rise. In semi-captive and captive populations, the numbers rise again.
Balantidium appears to be found in all orangutans.
Molecular detection of Bastocytosis by amplication of the 18S small subunit rRNA gene using PCR
PCR samples:
Collect blood in EDTA tubes NOT Heparin
Store at -20C on filter paper (FTA) cards or in lysis buffer
DNA extraction must be done in a separate room from PCR using separate equipment
PCR master mix must be done with separate equipment/separate room
Primers must be tested with a known control template DNA

Do not rely on one PCR result – one test is unreliable – must be done in duplicate - if conflicting results must run PCR 5 times (serial tests are often needed to improve accuracy – this can be why results take a while)

With Plasmodium – wild orangutans in primary and logged forest show low levels, but in captive and semi captive populations, the numbers increase very significantly.

***Call for collaboration from various wild and captive sites for parasite prevalence research

If you can – screen macaques in center areas to check for Plasmodium (human) as this can be deadly for primates.

P. knowlesi – an emerging disease – 60% of cases of malaria caused by *P. knowlesi* – can be transferred to humans and orangutans – reservoir: macaques.

Would it be possible to share what parasites are found at the various centers? Harvest adults in ethanol
Wendi is willing to supply Plasmodium detection kits to centers to further test for parasite prevalence (Participants to give Wendi an idea of the number of kits they might want, She can then shop the number around)

In Steve's experience, most fatal diseases in great apes are those contracted from humans. There is however, very little information on disease transmission between humans and orangutans.

Wendi Bailey – Parasite Imaging Presentation

Things to look for:

Histolytic

Type of movement (spinning, slow, fast...) and what is causing the movement

Size range

Ingestion of red blood cells

Examine a 'hot' stool (within 30 minutes)

Balantidium coli

Giardia

Trichomonas trophozoites

When looking at images:

What size is the object? Use a reference point (your own blood cells?)

What is the magnification?

Is there movement? What kind?

Steve: Film

PASA and OVAG work: because we are a family – and we share information and communicate –no matter how difficult it sometimes can be to be honest

Practical Nutrition Part 2 – Andrea

Resources:

SSP guidelines are available online, a chapter on nutrition will be provided as download for participants

Helpful websites: www.eaza.net www.nagonline.net AZA advisory group

NRC Nutritional Requirements for non-human primates: pdf to participants

USDA National Nutrient database – on line

Participants Need to compile:

Scientific name of foods/common name (English and local). Whether used in Sumatra /Borneo or both

Nutrient composition data

Templates for feeding records

Body condition scores???? Way to assess animals

Draft feeding guidelines...hopefully to be included in an overall manual

Malnutrition: the condition that results from taking an unbalanced diet in which certain nutrients are lacking in excess (too high an intake) or in the wrong proportions

A number of nutrition disorders may arise, depending on which nutrients are lacking

Nutrients

Deficiency

Excess

Energy

starvation

obesity, diabetes mellitus

Simple carbs none “
Complex carbs none obesity

Early indications:

Weight

Body condition

Demeanor (character/behavior)

Try to develop a scale to note body condition

Use a body outline or silhouette from emaciated to obese – using several people to get agreement

Perhaps have an orangutan body outline to follow and use as a guide?

Is this too subjective? What of animals with gastro problems that could give the appearances of obesity but is not?

Also do we judge based on wild orangutan body condition or separate for captive?

Sometimes, fur can also get in the way

Use visuals as well as palpating

Taking visuals as well as behavioral /activity information

Seasonality

Hitting the same energy plane throughout the year regardless of what is fed out

Enrichment

Food Presentation

Place/location time/frequency type of food Individual /group

Factors affecting choice

 Palatability

 Novelty

 Enclosure design

 Social structure

 Feed presentation

Who buys the food?

Some vets make the list for others to buy

Some add provisioned food to forest food

Some use local food sources solely

Some have partnership with local people to supply center with food = some centers (SL) can plant their own food sources

Some food decisions are made by vet staff and animal care staff and even behavior information

Sometimes there is a basic food list and vet staff can make suggestions for certain foods based on what they need

What orangutans need is a high fiber diet – more leaves less fruit – leaves might be able to be found for free around your areas

Ex sugar content:

<u>watermelon</u>	<u>pineapple</u>	<u>papaya</u>	<u>figs</u>	<u>spinach</u>	<u>wild fruit</u>
92%	87%	89%	79%	92%	76%

Effect of ripening: Banana - production of ethylene – enzymes begin

Acid neutralized – starches are converted to sugar – chlorophyll is denatured and pigment changes – pectin decreases as fruit gets softer

Animals get used to things that taste sweet – if you leave them hungry they will eat the other items

Primate requirements: Research on Internet

National Research Council, non human primates requirements (2003)

Website: <http://www.nap.edu/openbook.php?isbn=0309069890>

For chimps and humans:

NDF = Neutral Detergent Fiber (NDF) is the most common measure of fiber used for animal ... NDF measures most of the structural components in plant cells

Wild fruit and wild leaves are best sources of protein and fiber
Plantation fruits have very low fiber!!!!
Orangutan guts are designed to digest fiber!!!!!!!!!!!!!!!!!!!!
Calcium to phosphorous ratios are quite low
Leafy greens have really high calcium to phosphorus level
If leafy diet is increased – the use of probiotics might be able to be decreased
Most human probiotic products are useless
Plant composition – many nutrients, but you need the bacteria to break it down
Diet based on body weight:
 Based on knowledge that animals will consume 1-2% of body weight in dry matter
Suggest feeding half of this amount as a primate pellet
Leafy green and veggies and 10-20 fruit
Obese orangutans????
Wild orangutan feeding patterns from Cheryl Knott?
Food intake calculator?
Compile a list of all orangutan food choices and then look for analysis of each item
Volunteers to work on a body condition score
Compiling a food list with nutrient values
In time, this will enable us to produce our own feeding guidelines

GROUP activity

Review of Chester Food list analysis – food values will be the same but quality?
As foods age, starches turn into sugar – but minerals should stay the same

Anesthetics – Steve Unwin

Practicals of anesthesia:
How many people intubate orangutans when they anesthetize? Some
Importance of balanced anesthesia – state of animals before during and after/choice of drug/length of procedure
We recommend intubating every ape every time
Consistency is important!!!!
There should be a meeting before and a debriefing after
If the animal is highly excited, you might require more anesthetic
A squeeze cage reduces the amount of time the animal is stressed

Practical session at UGM:

Target practice with Steve and Ali (for certificate)
Fecal check from sitting samples (from Tuesday) with Wendi
Review of diagnostic blood gas with Barbel
Group activity continuing with Risk Assessment and Contingency Plan

Diagnostic Techniques – Joost Phillipa

Review of Acquired immunity for diagnostic testing
Sample collection:
Must be collected and stored in the proper way
Proper storage:
Cooling slows down enzyme breakdown and slows down bacteria

- Cool
 - Slow down enzymatic breakdown
 - Slow down bacteria
- Freeze
 - -20/ -80/-135 °C
 - Liquid Nitrogen (-196 °C)

- Bacterial Transport medium
 - Maintain viability
 - Buffers and salt
- Viral Transport medium
 - Preserve /maintain viability - infectivity
 - Protein for stabilisation
 - Buffer to maintain pH
 - Antibacteria
 - Antifungal

Storage of samples can be problematic in Indonesia due to variable electrical supply

Pathogen/Antigen detection: know your microscopy and staining

Culturing bacteria

Gold standard for TB diagnosis – is it really?

Limitations: slow growing bacteria (8 weeks)

Failure to culture – does not mean the animal is not infected (latent)

Needs a high standard:

RT-PCR Reverse transcriptase polymerase Chain reaction

What is the difference between plasma and or serum

How the StatPak works

Would it be useful to make an orangutan specific MAPIA

Cellular response test (TST – tuberculin skin test) – not very useful in orangutans as many false positives

Interferon gamma release Assay (IGRA) – measures T cell response

However, no test is 100% accurate – think about how you are storing samples, the most suitable test(s) and know why you are testing

Variability of surgical masks – particle respirator might be better than traditional surgical mask

Case Studies

Malaria & Dengue Case at Nyaru Menteng during Jan-Apr 2011 – Meriam, presenter

Malaria: plasmodium vivax, P. falciparum, P. cynomolgy, P. knowlesi

Mosquito from genus Anopheles

Distribution: Asia, Africa and America

Malaria outbreak in NM 2008-2009

Clinical signs: Fever (up to 38.5 C), Low activity levels, Abdominal pain, Jaundice, Anorexia, Diarrhea

Diagnostics: Full blood count (FBC), Blood smear (DDR), PCR (sent to Eichman lab in Jakarta)

Treatment: ACT (Artecef + Sulfadoxine-Pyrimethamine) continuous with Primaquine for 14 days, Supportive therapy (IVI, Antibiotic, antipretic, Hematopan, iron supplement, blood transfusion

20 cases of malaria and 21 cases of Dengue + Malaria (mixed infection)

Dengue: Also a mosquito borne infection potentially lethal complication if dengue hemorrhagic fever (WHO)

RNA virus of genus *Flavivirus* (arbovirus group B) family *Flaviviridae*. No clinical signs or fever up to 38.5C usually for 5-7 days. Sometimes followed by malaria. One case of a red spot on mucus membrane

Diagnostic: Blood check: hematology

Open discussion about malaria/dengue

Close or large contact with humans an issue

Updated Case: Deknong – Yenny SOCP, presenter

In first OVAG meeting, Yenny presented information about an individual – update on condition

Welfare of orangutans in Captivity : Dr Sumita Sugnaseelan

Captive conditions:

- Placing a wild animal in captivity represents a major change in the animal's environment
- Environmental pressures are controlled in captivity
 - Availability of resources
 - Predation
- Captive individuals experience little to no competition for food or predation risk
 - Group size is often more flexible in captivity than in the wild
- The living conditions of captive orangutans vary from abusive to pampered, but most often they are kept in poor condition with inadequate care

Most individuals that arrive at rescue or rehabilitation centers are

- physically and/or psychologically disabled as a result of accidents, inadequate captive care, or abuse by 'owners'
- in poor condition due to poor diet in captivity
- diseased infected with a pathological agent that may/may not be zoonotic in nature
- Certain traits that are selected for in nature are no longer selected in captivity
 - Other behavioural characteristics become more significant
- Animals in close confinement & concentrated population
 - Affect physiological & behavioural adaptation
 - Changed how diseases are transmitted

Areas of concern in captive orangutans

- Nutrition
- Malnutrition / obesity
- Disease & injury
- Abnormal behaviour –discussed in details – stereotypies, self or environment directed, abnormal behaviour addressed to another individual, failure to function, anomalous reactivity

Welfare assessment involves:

- The extent of any failure to cope
- The extent of any difficulty in coping
- The extent of signs of good welfare

Measures of welfare

Physiological indicators

Behavioural indicators

Health status

- Points of welfare concerns
- Taken from site of origin
- Change in environment
- Separation from human care-givers
- Transportation
- Handling
- Mode of transportation
- Quarantine
- New environment
- Unfamiliar conspecific and/or care-givers

Solutions

- Dietary management
- Usable space
- Horizontal vs vertical space
- Time-out
- Hide
- Social groupings
- Should an individual be placed in isolation, what do you do?

Veterinary care

- What do you do at your facility to promote and increase welfare amongst your orangutans?

Disease Contingency Plan and Risk Assessment (CON'T) – see next section

BOS NM: TB in clinic area

BOS SL: TB

IAR: Nonspecific infection

OFI: Infection at Health Center

SOCP: Strongyloides in quarantine and release site

Examples of PBLs: Reporting back Contingency Planning and Risk Assessment

SOCP

Outbreak Situation. Please consider, discuss and answer the questions in **bold**. **Modify your area risk assessment and contingency plans as appropriate**

Sudden death in a 9 year old female in SOCP quarantine cage. Only signs were that she seemed a little slower for 48 hours prior to death.

Your manager asks to delay the necropsy, as he has seen something similar and thinks it may be a poisoning.

Referring to your risk assessment, try to convince him why this might be a bad idea?

You take a faecal sample from the group and find high levels of strongyloides

Delegates are then given access to page 2.

SOCP page 2.

You are eventually allowed to do the necropsy 48 hours after death. **What is your opinion for taking diagnostic samples from this?**

Five days later, 2 more animals who recently moved to the Jambi from the release sight become anorexic and weak. Non responsive to supportive therapy, both die within 24 hours. You try to phone the project manager, who is away, without success.

These animals are necropsied.

What diagnostic samples do you take?

Referring to biosecurity – what do you do? (Based on your risk assessment – added measures beyond the general?)

(e.g – post mortem. Interview locals, quarantine area etc.)

Refer to your contingency plan – does it work?

Project manager calls to say he has heard there are some deaths and why wasn't he informed. He has just fielded a call from an international news crew who happen to be in town and who want a quote (a staff member has let slip there is an issue)

Refer to your contingency plan – does it help with the above question?

COMPLICATIONS +/-

There is no response from your international colleagues.

Local people find out the situation and demand answers

Infection in all three cases is confirmed as strongyloides.

Indicate ways how this could have infected the animals and why it might not have been picked up

Modify your risk assessment and contingency plan as appropriate to make it useful. What extra information should you include in your contingency plan?

Nyaru Menteng. Page 1.

Outbreak Situation. Please consider, discuss and answer the questions in **bold**. **Modify your area risk assessment and contingency plans as appropriate**

Clinic – 7 animals age 2 to 4 years all arrived in poor condition and with varying severity of upper respiratory infections. All arrived within the last 6 weeks but have stayed at the clinic as very ill. 2 are StatPak positive.

Sudden death in a 3 year old female – one of the StatPak positive ones

Your manager says there is no need to conduct the necropsy as it is obviously a TB case and not to contaminate the area.

Referring to your risk assessment strategy, try to convince him why this might be a bad idea?

How might you do the necropsy to prevent contamination if it is TB?

Delegates are then given access to page 2.

Nyaru Menteng page 2.

You are eventually allowed to do the necropsy 48 hours after death. **What is your opinion for taking diagnostic samples from this?**

Five days later, 2 more animals die (both StatPak negative). You try to phone the project manager, who is away, without success.

These animals are necropsied. **Referring to diagnostic samples - What do you do?**

Referring to biosecurity – what do you do? (Based on your risk assessment – added measures beyond the general?)

(e.g – post mortem. Interview locals, quarantine area etc.)

Refer to your contingency plan – does it work?

Project manager calls to say he has heard there are some deaths and why wasn't he informed. He has just fielded a call from an international news crew who happen to be in town who want a quote (a staff member has let slip there is an issue)

Refer to your contingency plan – does this help with the above issue?

COMPLICATIONS +/-

There is no response from your international colleagues.

Local people find out the situation and demand answers

You don't find any TB lesions at necropsy, but there is a severe pneumonia in both cases.

The remaining surviving animals are beginning to improve. What antibiotics have you been using?

ANSWER:

Turns out to be Bacterial pneumonia (not tuberculosis) Pseudomonas and Haemophilus, and a respiratory viral infection is suspected. **What samples would be useful to confirm this, from the remaining animals? 2 of the animals also have a low level Strongyloides burden – now what?**

Modify your risk assessment and contingency plan as appropriate to make it useful. What extra information should you include in your contingency plan?

Staff Health Programme – Managing Zoonotic Disease Risk^a

STAGE 1. Risk Assessment

	Component	By Whom?
1	For each taxonomic group identify main diseases of concern (hazard) and estimate likelihood of occurrence	Vet. Reviewed by advisors
2	For key disease risks -fill in disease info template	Vet. Reviewed by advisors

STAGE 2. Risk Management

	Component	By Whom?
1	Hygiene: Vets to work with Curators and their teams to ensure daily biosecurity and hygienic measures are appropriate to degree of risk	Vet. Reviewed by advisors
2	Disease Screening – Animal Collection: Vets to manage preimport, quarantine and opportunistic disease screening as laid out in CZ protocols	Vet. Reviewed by advisors
3	Disease Screening Staff: For each taxonomic grouping, advisors to advise on what screening would be recommended for <ol style="list-style-type: none"> New staff Current staff At times of increased risk (e.g field work, in face of outbreak etc.) Advisors to advise on whether this should take the form of <ol style="list-style-type: none"> Declaration of particular symptoms Active sampling Advisors to suggest process by which this might be managed.	Health advisors
4	Prophylaxis animal collection: Vets to manage any suitable prophylaxis of the animal collection in line with CZ protocols (i.e worming regimes, vaccinations etc.)	Vet
5	Prophylaxis Staff: For each taxonomic grouping advisors to advise on appropriate prophylaxis <ol style="list-style-type: none"> Routine – regime At times of increased risk – e.g fieldwork or in face of an outbreak 	Health advisors

Stage 3. Management in the face of an outbreak

Scenario 1. Zoonotic disease suspected in animal collection	
1	Vets suspect or confirm a zoonotic disease in the animal collection
2	Vets refer to disease fact sheet or pull one together if not already done so
3	Hygienic measures (barrier nursing etc.) put in place to minimise risk of further transmission
4	Staff in contact with this species (including those working in the enclosure) given a verbal briefing and if one has already been produced and audited by health advisors, a fact sheet about the disease in question, what to look out for and what additional hygiene measures they should take.

^a Based on Chester Zoo Zoonotic disease contingency plan.

5	Health advisors informed and provide advice on any additional info to be given to staff/ their own general practitioners and whether any screening or prophylactic treatment is recommended. Health advisors to assist with fact sheet production if not already prepared.
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Scenario 2. Zoonotic disease suspected in staff member.	
1	Staff member to report a disease that could be transmitted to/ caught from the animal collection to vet/ management/ health advisor
2	Vets refer to disease fact sheet or pull one together if not already done so
3	Hygienic measures (sending staff member home/ use of PPE etc.) put in place to minimise risk of further transmission
4	Animals with which the staff member was in contact are screened as appropriate. If they are found to be infected, measures taken as in scenario 1.
5	Staff in contact with the affected staff member are given a verbal briefing and if one has already been produced and audited by Health advisors, a fact sheet about the disease in question, what to look out for and what additional hygienic measures they should take.
6	Health advisors informed and provide advice on any additional info to be given to staff/ their own general practitioners and whether any screening or prophylactic treatment is recommended. Health advisors to assist in fact sheet production if not already prepared.

SOCP – Example of Answers

Jika ada hewan yang mati di Center dan drh sedang tidak ada di tempat yang akan dilakukan adalah:

1. Hubungi drh tentang kondisi yang terjadi dan informasikan ke manajer
 - a. Jika dokter hewan dapat segera kembali → lakukan nekropsi
 - b. Jika dokter hewan dapat segera kembali → pindahkan satwa mati ke tempat penyimpanan mayat/freezer
Isolasi sisa populasi jika satwa berasal dr kandang populasi
2. Mengenai kandang
 - a. Jika kandang individu → desinfeksi dan dikosongkan sementara
 - b. Jika kandang sosialisasi → sisa populasi tidak boleh dipindahkan sebelum hasil nekropsi keluar
3. Jika dokter hewan sudah datang → segera lakukan nekropsi sesuai dengan SOP nekropsi
 - a. Hasil nekropsi :
Jika zoonotic/penyakit menular:
 - Terhadap kandang : desinfeksi
 - Terhadap sisa populasi : lakukan general health check (faeces, urine, darah, etc)
Jika ada yang positif → isolasi dan pengobatan
Jika negatif → lanjutkan observasi
 - Staff in contact : general check up
Jika positif : diistirahatkan setelah dilakukan sosialisasi mengenai kondisi kesehatan
Diberikan pengobatan
Jika negatif : boleh kembali bekerja
 - Terhadap lingkungan :
Informasikan ke dinas terkait (kehutanan, karantina) dan dilakukan penutupan areal center tersebut untuk umum (→restricted area)

English Translations (*Italic*):

If there are dead animals at the Center and vets were not present:

1. Contact vets about what happened and inform the manager
 - a. Determine if the vet can do a necropsy
 - b. If the vet can, then move the dead animal into storage / freezer and isolate remaining populations if the animal came from a stable population
2. About the cage:
 - a. Disinfect cage
 - b. The rest of the population in socialization cages should not be moved until necropsy results are known
3. Upon arrival of vet, necropsy done in accordance with SOP necropsy protocol
 - a. Necropsy results:

If zoonotic / infectious disease:

 - For the cage: disinfection
 - For the rest of the population: do general health check (feces, urine, blood, etc.)

If there is a positive result, isolation and treatment

If negative result, continue observation

 - If Staff had contact: general check-up

If Positive: give treatment

If negative: may return to work

 - About the environment:

Inform all relevant agencies (forestry, quarantine) which might enforce closing the center or creating a restricted area

Outbreak situation.

Please consider, discuss and answer the questions in **bold**. Modify your area risk assessment and contingency plans appropriate

Clinic – 7 animals age 2 to 4 years all arrived in poor condition and with varying severity upper respiratory infections. All arrived within the last 6 weeks but have stayed at the clinic as very ill. 2 are statpak positive

Sudden death in a 3 year old female – one of the statpak positive ones

Your manager says there is no need to conduct the necropsy as it obviously a TB case and not to contaminate the area.

Referring to your risk assesment strategy, try to convince him why this might be a bad idea?

- Statpak positif, belum berarti bahwa ou tersebut mengidap TB, tidak tertutup kemungkinan penyakit itu disebabkan oleh agen penyakit yang lain selain TB
- Nekropsi merupakan salah satu alat untuk mengetahui penyebab penyakit yang sebenarnya, sehingga bisa dilakukan penanganan yang benar
- *If the StatPak is positive, it does not mean that orangutans are suffering from TB, it is likely the disease was caused by agents other than TB disease*
- *Necropsy is one tool to determine the actual cause of the disease, so that proper treatment can be done*

How might you do the necropsy to prevent contamination if it is TB?

- Personal protection equipment level 3 (double mask, double gloves, overall, goggles, boots)
- Dilakukan di tempat tertutup,
- Dilakukan secepat mungkin, pembukaan karkas dilakukan seminimal mungkin dan dilakukan pengambilan sampel.
- Desinfektan setelah melakukan nekropsi (bleach)

- Alat-alat yang dipakai selama nekropsi disteril kembali, karkas dibakar di incinerator
 - Alat yang 'single-use' spt masker, gloves, dll juga dibakar di incinerator
 - Dokumentasi (PM sheet, foto)
- *Especially in enclosed places*
 - *Do as soon as possible, keep to a minimum the opening of the carcass and take samples quickly*
 - *Disinfectant after performing necropsy (bleach)*
 - *The tools used during necropsy must be sterilized, carcass burned in incinerators*
 - *Tools that are 'single-use' such as masks, gloves, etc. are also burned in incinerator*
 - *Documentation (notes, photos)*

You are eventually allowed to do the necropsy 48 hours after death.

What is your opinion for taking diagnostic samples from this? Nekropsi dan pengambilan sampel masih perlu untuk dilakukan, selama penyimpanan karkas sesuai dengan prosedur (eg: harus ditaruh di tempat yang dingin sehingga mencegah terjadinya pembusukan)

Samples need to be taken, storage of carcasses in accordance with the procedures (eg: should be placed in a cool place as to prevent spoilage) to take samples from

Another 2 animals died, were StatPak negative. **Referring the diagnostic samples**, lakukan prosedur yang sama dengan kasus satwa yang mati (nekropsi, dll) sesuai dengan bio-security (karantina lokasi)

Follow a similar procedure to the case of dead animals (necropsy, etc.) in accordance with bio-security (quarantine location)

Refer to your contingency plan – does it work? Ya, tetapi masih banyak hal yang belum termasuk dalam *contingency plan* yang dibuat sebelumnya (tidak punya SOP untuk nekropsi TB, tidak punya SOP untuk penanganan *outbreak*)

Yes, but there are still many things that have not been included in the contingency plan made in advance (do not have a SOP for TB necropsy, no SOP for handling outbreaks)

Manager called from abroad, because the staff let slip an issue to an international news crew, does **this help with the above issue?** Memberikan pemahaman mengenai kejadian *outbreak* yang terjadi di center, sehingga terjadi satu persepsi yang sama mengenai *outbreak* tsb. Usahakan untuk menunjuk satu pembicara saja untuk menghadapi newscrew

This provides an understanding of the events that occurred in the center during the outbreak.

Have only one speaker address the news crew.

What antibiotic is used: Amoxicillin clavulanate, Ciprofloxacin, Cefotaxime

Sampel : dr tracheal wash

2 stronglylodes burden: beri anthelmintic (ivermectin)

Note :

tidak punya SOP untuk nekropsi TB

tidak punya SOP untuk penanganan *outbreak*

give Anthelmintic (ivermectin)

Note:

necropsy had no SOP for TB

did not have SOPs for handling outbreaks



**Orangutan Conservancy 2011 Orangutan Veterinary Advisory Group (OVAG)
Workshop**

2011 OVAG Report

July 4 - 8 , 2011



Section 4

Future topics:

Melioidosis
Records and scientific writing
Positive Reinforcement techniques
More case studies
Nutrition
Diagnostics / parasites
Effect of Mental health on physical health
Orangutans in the field

Next year (2012) possible locations are the Primate Center and Veterinary School in Bogor or even possibly Kuala Lumpur in Malaysia. Steve will make a trip to Malaysian Borneo to try to get Malaysian vets involved with OC/OVAG.

Evaluation Review for start of workshop

1. The most sensitive method for diagnosing *Strongyloides* infection is:
 - A Antibody detection test
 - B Formol ether concentration
 - C Faecal culture
 - D Saline preparation for motile larvae.
2. The stage in the life-cycle of the malaria parasite most commonly seen in a stained blood film is the:
 - A Merozoite.
 - B Sporozoite.
 - C Trophozoite.
 - D Gametocyte.
3. Finding an amoebic cyst of 18µm in diameter with 8 nuclei in a stool may:
 - A Indicate the animal has amoebiasis.
 - B Indicate the animal has a non-pathogenic infection.
 - C Indicate the animal could also have anaemia.
 - D Be the cause of diarrhoea.
4. Give a 1 sentence definition of 'biosecurity'
5. List the following types of investigative studies in order of result reliability, with the most reliable first
 - A. Cohort Studies
 - B. Expert Opinions, textbooks, personal experience and the internet
 - C. Systematic review
 - D. Randomised control trial
 - E. Meta-analysis
 - F. Single Case report
 - G. Case series
6. Which of the following are components of a disease or pathogen contingency plan?
 - A. A list of people and organisations to contact in a disease outbreak, and why they must be contacted.
 - B. Biosecurity protocols
 - C. Methods of disease transmission and management strategies to reduce transmission
 - D. A map of your facility
 - E. background information on the disease of concern
7. In 1 sentence, define disease risk
8. In 1 sentence, define malnutrition
9. Briefly describe the dietary components necessary for a juvenile orang-utan

10. After anaesthetising an animal with Ketamine and Medetomidine, how long should you **ideally** wait before approaching the animal to begin a procedure?

- A. 1 minute
- B. 5 minutes
- C. 10 minutes
- D. 15 minutes
- E. 20 minutes

11. In radiography – the Higher the kV

- A. The faster the electrons are at hitting the plate
- B. The more electrons are at hitting the plate
- C. The greater the tissue penetration
- D. The more X-rays produced

12. In 1 sentence, why do we collimate radiographs?

13. For each of the following diagnostics, state whether the test is looking for the Mycobacteria itself, or for the body reaction to it

- A: TST
- B: 454 Sequencing
- C: StatPak
- D: Paralens
- E. MAPIA
- F. Culture

14. In 1 sentence, describe latent tuberculosis

ANSWERS

1. C

2. C

3. B

4. Similar to: Protocols designed to reduce the risk of pathogen transmission

5. C, E, D, A, G, F, B.

6. They all are

7. Similar to: Disease Risk is the likelihood of the occurrence and the magnitude of the consequences (severity) of a pathogen entering a population – for this you need a vulnerable population and the possibility of exposure, to a particular pathogen

8. Similar to: Malnutrition occurs when the body does not get the right amount of vitamins, minerals, and other nutrients it needs to maintain healthy tissues and organ function and can occur when an animal is either undernourished or overnourished.

9. This will vary – but should include reference to wild diet, sanctuary diet, water access, and potentially energy, macro and micro nutrients etc,

10. D

11. A and C

12. Similar to: To control the size of the primary beam and improve image clarity and to reduce scatter.

13. A. body reaction. B. Organism C. Body reaction D. Organism E. Organism F. Organism

14. Similar to: Infection with *M tuberculosis* that has been contained by the host's immune system and thus does not infect others

Evaluation Review for end of workshop

1. After anaesthetizing an animal with Ketamine and Medetomidine, how long should you **ideally** wait before approaching the animal to begin a procedure?
 - A. 1 minute
 - B. 5 minutes
 - C. 10 minutes
 - D. 15 minutes
 - E. 20 minutes
2. In radiography – the Higher the mA
 - A. The faster the electrons are at hitting the plate
 - B. The more electrons are at hitting the plate
 - C. The greater the tissue penetration
 - D. The more X-rays produced
3. In 1 sentence, why do we collimate radiographs.
4. Which of the following are components of a disease or pathogen contingency plan?
 - A. A list of people and organizations to contact in a disease outbreak, and why they must be contacted.
 - B. Biosecurity protocols
 - C. Methods of disease transmission and management strategies to reduce transmission
 - D. A map of your facility
 - E. background information on the disease of concern
5. What can be used to preserve a bacterial sample at room temperature?
6. What can be used to preserve a virological sample at room temperature?
7. What tools are useful to help intubate an orangutan?
8. What is the MAIN reason to intubate an animal under anesthetic?
 - A. To obtain sterile lung wash samples
 - B. To maintain a patent airway
 - C. To help provide a stable anesthetic
 - D. Because Steve said we should
9. What tools which of the following (including all necessary consumables) would be of most use diagnostically in a field situation?
 - A. A microscope and a centrifuge?
 - B. A field PCR kit and a microscope?
 - C. An ultrasound and a pulse oximeter?
 - D. An X-ray and a field PCR kit?
 - E. A microscope and a field PCR kit?
10. You are faced with a disease outbreak in your center. Describe in 3-4 sentences how you would deal with this. Consider clinical and managerial aspects.

ANSWERS

1. C
2. B and D
3. Reduce scatter, improve image
4. All
5. 10% glycerol
6. RNA later
7. Laryngoscope, swab, light source, a second person...
8. B
9. A
10. Must mention diagnostics, biosecurity and communication

Test 1 pre workshop - based on last year's material and topics being covered this year					
Question Number	Correct	1/2 mark	Incorrect	Did not answer	Comments
1	15	0	12	0	
2	14	0	11	1	
3	14	1	11	1	
4	18	7	3	0	
5	0	7	17	3	Accuracy of study
6	6	8	10	3	
7	3	11	11	2	
8	7	16	4	0	
9	8	4	3	4	Increased protein prominent
10	5	0	20	1	
11	0	19	6	2	
12	2	13	9	3	
13	6	16	2	3	Paralens/ MAPIA unsure
14	20	3	1	3	
Test 2 - end of workshop, on topics covered this year					
Question Number	Correct	1/2 mark	Incorrect	Did not answer	
1	22	0	0	0	
2	20	1	1	0	
3	20	1	0	1	
4	22	0	0	0	
5	16	2	2	1	
6	16	1	1	3	
7	16	5	0	0	
8	20	2	0	0	
9	12	9	0	0	
10	18	0	1	2	

	A lot	Some	A little	None
Enjoyment	20	2	0	0

Comments:

Very important to meet colleagues from other centres andf reely share information and build friendships.

As a manager, I do realise this sort of workshop is really important. But it will be very useful if the topics related to management were put in the beginning. Practical things are good to know, but if management material was in the first 3 days, managers would be more able to take back to their centres

Yes - for the ideas, information and situation

I think the workshop is a fantastic forum for vets to share their knowledge and support/ assist one another in overcoming the daily challenges they face in their roles

For the information

In the next maybe will be better if we follow the schedule, so we are not wasting time

More motivational games!

Make final decision about TB and best policy that can apply generally

The atmosphere of the whole event is really fun and warm

Yes, because I can meet many colleagues

	A lot	Some	A little	None
New Knowledge and ideas	19	3	0	0

Comments:

Mainly the practical (parasitology) details were useful for me, but the nutrition bit has been essential as well

I have thought of several studies that have to be done in our centre and also we have to publish our field findings

Yes - especially for TB test, parasitology, nutrition and behavioural enrichments

Often there was conflicting information presented which can be confusing and frustrating. Case studies were great. Practical aspects were fantastic

Especially for new issue for TB test and the suggested/ recommendation treat for a difficult care in Quarantine

I get many ideas to make disease risk analysis and I hope we can apply this idea

More field technology

Arrange better schedule so the presentations not 'accumulate on last few days

This time OVAG is less dense, compared to last year regarding the new knowledge I get. The 2011 is more like evaluating/ doing practise from last year's material. Still it is great. There is a continuation from year to year materials

Yes - a lot of the things that was mentioned on the workshop is quite new for me, such as how to deal with TB, how to do good enrichment etc.

	A lot	Some	A little	None
Applying the learning	15	7	0	0

Comments:

I hope and will try to implement the ideas, and think that the ideas of having contingency plans and SOP's have woken people up. Just need to keep reminding people now.

Since I am not involved directly in any rehab centres, I can contribute by helping them in making planning and strategies based on what I learn from this meeting.

Yes - I will. There some good and excellent ideas to shown the others, and I think I must do to impart this knowledge

I would like to see topics such as positive reinforcement techniques and recording (documentation) protocols and procedures covered - how are things documented, who has access to that info, how/ where stored, what info is stored/ documented and how we could improve. Mental health as an important component of physical health

Yes I will. I will try but the impact/ effect still needs a time to make them follow what I want and Quarantine needs.

Will use contingency planning for outbreak

Learn many things to make involvement at Bukit Tigapuluh Release Site - THANK YOU!!

Sure, it's just that this year's material is less 'clinical' so it is a bit difficult to share with the team.

Yes, I will try and use the information and ideas. And yes, I have been shown how to impart this knowledge to others, but certainly that it will need time to make a difference

	A lot	Some	A little	None
Effect on results	12	10	0	0

Comments:

I think that in Nyaru Menteng the ideas and information will be implemented, but am not sure about the other centres

We have a lot of constraints to implementing our ideas. Mostly lots of the ideas end up in the laptop because of the obstacles

Yes, of course. Especially how to manage the spread of disease and how to manage the animal health management of the area.

Yes I do. Because from here I got a lot of information and of course with the contact with others to improve the animals health in quarantine

I get more information about medication for orangutan, the diagnosis and methods etc. I think it will help us in centre to taking care of and giving treatment to orangutans

Give opportunity for representative to describe their centre, so everybody knowing well of each other

Absolutely. These meetings make me more confident in doing my job, in providing me with back-ups as well

Hopefully yes, with the new information and the ideas that have been shared - will help me see animal health problems with a new perspective

Other Comments:

Improving communication (between vets in different centres, and between vets and managers) is very important. I think important first steps were made to improve this communication

More participants with more different background studies.

Thank you for inviting me in this new family

Great improvement in terms of delegate's participation - fantastic!! Keep it up.

There are so many ideas and information that I got. But most Indonesian people like us, 50% English words lost by not knowing or too fast speaking - please for note, because we all know how important the knowledge that the workshop does.

I think cebter manager involvement is important to encourage support of the vets in a united front/ collaboration/ co-operation. Thank you for allowing me to attend this workshop.

Please give some idea to night activity so we can be more closer to each other and it would make it feel more comfortable with each other.

Maybe in the future (in the next course) we can discuss about orangutans in the release site, not just in the rehab centre.

Can provide primatologist for the behavioural aspect? Vets can cope at least a little...

Sweet! Well Done :-)

Language is still a problem I think. Don't know how to solve that...

More little group activities, so that people will know each other better and make them more comfortable with each other

May we do more practice and perhaps sometime we can do activities outdoor (under shade of trees or open field) like video on PASA workshop



**Orangutan Conservancy 2011 Orangutan Veterinary Advisory Group (OVAG)
Workshop**

2011 OVAG Report

July 4 - 8 , 2011



Section 5

Attachments made available for participants:

1. Recommendations for Tuberculosis Risk Management in Samboja Lestari, East Kalimantan *by Chris Walzer and Alex Lecu – reviewed and accepted by OVAG delegates*
 2. **DRAFT RISK ASSESSMENT for Keeping staff working with Great Apes**
 3. Zoonosis/ risk assessed disease
 4. **Contingency Plan template**
 5. PASA VETERINARY MINIMUM STANDARDS
 6. Library of primate medicine resources
-

1.

Vienna and Paris 30.06.2011

Research Institute of Wildlife Ecology

**Recommendations for Tuberculosis Risk Management in Samboja Lestari,
East Kalimantan**

by Chris Walzer and Alex Lecu#*

Goal: While aware that MTB most probably exists in the environment in Eastern Borneo, minimize the risk of introducing MTB into the wild with rehabilitated orangutans. Exposure of Orangutans to mycobacterium is usually limited because of their arboreal lifestyle. Hence, their journey into a rehabilitation center markedly increases the contamination risk due to human contact, greater time spent on ground and interactions with animals of unknown status.

Method: In order to move forward with this issue the initial diagnostic workup has been greatly simplified by taking into account the realities of the site. An acceptable risk must be defined – a zero risk approach will guarantee a standstill because of our current incapacity to detect animals in the TB latent form.

1. Robust clinical exam of each individual animal including x-ray etc.
2. Employ only Culture and PCR from tracheal washes as diagnostic tools
3. For first-stage screening use only two categories: a) TB-negative and b) all others incl. the ex-TB
4. Define “TB-negative” as negative on BOTH culture and MTB complex specific-PCR and negative on clinical exam, x-ray, use no other tests to make this classification.

Notes:

- the validity of this assessment is entirely dependent on: i) the quality of the veterinarian's diagnostic workup, ii) thorough knowledge in reading x-rays, iii) adequate sampling techniques, iv) correct sample storage and transport, and v) robust lab procedures and protocols (according to WHO standards).

- the TST is clearly not valid for orangutans (Kilbourne et al. 2001); and has severe general limitations (see e.g. Rangel-Fausto et al., 2001 and Good et al. 2011)

- Tracheal wash should be run with a standard amount : 1ml/kg BW of sterile saline flushed into trachea and immediately collected back (usually 30 to 50% of initial volume) and then equally divided into tubes for PCR, cytology and stain (EDTA) and culture.

- The PrimaTBStatPak® is not validated for species other than *Macaca sp.* and therefore cannot be used for initial screening. However, serum of all animals should be stored (-25°C) for further serological evaluation.

5. isolate the TB-negative OU from all others immediately (healthy quarantine1), and re-test them in 3 months (or more, see below)

Note:

- this TB-negative group could contain “false” negative, i.e. latent TB cases. That is why they cannot be released directly.
- 3 months is the recommended period for humans (of the tested species the ou’s closest relative).
- Protocols should be implemented in order to isolate Healthy Quarantine from the remaining animals, i.e. separated tools, different staff, sequential work, physical buffering space ...

6. All dead OU must undergo a full necropsy workup including culture and PCR of the following organs : lung (apical), liver, spleen and the following lymph nodes : mediastinal, tracheobronchic, cervical, mesenteric..

7. All other OU will require an individual workup to determine their status
In the “healthy quarantine” the negative animals must be spatially separated from the group of other OU. Keeper staff should not move between the two groups. Keepers should have tested negative for TB. Fomite transmission must be prevented by employing separate tools and utensils. Feeding material of the two groups must not mix. If possible animals should be housed individually. However, behavioural wellbeing must be considered.

If one individual in a group becomes positive during the three months all animals in that group should be considered positive.

References

Good, M., Clegg, T. A., Murphy, F., More, S. J. (2007): The comparative performance of the single intradermal comparative tuberculin test in Irish cattle, using tuberculin PPD combinations from different manufacturers. *Vet Microbiol* **151** : 77-84
Kilbourn, A.M., Godfrey, H.P., Cook, R.A., Calle, P.P., Bosi, E.J., Bentley-Hibbert, S.I., Huygen, K., Andau, M., Ziccardi, M. & Karesh, W.B. (2001) Serum antigen 85 levels in adjunct testing for active mycobacterial infections in orangutans. *Journal of Wildlife Diseases* **37**(1): 65-71.
Rangel-Frausto, M. S., Ponce-de-León-Rosales, S., Martinez-Abarora, C. & Hasløv, K. (2001): Tuberculosis and tuberculin quality: best intentions, misleading results. *Infection Control and Hospital Epidemiology* **22**: 481–484.

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2.

DRAFT RISK ASSESSMENT for Keeping staff working with Great Apes (Insert Centre) – guidance notes on filling in *the form are in italics.*

Note areas in blue can be filled in by center manager/health and safety officer. Areas in yellow are likely to require input from the center veterinary surgeon. Areas in red should be agreed and discussed between them both.

Name of Organisation	
Activity to be assessed	<i>Type of enclosure (including type of access)</i>
Location	
People at risk	
Animals involved (taxonomic groups)	
Other animal risks	

Sources of infection	Transmission route	Likelihood
<i>EG:</i> <ul style="list-style-type: none"> • <i>Body fluids (Blood, placenta, body parts)</i> • <i>Waste (faeces, urine, vomit)</i> • <i>Direct skin contact</i> • <i>Aerosol</i> 	<i>route e.g. inhalation, ingestion etc</i>	<i>Would need to give guidance on terminology (i.e. what does low or moderate or high mean). This section should also give a brief justification for the score given</i>

Control Measures to minimise transmission risk	<i>Safe working practices that managers should be able to come up with as a result of knowing the animals, their enclosure and assessing potential sources of infection and transmission routes alone</i>
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Biological agents of primary concern	Source (s) of infection	Harm to humans	Likelihood of occurrence at centre
	<i>should tally with the ones in the blue section</i>	<i>Consider severity of disease caused in humans, whether it can be easily treated and whether it can spread easily from person to person</i>	<i>Vet should base this decision on factors such as the previous history of disease in population, whether disease could be introduced into animals</i>

Control measures to minimize contamination risk	<i>Measures directed at reducing the likelihood of the animals contracting the organisms listed and to controlling spread / contamination of the enclosure if these agents are suspected/ confirmed. This should be within the capability of the collection's vet who could fill this in without knowing the details of how the enclosure is managed. The manager would not be able to fill in the yellow section as it requires specialist knowledge both microbiological and the disease history of the collection/animals concerned.</i>
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Further information/ notes	<i>Any further notes (e.g. justification why things added or not included)</i>		
Further information/ notes	<i>Any further notes (e.g. justification why things added or not included)</i>		
Assessor (facility manager)	<i>Two assessors required as in most centres, no one person will have sufficient knowledge to complete both parts.</i>	Assessor	<i>Two assessors required as in most projects, no one person will have sufficient knowledge to complete both parts.</i>
Date		Date	

3.

Zoonosis/ risk assessed disease

	Species: Non-human apes	Human	Action
Positive ID at Centre or in wild		?	
Source			
Transmission			
Clinical Signs			
Most at risk - (exposed/ biological)			
Implications of infection			
Control of infection			
Management recommendations			
References			

Disease of Concern:

Contact details: Relevant diagnostic laboratories

Contact details: Government officials

Contact details: Management

Contact details: Animal Health network

Contact details: Trusted media

4.

<p>Main Routes of transmission</p>	<p>Contingencies to reduce risk of transmission to/from Sanctuary animals.</p>
<p>Wildlife and Domestic animals</p>	<p>Aim: reduce contact between wild animals and sanctuary animals:</p> <p>Preventative measures:</p>
<p>New Arrivals</p>	<p>Aim: Prevent introduction of infected animals.</p> <p>Control measures:</p>
<p>Food</p>	<p>Aim: Prevent entry of the disease in infected food products.</p> <p>Control measures:</p>
<p>Fomites (vehicles, equipment, crates, clothing and shoes etc.)</p>	<p>Aim: Prevent disease being transferred to animals, their food or anything they may come in direct contact with.</p> <p>Control measures should disease be widespread (outbreak):</p>
<p>Faeces / waste food/ soiled bedding etc.</p>	<p>Control measures in the event of outbreak:</p>
<p>Infected Humans</p>	<p>Prevention of transfer of a disease strain that can infect both humans and animals.</p> <p>Recommendations</p> <p>Visitors:</p> <p>Staff:</p>

Additional points:

- These contingency measures are liable to revision as the threat changes and our knowledge of the disease and its control develops. They will be reviewed on a regular basis (minimum monthly).

- The contingency of how we would operate and provide care for our animals in the event of a human pandemic is also not covered within this document.

Summary:

Measures in place (DATE):	
Measures to be put into effect ASAP: Timing to be supplied as soon as they are known.	
Measures to be put in place if outbreak:	

5.

PASA VETERINARY MINIMUM STANDARDS – available freely online at www.pasaprimtes.org

Sections of PASA veterinary manual shared with delegates are freely available on the PASA website and include:

- Creation of a preventative health programme
- Disease contingency planning
- Basic Nutrition
- Management of the malnourished primate
- Diagnostic Sampling Procedures
- African primate handling and anaesthesia
- Tuberculosis and its control

Risk assessment – HBV in gibbons in a zoo setting – available from s.unwin@chesterzoo.org

6.

Table 1. Typical serological patterns of acute and chronic HBV infection (adapted from Dienstag and Isselbacher, 2001 and Hollinger and Liang, 2001).

Classification	HBSAg (what we test for at CZ)	Anti-HBs	Anti-HBc ^b	HBeAg ^c	Anti-HBe ^d
Never Exposed	-	-	-	-	-
High infectivity chronic carrier	+	-	+	+	-
Low infectivity chronic carrier	+	-	+	-	+
Current acute infection	+	-	+	+/-	+/-

^b As HBcAg is not present in commercial vaccines, the presence of anti-HBc in serum is indicative of actual infection rather than vaccine induced immunity.

^c HBeAg in serum of carriers constitutes the replicative phase of infection and is indicative of a high relative infectivity, coinciding with high circulating concentrations of HBV DNA. May persist indefinitely.

^d Seroconversion of carriers from HbeAg to anti-HBe is associated with conversion to the non replicative phase and a low relative infectivity.

Vaccine Immunity ^e	-	+	-	-	-
Past exposure (exposure immunity)	-	+	+	-	+/-

Appendix - List of 25 diseases of immediate concern

Each participant researched and investigated a disease from the list which will produce a rough assessment. 2 examples below

Rough Assessment: Disease example: EMCV – Encephalomyocarditis virus. Family Picornaviridae, Genus Cardiovirus. Species: Orang-utans

Likelihood of susceptibility: 4. Susceptibility varies between species. Peracute mortality has occurred in orangutans.

Likelihood of Exposure: 4. Currently unknown due to lack of data, but with suspected prevalence being high in wildlife, take precautionary approach due to vermin issues in most sanctuaries. Biosecurity measures will mitigate this somewhat (vermin control and potential vaccination – this second IF have confirmed cases. Note however, severe local reaction to vaccination seen in bonobos).

Likelihood of Becoming Infected: 3. Depends on local biosecurity – is spread in urine and faeces from rodents. Also species dependant. Ro/ ID50 unknown, but highly virulent in African elephants, while Asian elephants appear to seroconvert. Sudden death has been seen in orangutans.

Likelihood of Transmitting it to others: 3. Depends on biosecurity as for above question.

Severity for the individual: 4. Species dependant – subclinical to per acute death

Severity for the Population: 4. Outbreaks confirmed in chimpanzees, bonobos and Bornean orangutans. Potentially disastrous, with mortality up to 10%.

Zoonotic potential (extra question)? 2 (over 4 categories). This is LOW directly from apes due to transmission method BUT, humans are susceptible to infection in the same way apes are. Infection is possible in humans, but disease is rare.

Estimated Significance to the Programme?: 23/35 = HIGH Requires risk assessment and management.

References Used: PASA vet healthcare manual Chapter 5.9 (and peer reviewed references contained therein); Vogelnest et al JZWM; Mclelland D Doctoral thesis, University of Sydney; see further reference listed within this thesis, personal experience

Rough Risk Assessment: *Pasteurella* sp.

According to Kawashima *et al.* (2010) and Asheley *et al.* (2003) *Pasteurella* is found in the nasopharynx and gastrointestinal track of domestic animals. It produces a secondary infection in humans with low pathogenicity in healthy individuals. Contact with domestic animals increase the likelihood of infection. Very occasionally produces infectious disease in humans. As reported by Ashley *et al.* (2004) most of the human *Pasteurella* infections usually manifest as local skin or soft tissue infection following an animal bite or scratch. Systemic infections are less common and are limited to patients at the extremes of age or those who have serious underlying disorders. Escande and Lion (1993) found in a retrospective study of infections due to *Pasteurella* that among the 958 cases recorded, wound infections (bites, scratches and punctures) were the common forms of pasteurellosis (66%) caused by *P. multocida* (48%), *P. canis* (11%), *P. dagmatis* (5%), *P. stomatis* (4%). In human infections unrelated to animal wounds, respiratory tract diseases and bacteremia-septicemia were the predominant infections with respectively 19 and 11%, and caused by *P. multocida*. Next in importance were urogenital (2.5%), abdominal (1%) and central nervous system (< 1%) infections.

In a case study by Ashley *et al.* (2004) it is reported a fatal case of peritonitis and septicaemia caused by *Pasteurella dagmatis* in a patient with cirrhosis. The infection followed a scratch inflicted by a pet dog. Spontaneous bacterial peritonitis caused by *P. dagmatis* had not been reported previously. According to Ashley *et al.* (2004) *Pasteurella dagmatis* is a relatively recently described species, which

^e HBsAb > 10 mIU/mL considered protective in humans

is rarely reported as a human pathogen. This species may be misidentified unless commercial identification systems are supplemented by additional biochemical tests.

Table by Kawashima *et al.* 2010:

Case/author	Age /sex	Animal Contact	Risk factor	Antibiotic	Neurological complication	Outcome
Per et al.	15/M	Rabbit	None	Cefazolin, penicillin, chloramfenicol	Epidural epyema	recovery
O'Neill et al.	72/F	Dog	None	Penicilline	Meningoencephalitis	Recovery
Prulx et al.	33/F	Dog	None	Penicillin G	ADEM	Recovery
Tjen et al	72/F	NR	None	Penicilline, cefotaxime	ND	Recovery
Tattevin et al	66/M	Dog	Alcoholism	Cefotaxime	ND	Recovery
Jordan et al	60/F	Cat	None	Aztreonam, Levofloxacin	None	Recovery
Kawashima et al	44/F	Cat	None	Meropenem	None	Recovery

Likelihood of susceptibility: 1. Susceptibility is low in humans. No data found in orang-utans.

Likelihood of Exposure: 3. Although currently in orang-utans is unknown due to lack of data, In humans it is mostly related to close contact (bite, scratches...) with domestic animals (dogs, cats...) , therefore the possibilities of exposure in orang-utans is considered very low as the access to domestic animals in rehabilitation centres is quite limited. However, contact with dogs, cats and other domestic animals is possible while the orangutan in captivity. Biosecurity measures to avoiding the contact of orang-utans with cats and dogs would potentially reduced the risk to almost 0, unless this bacteria is also found as normal flora in orang-utans for what data has not been found in all searched literature.

Likelihood of Becoming Infected: 1. In humans the main via of transmission is through close contact (kissing, bite, scratch) with domestic animals. The likelihood of this happening in orangutans is very low.

Likelihood of Transmitting it to others: 0. No data has been found about direct transmission amongst humans therefore it is considered that likelihood of transmission amongst the orang-utans is 0.

Severity for the individual: 3. In humans only one fatal case has been found in the literature (Ashley *et al.* 2004). It is normally a treatable infection with the adequate antibiotherapy. Only concomitant diseases or association with underlying disorders and some cases of neurological complications have been found.

Severity for the Population: 0. Transmission amongst people has not been found in the literature. The probabilities of an outbreak are quite remote and mortality rate is very low.

Zoonotic potential (extra question)? 1 (over 4 categories). Potential zoonosis in humans from domestic animals. Zoonotic potential from orang-utans to humans is very unlikely.

Estimated Significance to the Programme?: 9/35 = very LOW risk. Does NOT Require risk management although more data specific for orangutans is needed. No data has been found for other species of *Pasteurella* (like *P.haemolytica* or *P.pestis*) in humans or other great apes.

References Used: Ashley *et al.* 2004; Escande and Lion 1993; Kawashima *et al.* 2010.