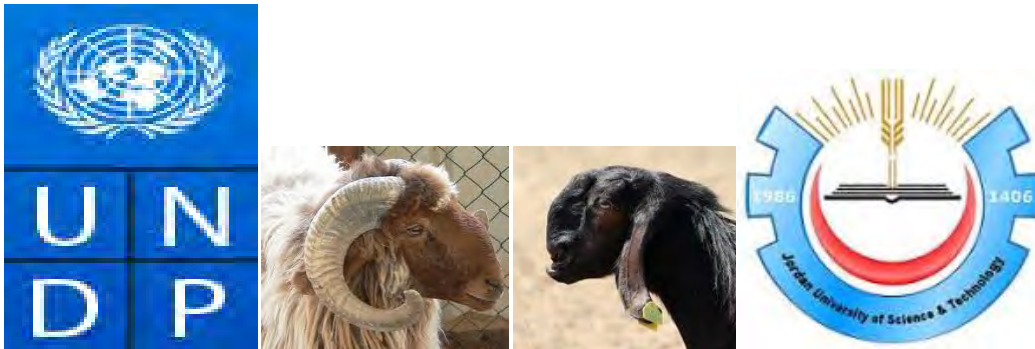


Report of Meeting

Improving the Diagnostic Capacities of Brucellosis, Enhancing the Vaccination and Control Strategies with Special Emphasis on Farmers Awareness in Egypt, Algeria, the Palestinian State (PS) and Jordan, Jordan University of Science and Technology Irbid-Jordan, 5-7th of January 2014



Executive Summary:

Forty-four key scientists from universities and governments in 5 countries gathered in Irbid, Jordan, to present and discuss various aspects of brucellosis control in the region. Through scientific presentations, laboratory sessions, and targeted discussion sessions, they gained valuable information on control of this important public health problem. Each country developed a list of specific changes or approaches in their brucellosis control program as a result of this conference. Also, the entire group worked together to develop a consensus plan on greatest needs for the region. These needs focused on creation of a regional center for brucellosis control that would organize farmer awareness, public health awareness (to decrease consumption of unprocessed dairy products) and to coordinate animal research.

For the agenda, see Appendix A

For a full list of attendees, see Appendix B

Monday, January 5

In this report, each presentation is summarized and then comments and discussions are highlighted in blue.

Opening Ceremony:



Dr. Mustafa, Director of the Consultative Center, welcomed the participants on behalf of JUST University.

Dr. Nabil Hailat, conference organizer, thanked the participants for taking time away from their work and their families to attend the workshop.

Dr. Ghulam Ziay, Director of the Central Veterinary Diagnostic and Research Laboratory, Afghanistan, mentioned One Health and how everyone needs to think about this as they strive to control zoonotic disease.

Dr. Yehia Otify, Egypt, thanked the organizers and said he was looking forward to the workshop.

Dr. Nimer Khraim, Al-Najah University, mentioned he graduated from JUST and that it was nice to return. He and his Palestinian colleagues were looking to increase regional cooperation in control of brucellosis.

Dr. Ehad Abu Basha, Dean of Faculty of Veterinary Medicine, gave some information about JUST. It is a distinguished school in the region, striving to become one of the top 500 universities worldwide. JUST is now twinned with Royal Veterinary College, and is partially accredited by the European Association for E Veterinary Education.

Dr. Salimat, Secretary of the Jordanian Veterinary Association, welcomed participants to the conference on behalf of the country's syndicate.

Dr. Munther Al-Refai, Secretary General for Animal Health, and Jordan's delegate to the OIE, thanked the organizers and wished everyone a productive conference.

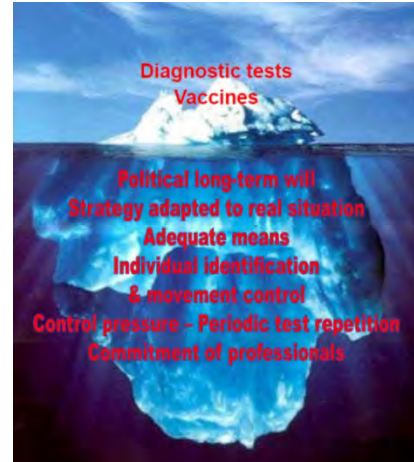
Session 1: Brucellosis – Overviews and National Perspectives

Chair: Dr. Mohammad Ababneh; Co-chair: Dr. Jessie Trujillo

KEYNOTE 1: Brucella infection in ruminants - Fundamentals for a sound control strategy,
Dr. Bruno Garin-Bastuji, Director of the OIE Reference Laboratory for Brucellosis



Dr. Bastuji compared brucellosis to an iceberg. The tools and methods to control and eradicate brucellosis are available, but the strategies often fail. It is the less visible parts of disease control (political will, commitment of stakeholders, repeat testing, quality of vaccine, animal identification and movement control) which lead to failure of brucellosis control.



Prevention and control program of brucellosis in Jordan, Dr. Munther Al-Refai, Secretary General Assistant, MoA-Jordan

Jordan has 3.5M sheep and goats and 73,000 cattle. *Brucella melitensis* is the only species identified in Jordan. The government runs an annual vaccination program, and last year delivered 400,000 doses of Rev-1 via the SC route. Coverage is thought to be adequate; there is a feed subsidy program whereby farmers can purchase feed at a reduced price if they show that their animals have been vaccinated. Currently there are about 300 cases of human brucellosis per year compared to 800 per year prior to implementation of the vaccine campaign.



Current situation and risk assessment of brucellosis in Egypt, Dr. Tharwat Mohamed Elshemey, assistant professor of infectious diseases, Alexandria University, Egypt



Prevalence in cattle in Egypt is about 11%. There are some high risk human populations in Egypt, where they have implemented control programs, with vaccination of cattle with Strain 19 or RB51. They vaccinated some cattle with Rev-1 but found that it led to brucellosis in cattle.

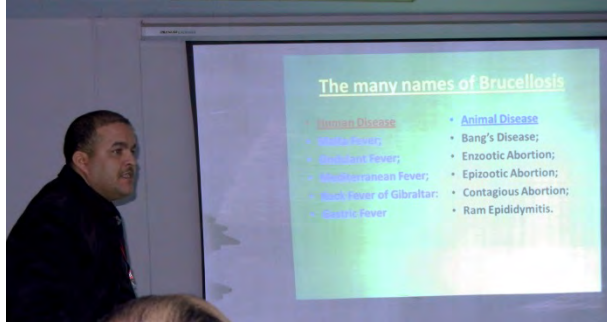
Control and prevention, and some studies of brucellosis in Algeria, Dr. Niar Abdelatif, Dean, Tiaret University, Algeria

A mass vaccination campaign for all sheep and goats was mandated in Algeria beginning in 2006. There was a dramatic decrease in the number of cases in small ruminants. However, there was an increase in human cases during this time period. They believe the human cases are due to consumption of raw dairy products from cattle.

Comment: This study highlights the importance of looking at all hosts when instituting a control program. Also, most countries reported that the majority of human cases are due to consumption of unprocessed dairy products. In fact, many less educated people firmly believe that raw milk,

in particular, raw camel milk, has medicinal properties (anti-cancer) and that these properties are destroyed by boiling.

Further studies on brucellosis in Algeria, Dr. Hemida Houari, Tiaret University, Algeria



The average cost of one human infection in Algeria is equivalent to 8 months of the guaranteed minimal wage. The primary problem in human infection is consumption of non-processed dairy products. A study was done in the Tiaret region to determine prevalence in sheep and goats in the region, with comparison of Rose Bengal and complement fixation tests.

Comment: A general discussion highlighted some misunderstandings regarding “confirmatory” testing. In fact, all *Brucella* tests should be additive (complementary), not confirmatory.

There was a discussion about human cases due to vaccination. Self-vaccination happens (needle stick) but it is rare. However, many veterinarians involved in the brucellosis vaccination campaign become infected. This is probably not because they inoculate themselves with the vaccination needles, but rather, as they become involved in the control programs, they are exposed to more infected animals, and so more likely to become naturally infected.

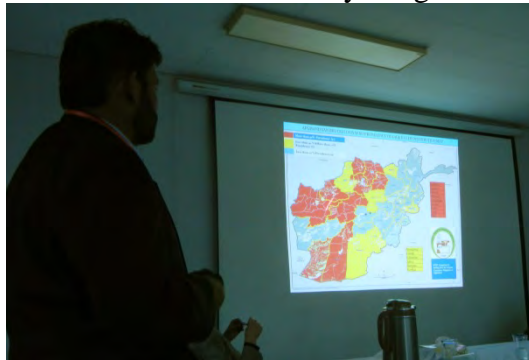
Epidemiology of Brucellosis in the Middle East, Dr. Ahmed Al-Majali, JUST

Dr. Al-Majali is collaborating with JOVAC on a study involving safety/efficacy of Rev-1 in cattle. They are evaluating the results now. All encouraged publication of the results because this is information the community needs.

Session 2: Brucellosis – Overviews and National Perspectives (cont.)

Chair: Dr. Corrie Brown; Co-Chair: Dr. Tharwat Elsheimy

Control Program of brucellosis and recent strategies in Afghanistan, Dr. Ghulam Ziay, Director Central Veterinary Diagnostic and Research Laboratory, Afghanistan



Afghanistan has more than 20M sheep and goats which form a large part of animal agriculture and smallholder economic viability. Beginning in 2011, FAO along with several NGOs launched a brucellosis surveillance control program. They used targeted epidemiology for an initial surveillance program, and included animals in large herds, backyard animals, and nomadic (Kuchi) animals. Of the 33 provinces surveyed, 9 had prevalence >40%, 6 had prevalence 20-40%, and 15 had prevalence <20%.

This was the first serosurveillance study done in Afghanistan since the rinderpest eradication program. They then instituted a country-wide vaccination program, for all young animals (both small ruminants and cattle). Vaccine coverage was very high. The World Bank and the UK

government are both heavily supporting the project now, and the action plan is to collect 100 fetuses from 6 different provinces (2 high prevalence, 2 midlevel, and 2 low prevalence) and do diagnostics for the 6 common agents on these fetuses to determine how much abortion is due to *Brucella*.

Comment: if there is 40% animal prevalence, there may be 100% herd/flock prevalence and so vaccinating only the young ones may not be sufficient. A mass vaccination of all age animals may have to be done in order to reduce the amount of brucellosis. For *Brucella*, the epidemiologic unit is not the individual animal, it is the flock/herd.

Practical laboratory –

In the necropsy area of the clinic, participants had a chance to practice examination with necropsy and collection of samples. There were three aborted fetuses with placentas. Participants did the necropsy, collected relevant samples for pathology, microbiology, and PCR. Impression smears of cotyledon were made for examination in the laboratory the following day. There were general discussions concerning lesions and sample collection.



Dr. Nabil discussing methods of sample collection in cases of abortion



Severe submandibular edema and hemorrhage in a calf fetus – this indicates dystocia, rather than abortion

Monday January 6

Session 3: Pathogenesis and Diagnostics

Chair: Prof. Yehia Otify; Co-Chair: Dr. Samir Al-Fuqaha

KEYNOTE 2: Molecular diagnostics for detection of infectious agents associated with ruminant abortions, Dr. Jessie Trujillo, Iowa State University



Dr. Trujillo began with an overview of the mechanisms of PCR. She emphasized that in a molecular laboratory, Standard Operating Procedures are extremely important, and it is critical to prevent contamination of the laboratory. Another important aspect of PCR is that “not all agents are the same.” For instance, *Brucella* has an oxidase which is carried over into the extracted DNA and continues to degrade the nucleic acid even at 4C. She emphasized that “you need to know your pathogen.” The iiPCR, POCKIT machine (GeneReach) is a portable real-time PCR that operates with fluorescence. It can give a positive-negative reaction in one hour and is extremely sensitive. It is designed as a point-of-care machine, for use in a laboratory, in a clinic, or in the field.

Comment: “Sensitivity and specificity” of a PCR assay is not synonymous with sensitivity and specificity of a diagnostic test for determining a disease condition. Knowing the limits of your test and establishing valid cut-off points is essential. Some commented that PCR might be so sensitive that it picks up agents which are not the cause of the disease, and correlating PCR results with other aspects of the case, such as pathology and histopathology of placenta and fetus can be instrumental in ensuring accurate diagnostics. This is especially true in chronic infections such as brucellosis and chlamydiosis.

A general overview of the pathogenesis of abortions, Dr. Corrie Brown, Fulbright Scholar, JUST

Using animated powerpoints, the transmission and pathogenesis of each of 5 major causes of sheep and goat abortions were demonstrated. Understanding how the agent causes disease can be central to ensuring that correct samples are taken, and also very helpful in implementing control programs.

Molecular characterization of *Brucella melitensis* vaccine strain and field isolates in Palestine, Dr. Kamel Adwan, An Najah University

Sera and milk from aborting animals in several parts of West Bank were studied using serology, culture, and PCR. 37% of aborting animals were positive by one test or another.

Comments: More than 80% of *Brucella*-infected females excrete *Brucella* in the milk.

Comments: What is the “gold standard” for *Brucella* infection? It is culturing 3 pairs of lymph nodes from an animal. Culturing from milk is not always reliable.

Diagnosis and molecular identification of *Chlamydomphila* as cause of abortions in sheep/goats in Jordan, Dr. Huthaifa Ababneh, NCARE, Jordan

Dr. Ababneh presented the results of his Master’s thesis research at JUST. Studying more than 60 abortion cases (with PCR on OMP2 on placenta and also on vaginal swabs of dam), 55% were positive for *Chlamydomphila*. RFLP analysis confirmed that all were *Chlamydomphila abortus* and none were *Chlamydomphila pecorum*. The OMP2 gene in Jordan has an identical sequence to the reference strain. Seroprevalence using indirect ELISA shows that approximately 50% of mature ewes and does are positive.



Using the vaginal swab material, he determined that shedding occurs for 2 weeks post-abortion so it is important to segregate the affected animal to prevent others from being infected.

*Comment: The International Committee on taxonomy has just renamed this organism, it is now *Chlamydia abortus*.*

Session 4: Pathogenesis and Diagnostics (cont.)

Chair: Prof. Niar Abdelatif Co-Chair: Dr. Sayed A.Hattab

Brucellosis /Abortions in Algeria, Dr. Dahmani Ali, Algeria



An agropastoral area in the northern highlands of Algeria experienced a spike in human cases in 2006. Most cases occurred in the months March-September, which coincides when the greatest amount of milk and dairy products are produced and consumed. A serosurvey showed a herd prevalence of 22%. A national mass vaccination campaign began in Algeria in 2006, and over the next 4 years, there was a successive drop in human cases.

Comment: Monitoring of human cases of brucellosis is an excellent indicator of the success of the control programs in animals.

Pathogenesis and diagnosis of brucellosis in humans in Jordan, Dr. Wael Hyiagneh, Deputy Director, King Abdulla Hospital, JUST

Globally, there are 100,000 cases of brucellosis in humans every year, and the Middle East carries the greatest burden. The cause of most cases is consumption of unprocessed dairy products. In particular, raw camel's milk is thought to be medicinally optimal, and to be cancer curative and these properties are lost when the milk is boiled. In Jordan recently, there have been many cases in people who consumed fresh cheese brought in from Syria. The yearly incidence in Jordan is thought to be around 4%. It is a reportable disease, but that doesn't mean it is always reported. There are 3 forms of brucellosis in humans: acute, subacute, chronic. The acute form can be very hard to diagnose as there are no specific symptoms associated with it. In the subacute and chronic forms, lesions are often found in bones and joints. Cardiovascular complications (endocarditis) occur in a small percentage of cases but these are notoriously difficult to treat and often require surgery to remove the bacterial inflammation from the heart valves. Treatment in acute cases is a combination of antibiotics for six weeks whereas in



chronic cases, this treatment is administered for 6 months.

Comment: The best solution to decrease the human burden of brucellosis is to decrease the amount of disease in animals.

Control of brucellosis in small ruminants in Palestine and Oman, Dr. Samir Al-Fuqaha, Ministry of Agriculture, Palestine

Unless there is a multi-year approach, control will not be effective. Palestine devised an excellent multi-year program, with alternating years of mass vaccination, and young stock vaccination. For the first few years, the control was excellent and seroprevalence declined. Then there were security, political, and vaccine quality issues in subsequent years, and the herd and flock prevalence actually increased to levels higher than before they began the program. Dr. Samir served as consultant to Oman for their brucellosis control program in the Dhofar region. They vaccinated sheep, goats, camels, and cattle. Unfortunately it was difficult to deliver the vaccine into the cattle because they were not used to being restrained. After 5 years of the control program, the herd prevalence in cattle had actually increased. Also, they did an experiment of inoculating Rev1 into camels by the SC route, and 1 in 5 camels excreted the vaccine into the milk.

Comment: Brucellosis control requires long-term and consistent commitment.

Comment: What happens if humans drink sheep milk with Rev-1? To be infected via drinking milk, there needs to be a large enough dose in the milk, which only happens with natural infection, not with Rev-1.

Tuesday, January 7

Session 6: Other causes of abortion

Chair: Prof. Dr. Dahmani Ali; Co-Chair: Prof. Suleiman Alkhalil



Parasitic abortions in ruminants with reference to toxoplasmosis and neosporosis in Egypt, Prof. Yehia Otify, Egypt

Cat feces are the source of *Toxoplasma* infection for ruminants. In Alexandria, 8% of abortions are due to *Neospora*. This abortion problem is more severe in intensive dairy operations and less commonly seen in beef animals.

Infectious causes of abortions in small ruminants in Jordan, Dr. Abdelsalam Talafheh, JUST
Abortion rates in Jordan are approximately 5%. Non-infectious causes of abortion may be more common than infectious causes. Diagnosing infectious causes of abortion is difficult and even the best laboratories in the world can only diagnose 60% of the infectious causes. It is very

important to do a systematic examination of the case – history, appropriate samples, diagnostic tests. Often the farmers are frustrated.

Diagnosis of brucellosis in Egypt, Dr. Sayed Hattab, Alexandria, Egypt

There was a microbiological and historical overview of diagnostic testing for brucellosis in Egypt.

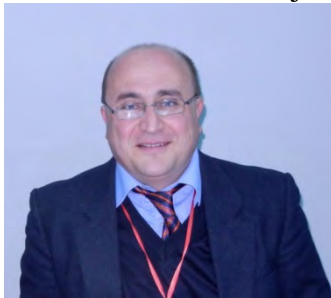
Comments: RB test is the best, it favors IgM and so can diagnose acute infection. Also, it is more sensitive than the complement fixation test.

Session 7: Public health and diagnostics

Chair: Dr. Ziyad Ghulam

Co-Chair: Dr. Wael Hananeh

Prevalence and mode of transmission of brucellosis in animals and humans in Palestine, Dr. Sameh Abuseir, Al Najah University, Palestine



In Palestine, losses due to brucellosis are estimated at \$3M per year. The southern part of West Bank has the majority of cases. Most cases in humans are due to ingestion of unpasteurized dairy products sold locally. Transmission from meat is very rare because the organism does not survive for very long in the meat after slaughter.

Comment: An awareness campaign targeting schoolchildren about not drinking unpasteurized milk may be necessary to change the mentality.

Public health aspects of brucellosis, Dr. Akram Al-Aboudi, JUST

Once Brucella is in a dairy product, it is resistant to degradation. So “fresh cheese” can remain infective for some time.

Prevalence of brucellosis in humans in Jordan, Dr. Mohamad Al-Rashdan, Ministry of Health, Jordan

Proposal for Master’s program to assess diagnostics for abortion, Dr. Shereen Khlouf, JUST

Dr. Khlouf has just begun her master’s program. She will examine archival tissue to develop immunohistochemical tests for the major causes of abortion in sheep and goats, and then these tests will be applied to submitted clinical samples and compared with PCR.

Histopathology and immunohistochemistry for abortion diseases, Dr. Nabil Hailat, JUST

Dr. Hailat discussed the various lesions seen in placentas and fetuses. There are some features which are diagnostic, but many are not. Adding immunohistochemistry will aid greatly in allowing the pathologist to effectively diagnose many of these cases.

Laboratory exercises – PCR, scenario exercises, and staining of impression smears



Dr. Jessie Trujillo demonstrates how the POCKIT PCR machine works



Diagnostic exercises – scenario smears and lesions for participants to quiz themselves



Dr. Amjad stains an impression smear



Acid fast stain



Looking at stained smears on the multiheaded microscope

Wrap-up Session:

The various presentations were quickly reviewed, with highlights.

Participants were then asked to ruminate for one minute about their own particular “aha” moments in this conference, what were major take-home messages for them?

- Several commented that it was good to hear that every country is suffering with this problem and that they can learn from each other, they are not alone.
- Control has to be long-term, if not, it WILL fail
- There is a HUGE load of small ruminant *Brucella* in this region
- *Brucella* serology tests are not confirmatory, rather they are complementary

Participants were then put into their country groups and tasked with creating a consensus about 2 or 3 control methods that they will do differently or de novo.

Afghanistan:

1. Continue with young animal vaccination
2. Re-analyze data by herds/flocks, as that is the relevant epidemiologic unit
3. All tests are additive, there is no need to do “confirmatory” testing



Algeria:

1. Work to gradually stop the consumption of raw dairy products
2. Look at all animal species for vaccination (for instance, camels)
3. Continue with the mass vaccination campaign

Egypt:

1. Institute obligatory vaccination of replacement heifers with Strain 19
2. Conduct further studies on Rev-1 vaccination in cattle
3. Improve animal identification and overall awareness of the disease



Jordan:

1. Consider changing the route of vaccination from SC to ocular
2. Discuss possibilities of creating a campaign to decrease consumption of raw milk
3. Promote a regional laboratory for diagnosis of *Brucella*



Palestine:

1. Show policymakers how the annual inconsistencies in the vaccination program have caused the failure
2. Conduct a new national survey
3. Utilize the Community Based Learning (CBL) program to promote awareness of brucellosis and risk factors.



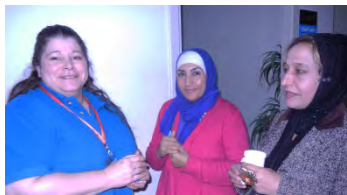
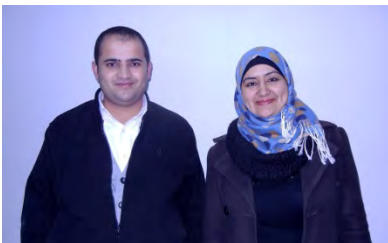
THEN, each country was asked to reach a consensus about the greatest need for brucellosis control in the region – either through research or through education/extension. We listed these on the whiteboard and then asked each participant to vote for their two priorities. The final prioritized list was as follows:

1. Institute an awareness campaign – interactive internet, social media – aimed at decreasing consumption of raw milk
2. Improve awareness among farmers about this disease and its control
3. Create a regional referral center for brucellosis control
4. Conduct training for animal health personnel

5. Do massive screenings
6. Study brucellosis more in camels
7. More investigations into Rev-1 in cattle

A consensus document is being prepared for circulation to the participants.

As with many conferences, the breaks provided good opportunities for networking and collegiality:



Agenda



**Improving the Diagnostic Capacities of Brucellosis, Enhancing the Vaccination And Control Strategies with Special Emphasis on Farmers Awareness in Egypt, Algeria, the Palestinian State (PS) and Jordan,
Jordan University of Science and Technology
Irbid-Jordan
5-7th of January 2014**

Sunday, January 5

TIME	ACTIVITY	SPEAKER
8:30-9:00	Registration	
9:00-9:30	Opening Ceremony – 30 minutes, 6 welcoming speeches	
9:30-10:00	Coffee and Tea break	
<i>Session 1: Brucellosis – Overviews and National Perspectives</i> Chair: Dr. Mohammad Ababneh; Co-chair: Dr. Jessie Trujillo		
10:00-10:50	<i>Brucella</i> infection in ruminants - Fundamentals for a sound control strategy.	Dr. Bruno GARIN-BASTUJI (OIE France-Brucellosis Reference Lab)
10:50-11:15	Prevention and control program of brucellosis in Jordan	Dr. Munther Al-Rifahi (MoA), Secretary General Assistant, MoA-Jordan
11:15-11:40	Current situation and risk assessment of brucellosis in Egypt	Dr. Mohamed Galal Agour , Egypt
11:40-12:10	Control and prevention, and some studies of brucellosis in Algeria	Prof. NiarAbdelatif and Dr HemidaHouari University of Tiaret, Algeria
	Epidemiology of Brucellosis in The Middle East	Dr. Ahmad Almajali , JUST

12:10:-12:40		
12:40:-01:05	Prevalence of brucellosis in humans in Jordan	Dr. Mohamad Al-Rashdan (MoH), Jordan
01:05-01:15	Discussion	
1:15-2:15	Lunch, University Restaurant	
<i>Session 2: Brucellosis – Overviews and National Perspectives (cont.)</i> Chair: Dr. Mohammad Agour; Co-Chair: Dr. Tharwat Elsheimy		
2:15-2:35	Control Program of brucellosis and recent strategies in Afghanistan	Dr. Ziaiy Ghulam, MAIL, Afghanistan
02:35-02:55	Control of brucellosis in small ruminants in Palestine	
2:55-4:55	Laboratory exercise –necropsy and sampling	
5:00	leave for hotel	
6:30	Group Dinner	

Monday, January 6

TIME	ACTIVITY	PERSON RESPONSIBLE
<i>Session 3: Pathogenesis and Diagnostics</i> Chair: Prof. Yehia Otify; Co-Chair: Dr. Samir Al-Fuqaha		
9:00-9:20	A general overview of the pathogenesis of abortions	Dr. Corrie Brown, Fulbright Scholar, JUST
9:20-10:20	Molecular diagnostics for detection of infectious agents associated with ruminant abortions	Jessie Trujillo, DVM, PhD Assistant Professor, College of Veterinary Medicine, Iowa State University
10:20-10:45	Molecular characterization of <i>Brucella melitensis</i> vaccine strain and field isolates in Palestine	Dr. Kamel Adwan, Palestine
10:45-11:15	Diagnosis and molecular identification of <i>Chlamydia</i> as cause of abortions in sheep/goats in Jordan	Dr. Huthaifa Ababneh, Jordan
11:15-11:30	Coffee Break	

Session 4: Pathogenesis and Diagnostics (cont.)		
Chair: Prof. Niar Abdelatif Co-Chair: Dr. Sayed A.Hattab		
11:30-11:55	Brucellosis /Abortions in Algeria	Dr. Dahmani Ali , Algeria
11:55-12:20	Prevention and control of brucellosis in Egypt	Dr. Tharwat Mohamed Elsheimy , University of Alexandria, Egypt
12:20-12:45	Pathogenesis and diagnosis of brucellosis in humans in Jordan.	Dr. Wael Hyiagneh , Deputy Director, King Abdulla Hospital, Jordan
12:45-01:00	Discussion	
1:00-2:00	Lunch, University Restaurant	
Session 5: Practical exercises on Diagnostics (Non-molecular)		
2:00-3:00	Laboratory exercise for diagnosis: 1. Staining of impression smears 2. Identification of pathogens	C. Brown and N. Hailat
3:00 Bus to Umm Qais	Trip to Umm Qais and Golan Heights	
Evening 7:00	Dinner in Yarmouk University Street	

Tuesday, January 7

TIME	ACTIVITY	PERSON RESPONSIBLE
Session 6: Other causes of abortion		
Chair: Prof. Dr. Dahmani Ali; Co-Chair: Prof. Suleiman Alkhalil		
9:00-9:20	Parasitic abortions in ruminants with reference to toxoplasmosis and neosporosis in Egypt	Prof. Yehia Otify , Egypt
9:20-9:40	Infectious causes of abortions in small ruminants in Jordan	Dr. Abdelsalam Talafheh , JUST
09:40-10:00	Diagnosis of brucellosis in Egypt	Dr. Sayed Ahmed Hattab , Egypt
10:00-10:20	Discussion and Coffee Break	
Session 7: Public health and diagnostics		
Chair: Dr. Ziay Ghulam Co-Chair: Dr. Wael Hananeh		
10:20-10:40	Prevalence and mode of transmission of brucellosis in animals and humans in Palestine	Dr. Sameh Abuseir , Al Najah University, Palestine

10:40-11:00	Public health aspects of brucellosis	Dr. Akram Al-Oboudi, JUST
11:00-11:10	Proposal for Master Thesis; Pathological, Immunohistochemistry and Molecular Diagnosis of Abortions in Jordan	Dr. Shereen Khloof, MSc student at JUST
11:10-11:30	Histopathology and immunohistochemistry for diagnosis of abortions	Prof. Nabil Hailat
11:50-12:00	Discussion	
12:00-1:00	Lunch, University Restaurant	
<i>Session 8: Practical training in molecular diagnostics</i>		
1:00-2:30	Field PCR for Brucella - practicalsession	Jessie Trujillo, DVM, PhD Assistant Professor, College of Veterinary Medicine, Iowa State University
2:30-3:00	Recommendations, future planning and receiving certificates, photographs	
Evening	SHOPPING EVENING IN IRBID OR LEAVE TO THE AIRPORT	
Evening 7:30	Dinner in Yarmouk University Street	



Appendix B. List of participants

List of participants			
Name	Affiliation	Email:	Phone number
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3. Dr. Mohamed G. Agour	Ministry of agriculture – Egypt		
4. Prof. Yehia Otify	Alexandria uni -Egyp	Yehia.otify@alexu.edu.eg	00201006758977
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8. Dr.Abdelsalam Talafheh	JUST		
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10. Dr. Nabil Hailat	JUST	hailatn@just.edu.jo	0795885219
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26. Dr. Iyad J. El DraH	Moa-Palestine		
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