MINISTER VOWLES

Estimates Review Committee

Question 5:

In the case of international travel, please provide the purpose, itinerary, persons and costs involved in each trip and the written report into what taxpayers gained from the trip. If no report given to department chief executive exists, please explain why.

Response:

See attached.


Terima kasi

Summary

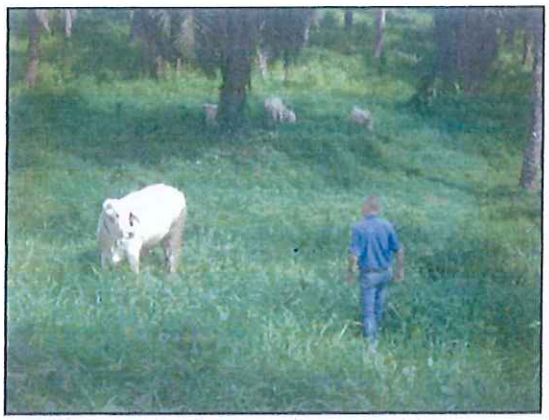
- Quarantine and settling period is very important
- Time when pregnant animals are available is very limited. Do not import heavily pregnant cows
- Brahman cattle become quiet very quickly
- Productive Brahman cattle need more feed than local Bali cattle
- Grazing is better as it gives the cattle the chance to pick a better diet, and is less work for the farmers
- The second calf will always be a problem
- Skinny cows will not conceive, so weaning at 4 months is important
- For good breeding success, cows need bulls
- Data collection is very important – use iSIKHNAS?

Genetics and Breeding

- Genetics is less important than nutrition
- Crossbreeding is the best way forward, but should be with tropical breeds from other sources
- We are using African *Bos taurus* crossed with Brahman
- Selection of heifers is not easy or important. If there are any infertile animals (2-3%), then they can go for slaughter
- Perhaps choose different breeds for breeders than feeder steers?

Advice

- Feedlots are not suitable for breeders. The cost of supplying feed is too expensive and the long time period for breeding will choke up the feedlots
- Farmers can look after breeding cattle. Government and companies (or SPRs?) can provide management. Need to maintain control
- Need good data collection
- There will be difficulties but it should be possible to make reliable contracts.
- This is a potential way forward



Weaning

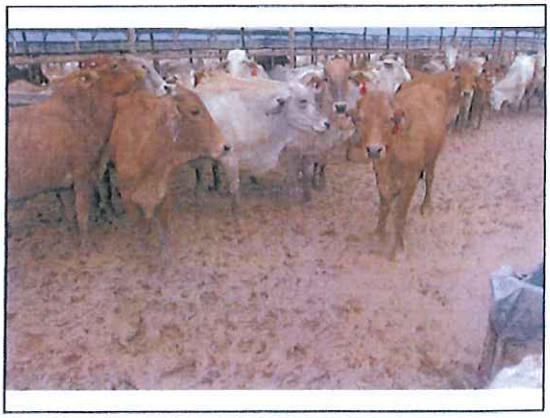
Age and diet for weaners

Age (months)	Weight	Feed needed
2	70	Special high energy diet
3	100	Weaning diet for 3 weeks then good pasture
4	120	Weaning diet for 3 weeks then good pasture
6	160	Pasture

Skinny cows will not breed.

Growth rates of calves

- Birth weight 30 kg
- Growth while fed by mother 0 7 kg per day = 20 kg / month
- Ready to wean at 120 kg (from 4 months)
- They will lose up to 20 kg at weaning and then grow at 0 5 kg / day
- At 2 years they will be over 300 kg (then ready to breed or feedlot)



Problems getting the second calf

Cause of low 1st calf heifer fertility?

Result of poor body condition due to high nutritional demands for lactation and growth at the same time.

(Mobilise their own nutrients to put into lactation)

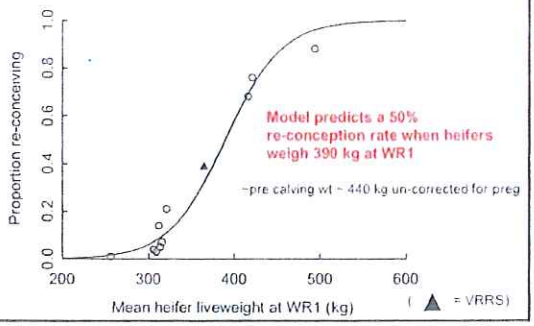
NEED BIGGER BODY WEIGHT AND EARLY WEANING

Calving rates in north Australia

- First mating at 2; first calf at 3 years
- Cull from 10 years (but no need to do so in more intensive management)
- Average 5.2 calves per cow in lifetime
- Average calving interval 14 months
- There are very few infertile heifers (maybe 2% or 3%), and almost impossible to identify
- Calf loss is a major factor. (average 8%?)

AGE	CALVING RATE
3	85%
4	25%
5	70%
6	70%
7	70%
8	70%
9	70%
10	70%
Over 10	60%

Strong relationship between the average weight of 1st lactation heifers at weaning muster (WR1) and their re-conception rates



Re-conception rates in heifers lactating with their first calf may be quite low, depending on their body condition.

Heifers often skip a year after calving for the first time if they are not in good body condition

4% re-conception rate

Average weight = 306 kg

88% re-conception rate

Average weight = 494 kg

High re-conception rates are achievable but require high weights during lactation (stocking rate, supplementation, seasonal conditions, high joining weights in maiden heifers)

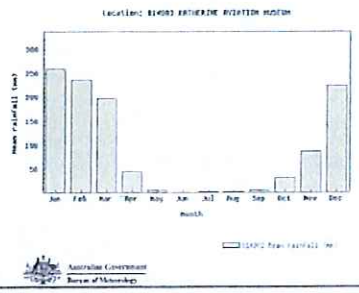
Cattle behaviour

Brahman cattle in north Australia are only brought in twice a year so at first may seem wild. They are frightened.

But they are intelligent.

After a few weeks they will be quiet and gentle.

In North Australia, we have a monsoonal climate with a wet season from November to March
-This sets the timing for heifers getting pregnant and therefore being available for export



Buying pregnant heifers – window of availability

- Nov
- *Wet season*
- March

Heifers mated from Jan – March

- April
- *Dry season*

Heifers less than 6 months pregnant available to be shipped from May to Aug – mainly just the months of June and July

- Oct
- Nov
- *Wet season*
- March

Most calves are born between Oct – Dec

Transporting pregnant cows

- Australian regulations do not allow shipping of cows over 6 months pregnant
- High rates of calf loss
- High rates of heifer mortality and other problems like prolapse
- Because of the seasons in north Australia, pregnant cows will only be available in large numbers for 8 weeks from mid-June to mid-August
- Very few heifers will not breed (maybe 3%), and it is almost impossible to detect them
- Better to buy non-pregnant and mate in Indonesia?

Natural Mating or Artificial Breeding?

- Problem with AI is not the skill of operators, it is the difficulty in recognising heat, especially in Brahmans which often have a silent heat in the middle of the night, problems of handling semen and problems of getting the inseminator there on time.
- Heat detection harder when the cows are tied up in individual stalls
- Can still use AI and then "Clean-up bulls"
- Bull percentages of 4% would be suitable (in our large herds we use 2-3%). Too many bulls causes fighting
- Best to leave the bull and cows to be free in an enclosure

Grazing

- Either need to allow to graze day and night, or feed extra in the evening
- Cattle can't eat everything. Only count the palatable species
- Weed control is very important
- Ticks can be a problem

Growing feed

- Need high protein feed, not just grass. Include legume or concentrate
- If you grow King grass, you will need to fertilise

Preparation of farmers

- 3 months preparation in East Kalimantan
- Training of farmers and Dinas staff
- Training in nutrition, animal health, animal handling, yard construction and design
- Checking on facilities being made by farmers

Kaltim data – one area
Heifers imported Oct-Nov 2015
Report on 14 March 2016 (4 months)

	Number	%
Heifers received on farm	713	
Births	426	59.8%
Heifers died	29	4.1%
Calves died	63	14.8%

Issues

- There were no bulls imported with the cows and the artificial breeding (AI) is not working *
- The farmers are not used to weaning. They have started to wean but still too late
- Ticks are a problem on some plantations
- Mortality (5% of cows, 19% of calves) are twice what we intend it is be.

Managing Brahman cattle

Brahmans
More productive if well managed
Less fertile
Need more feed and better feed

Bali cattle
Easy care
More fertile
Calves grow very slowly

Disease and mortality

5% breeders died
Stress
Bovine ephemeral fever

19% calves died
Prolapse

* We plan to achieve half these rates

Feeding a Brahman Cow

- Typical Brahman cow 360 kg
- Needs about 10 kg per day of dry matter
- Fresh grass is about 65% water
  so each cow needs 30 kg fresh grass per day = 11 tonne per year
- Needs more than just grass, especially protein. Need legume or concentrate.
- Grazing is much more efficient, because cows select a better diet and it is less work for the farmer.
- The breeding cycle is very long and the farmer may get tired of carrying feed.

ATTACHMENT C

13/12/2016

Breeding Australian Cattle in Indonesia; Lessons learnt from East Kalimantan

Northern Territory Government

To be successful, the project needs to show....

GOOD ANIMAL WELFARE

GOOD PRODUCTION

GOOD PROFITABILITY

The farmers own the cows – we can only provide advice and training

Neil MacDonald
Director

Whitney Dollemore
Research Officer

Livestock Industry Development
Northern Territory Government

Northern Territory Government

The first stage ....

- Farmers trained and cooperative facilities prepared in 3 months from August to October, with help from MLA, Austrex, Dr Ross, NT Government, University of New England
- 2100 heifers imported in October 2015, 60% pregnant
- The quarantine yards were not well made. The infrastructure collapsed making it very difficult to supply feed and water. 6% mortality, mostly from pneumonia caused by stress
- Heavy pregnancy also caused problems
- 2000 heifers distributed to farmers (47 cooperatives) in November 2015
- Mr Greg Smith, project manager provides continuing advice and training

East Kalimantan project

- Pilot breeder importation project for Kaltim smallholder farmers, as an example for proposed importation across Indonesia (last year's plans for 50,000 heifers to be distributed across Indonesia)
- Cattle purchased by Indonesian Government and East Kalimantan provincial government
- Northern Territory Government agreed to help with training and advice.
- Cattle to be distributed to farmer cooperatives with 25 members, so that is 2 cows per farmer
- Although Government policy has now changed to require the Feedlot companies to import the breeders, the results of this project will still be relevant, especially if the companies are to get smallholder farmers to look after the breeders

The situation now ...

Animal welfare is no longer a problem

- Farmers were well prepared
- Farmers are feeding them well (most of them)
- Cattle behaviour is very good
- Health is not a major problem
- Some of the farms are grazing.
- Dinas Peternakan staff are cooperative

Production and **Profitability** – too early to tell. Ask us next year!

ATTACHMENT B

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

OVERSEAS TRAVEL REPORT

NEIL MACDONALD AND WHITNEY DOLLEMORE

Lampung, Bandung, Medan and Surabaya, Indonesia
21 – 30 November 2016

Monday 21 November

- Neil MacDonald and Whitney Dollemore depart Darwin in the evening for travel to Denpasar.

Tuesday 22 November

- Travelled to Jakarta, met the rest of the workshop team and flew on to Lampung.

Wednesday 23 November

- Delivered workshop in Lampung (90 participants).

Thursday 24 November

- Early start; flew from Lampung to Bandung.
- Delivered workshop in Bandung (80 participants).

Friday 25 November

- Flew from Bandung to Medan (north Sumatra).

Saturday 26 November

- Delivered workshop in Medan (50 participants).
- Neil MacDonald departed in the evening and flew to Singapore.

Sunday 27 November

- Neil MacDonald returned to Darwin and then drove to Katherine.
- Whitney Dollemore flew to Surabaya.

Monday 28 November

- Whitney Dollemore delivered workshop in Surabaya (55 participants).

Tuesday 29 November

- Whitney Dollemore flew from Surabaya to Denpasar.

Wednesday 30 November

- Whitney Dollemore returned to Darwin.

MLA will not be responsible for any other expenses, services or liabilities in relation to your travel and for the avoidance of doubt, the following expenses will not be covered for reimbursement by MLA:

- Appearance fees
- Personal expenses
- Any other expenses unrelated to the lead up to, in between each Seminar or of the day of each Seminar.

To confirm your acceptance of these terms I would be grateful if you would arrange signing of the enclosed copy of this letter and return it, marked for the attention of:

Rashelle Levonian rlevonian@mla.com.au

We hope that you can share your experience in assisting the East Kalimantan Breeding Project and we look forward to your attendance and participation at the seminars.

Yours sincerely,

Michael Finucan
General Manager, International Markets
Meat & Livestock Australia

For and on behalf of Northern Territory Department of Primary Industry & Fisheries I agree to the terms and conditions of this letter.

.....

Authorised Officer

Dated: 2016

Meat & Livestock Australia
Wisma BCA Wing A Zone 7, 3rd . Fl.
Jl. Kapt. Soebianto Djojohadikusumo, BSD City 1
T. 6221 53167190 F. 6221 29004376
www.mla.com.au

Neil MacDonald
Director of Livestock Industry Development & Regional Director
Northern Territory Department of Primary Industry & Fisheries
PO BOX 1346
Katherine NT 0851

Dear Neil,

Re: Invitation to be a speaker at the Nutrition and Breeding Seminar, 23-28 November 2016

You may be aware of the recent situation across the Indonesian cattle industry, where cattle importers need to comply with the 20% "breeders-for-feeders" scheme. As part of our services, MLA is organising a series of Nutrition and Breeding Seminars.

The first series of Nutrition and Breeding Seminars will be held from 23-28 November 2016 ("**Seminar**").

The Seminar will be held across four locations as follows:

- 23 November 2016 in Lampung, Indonesia
- 24 November 2016 in Bandung, Indonesia
- 26 November 2016 in Medan, Indonesia
- 28 November 2016 in Surabaya, Indonesia.

The aim of the Seminar is to transfer knowledge and information around nutrition and breeding to industry and government representatives that are expected to handle and manage breeder cattle.

We are expecting more than 150 participants from feedlots, breedlots, universities, SPR (Centre for Community Farming), SMD (Village-based Entrepreneurs), and private businesses that are interested in the cattle fattening and breeding industry.

We would hereby like to invite Northern Territory Department of Primary Industry & Fisheries to present at our Seminar on the topic of *"Case Study – Lessons Learned from East Kalimantan Breeding Project"*.

As a part of our offer, we will agree to reimburse you for expenses incurred to attend the Seminar, which shall not exceed the value of AU$2,800.00 (GST exclusive) paid on receipt of a Tax Invoice with a financial transaction listing attached to verify expenditure. Expenses include:

- Meals during each Seminar
- Local transports (airport transfer, ground transport and flights)
- Accommodation (as organised by MLA)
- Economy class flights (best fair on the day) – international flights from and to Australia.

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CONCLUSION

Running breeders in feedlots is not realistic. The length of the breeding cycle makes supplying feed over that period cost prohibitive, and keeping breeders for years will soon choke the feedlots and prevent the normal flow-through of feeders.

The most realistic solution appears to be for smallholder farmers to look after the breeders, and this has the added incentive of a reduced target for breeder from 1:5 to 1:10. The East Kalimantan results are highly relevant to this scheme. DPIR presenters were able to demonstrate that the farmers are looking after the cattle well, that there are no significant issues with health, behaviour or theft, and that the management and cultural issues that are impeding production could be overcome by the companies maintaining ownership and by the provision of good technical supervision. This supervision could be provided by the companies themselves or by SPRs (*Sekolah Peternakan Rakyat* - a model of community farmer organisations in which a professional manager supervises up to 500 head in a district) with additional input from the universities and government.

Issues raised included security over the stock, and how contracts could be arranged. Implementing such a scheme will require some research and policy development, but out-grower programs work throughout the world and could be made to work in Indonesia too.

Another main discussion point was whether Australia could supply the breeders that Indonesia will require over the next few years. With the current supply and demand situation that will be difficult, but DPIR staff did point out that currently 20% of feeders are females and that a significant proportion of the male feeders are bulls not steers. It should not be impossible to request females not be spayed or treated with hormonal growth promotants and to select the breeder proportion from feeders. That may require some relaxation of protocols, and an understanding from the Indonesian Government that there is essentially little difference between commercial feeder and breeder populations in North Australia.

Overall there seems to be possible ways to avoid Regulation 49 bankrupting importers but they will need development and Indonesian Government support.

Action Officer:	Neil MacDonald	39746
Group Head	Neil MacDonald	39746
Chief Executive	Alister Trier	92005

ALISTER TRIER **14/12/2016**

NOTED

12/1/17

KEN VOWLES

- Update on implementation of Indonesia's new breeder importation policy.

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

- Workshops in the cities of Lampung, Bandung, Medan and Surabaya were well attended by industry, farm community leaders, academics and a few government officers:

Lampung	– 90 (mid-range industry and farm leaders)
Bandung	– 80 (senior industry representatives)
Medan	– 50 (senior industry and academics)
Surabaya	– 55 (academics and government)

  Feedback from the first three workshops was very positive and in each case there was very lively discussion. However, the workshop in Surabaya was disappointing, with no significant industry involvement, poor discussion and considerable scepticism about the "Australian" solutions.

- Promotion of the findings of the East Kalimantan project. Everybody had heard of the project (mainly through social media) but there was considerable misinformation and it was pleasing to be able to explain the project properly.

- A clearer idea of possible solutions for companies facing the new breeder regulations. In the first three workshops the discussions were centred on a positive need to find solutions.

- A copy of the Powerpoint Presentation for the Workshops is attached for your information (refer to Attachment C).

FOLLOW UP ACTION REQUIRED

- MLA plan to make breeder management training a continuous process with follow-up workshops in May 2017. DPIR will no doubt be asked to participate further but a decision on whether that is of value to the NT Government can be made nearer the time. No commitment has been made.

- As part of continuing support for the live export industry, DPIR will continue to maintain a watching brief on Indonesian Government policy regarding breeder imports and provide technical advice as required.

- DPIR plans to continue the East Kalimantan project to be able to report on the production and profitability of importing Australian breeders for smallholder management. Currently the project is due to finish in April 2017; however, a decision on a 1-2 year extension of funding from the Red Meat Partnership is expected in February 2017.

BUDGET

The total cost of the trip for the two officers was $6 021.06. The reason for the second officer travelling was to give Ms Dollemore Indonesia experience so that she can contribute to departmental overseas programs in the future. Of this sum, MLA has pledged $2 800 with the balance coming for the East Kalimantan external funding provided by the Federal Government on behalf of the Red Meat Partnership.

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

RECEIVED

OVERSEAS TRAVEL REPORT

12 JAN 2017

Dept Ref: 16-0837-SEC
Min Ref: 2016/0278-KEV
Trim Ref:

MIN.LIAISON

Title:	Workshops in Indonesia on managing Australian breeding cattle
Destination:	Lampung, Bandung, Medan and Surabaya, Indonesia
Date/s:	21 - 30 November 2016
Travel approved:	2 November 2016 (refer Attachment A)
Officer/s travelling:	Mr Neil MacDonald and Ms Whitney Dollemore

RECEIVED
14 DEC 2016
MINISTER VOWLES' OFFICE

PURPOSE

To assist Meat and Livestock Australia (MLA) to present four workshops to train staff from feedlot companies, farmer groups, government and universities to manage Australian breeding cattle in response to the Indonesian Government's requirement for importers to maintain one breeder for each five feeders (Regulation 49 of 2016).

BACKGROUND

The Indonesian Government has a long-standing goal of increasing their domestic cattle herd and domestic supply of beef. Over the years they have tried to achieve this with several different approaches, including in 2015-16 a plan to import 50 000 Australian heifers per year for ten years. This plan has now been replaced by Regulation 49 of 2016 which will require importing companies from 2018 to bring in one breeder per five feeders or one breeder per ten if they collaborate with local farmers and thus promote community development.

In order to secure a current import permit, companies are required to sign an agreement to abide by this regulation and accept, as yet, unspecified penalties for failure to do so. In agreeing to this regulation, it appears that few of the companies have thought how they will manage these breeders without crippling themselves financially or facing animal welfare issues.

MLA organised this series of workshops to help the Indonesian industry, government, farmer groups and universities decide how these breeder should be managed.

The Northern Territory (NT) Department of Primary Industry and Resources (DPIR) is supervising a project in East Kalimantan in which 2000 heifers are being managed by nearly 1 000 small-holder farmers. MLA asked DPIR to contribute to these workshops to present the lessons learnt from East Kalimantan and from our knowledge of the NT cattle industry.

A copy of the Itinerary for the Workshops can be found at Attachment B.

PROPOSED OUTCOMES

- Make presentations on the management of Australian breeder cattle in Indonesia, with particular emphasis on the lessons learnt from the East Kalimantan project; and

Department of Mines and Energy

Ref: 16-0290-SEC

Draft Program – China – September 2016

SEPTEMBER 2016	PROGRAM
Wednesday 21 and Thursday 22	• Travel Darwin to Tianjin
Friday 23	• Attend the opening session of the China Mining Congress, Tianjin • Meeting with China Mining Association (CMA), Tianjin • Visit NT booth at China Mining Congress, Tianjin
Saturday 24	• Meetings at the China Mining Congress, Tianjin
Sunday 25	• Travel Tianjin to Chongqing
Monday 26	• Meeting with Chongqing Municipal People's Government • NT minerals and energy investment seminar, Chongqing
Tuesday 27	• Site visit and meetings • Travel Chongqing to Singapore
Wednesday 28	• Travel Singapore to Darwin

FOLLOW UP ACTION REQUIRED

Detailed notes were taken of all investor enquiries and meetings held in China.

Major actions arising from the visit include:

1. Liaise with SDGM to organise its planned investor visit to Darwin in 2017.

2. Continue to work closely with other NT government agencies who participated in the Forum to maximise new investment and trade opportunities for the NT. This particularly includes the Office of Asian Engagement, Trade and Investment (Department of Trade, Business and Innovation) which was the lead agency on this delegation.

3. Follow up with Paspaley Group regarding future trade opportunities scoped during the visit

4. Liaison with Yangling Agricultural Hi-Tech Industries Demonstration Zone regarding future delegation of investors in 2017.

5. Participation on a panel with the Department of Trade, Business and Innovation to develop a Memorandum of Understanding with Rizhao Department of Commerce for future joint trade and investment activities.

CONCLUSION

DPIR's participation in the Northern Territory (NT)–Rizhao City Joint Economic Cooperation Forum achieved its objectives.

Action Officer:	Fiona Park	91385
Group Head:	Ian Scrimgeour	95377
	Lorraine Corowa	95363
Chief Executive	Alister Trier	92005

Date: 21/11/2016

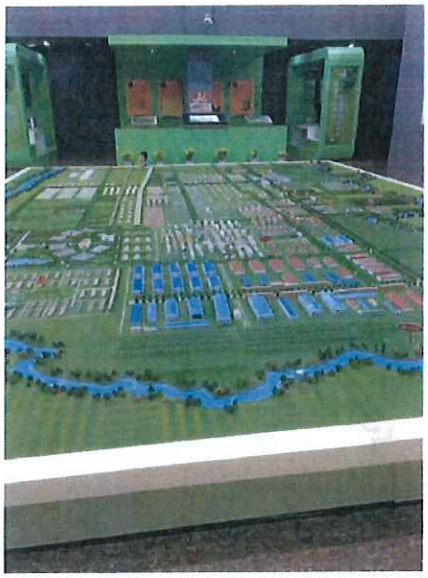
NOTED

28/11/16

KEN VOWLES

Presentation of NT trade and investment opportunities at Yangling

A meeting was also held with the Foreign Affairs Office of the International Cooperation Bureau for the Yangling Agricultural Hi-Tech Industries Demonstration Zone. At this meeting the Director, Mr Ming Tao committed to bringing a delegation of "dragon-head" agriculture investors to the Northern Territory early in 2017. Dragon-head companies are those who have been approved by the Chinese Government for outward investment. This delegation is a strong sign that the NT has forged a solid relationship with Yangling Agriculture Hi-Tech Industries Demonstration Zone.



Yangling Agriculture Hi-Tech Industries Demonstration Zone model

Outcome 3 – achieved:

Provide a platform in which NT agribusiness and minerals organisations can identify and directly access potential investing and trading partners

There were numerous opportunities for NT companies in the delegation to meet and build relationship with potential new Chinese business partners. The NT delegation was well represented by organisations from the agribusiness and minerals & energy sectors, including:

- NT Cattlemen's Association
- The Paspaley Group
- Mark Sullivan from Flying Fox Station
- Various groups interested in donkey farming and processing
- Rum Jungle Resources
- SRA Information Technology
- Minerals Council of Australia – NT Division
- Atrile Solutions

DPIR will track any investment and new trading relationships that arise from the introductions and networking which took place at the Forum.

Other activities:

Minerals and energy meeting in Jinan

Dr Scrimgeour and Ms Park travelled to Rizhao via Jinan, the capital city of Shandong Province. In Jinan they met with the Shandong Provincial Bureau of Geology and Mineral Resources (SDGM), a long-time contact of DPIR. SDGM has been an active investor in Australia's minerals sector for more than a decade. It has recently expanded its investment interests to include agribusiness assets, having purchased a farming property in South Australia. During the meeting, SDGM stated that, with recent signs of a recovery in mineral commodity prices, it would be actively seeking new mineral investments in 2017, and intended to visit the NT within the next year.

Yangling Agriculture Hi-Tech Fair in Shaanxi

Chief Executive, Mr Alister Trier travelled to China in February 2016 with a delegation of Chief Executives to strengthen relationship with Chinese officials and industry in provinces where the Northern Territory has established formal ties. Yangling is an agriculture demonstration zone just outside Xian and is the host site for the largest agriculture fair in China, attracting more than 1.5 million people over 4 days. Mr Trier was invited to attend and Lorraine Corowa was given the honour of presenting trade and investment opportunities during a forum on international cooperation and cross border investment on the economic belt and road, the signature investment policy of the Chinese Government.

New refrigerated bonded storage facilities in Rizhao

In Beijing Chief Executive Alister Trier, Lorraine Corowa and James Paspaley were invited to inspect the processing facility of Sino-Australia Top Beef. The Department has been working with the owner, Mr Zhang, for the past 2 years to facilitate trade and investment in the Northern Territory. This company has successfully imported a box of frozen Humpty Doo Barramundi on a trial basis and is confident of future trade. Sino-Australia Top Beef owns cattle properties and feedlots in Victoria and New South Wales and is expanding its processing facilities in China.

Also in Beijing meetings were arranged with the Australian Government Department of Agriculture and Austrade to discuss progress in live cattle, donkey protocols and potential for melon imports.

Outcome 2 – achieved:

Communicate the NT's ongoing willingness to be a trusted, long-term and stable supplier of minerals and agricultural commodities to China

At both the formal government-to-government meeting and the plenary session, NT Chief Minister Hon. Michael Gunner MLA reaffirmed the NT's commitment to a solid trade and investment relationship with China. The scale of the NT delegation visiting Rizhao – numbering more than 80 – reinforced the importance of the relationship to the NT.

During the Forum's site visits, the NT delegation witnessed the development of new facilities designed to accommodate the expected increase in exports of NT agricultural and mineral commodities over coming years, arising from the lease of the Port of Darwin to China's Landbridge Group. One of this site visits was to Landbridge's own port in Rizhao, capable of high-volume handling of bulk commodities. Another site visit was to the new Australia-China Industrial Park in Rizhao, which will include extensive refrigerated storage facilities for food imports.

Mineral unloading facilities at Rizhao Port

Landbridge Rizhao Port complete design concept

The minerals and energy breakout session took the form of a business roundtable, with approximately 25 Chinese attendees from 13 organisations. The organisations included prominent industry players Shandong Iron and Steel, Rizhao Iron & Steel, and a subsidiary of the Shandong Provincial Bureau of Geology and Mineral Resources (SDGM). The Chinese delegation at the session was led by Mr Yue, a senior official from China's Ministry of Commerce, which plays an influential role in the approval of Chinese outbound investments. DPIR Chief Executive Officer Alister Trier exchanged opening remarks with Mr Yue on behalf of the NT delegates present.

Ian Scrimgeour, Executive Director of the NT Geological Survey, gave a well-received overview presentation about the NT's minerals and energy sector. Other NT delegation presentations included Rum Jungle Resources (owner of the Ammaroo phosphate and Karinga Lakes potash projects), SRA Information Technology (provider of environmental management software) and the Minerals Council of Australia – NT Division.

Minerals and energy breakout session

The agriculture session was the largest breakout group, with 30 Chinese attendees from a range of companies including cold chain logistics, farming machinery, food importers and processors, donkey farming and processing, aquaculture, biofuels and Landbridge subsidiaries. DPIR Chief Executive Alister Trier co-chaired the session with Ms Shen Shuqing who is a high profile Executive Deputy District Mayor of the Lanshan District, including Rizhao City.

Lorraine Corowa, Director Major Agribusiness Projects provided a well-received overview of the trade and investment opportunities in agriculture and aquaculture in the NT including reference to the two industry participants who were present at the forum, Mark Sullivan from Flying Fox Station and James Paspaley from the Paspaley Group. Both industry participants received significant interest from forum attendees.

Northern Territory Cattlemen's Association Chief Executive Officer Tracey Hayes provided a presentation on the pastoral industry and also donated a stock whip as a business card draw prize. This was well received and won by Mr Zheng Qiang, General Manager of Rizhao Tianze Cold Chain Logistics Co. who had travelled to Darwin in the May 2016 delegation and may be considering investment in the new Landbridge industrial park at East Arm.

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

RECEIVED

28 NOV 2016

MIN.LIAISON

OVERSEAS TRAVEL REPORT

Dept Ref: 16-0830-SEC
Min Ref: 2016/0223-KEN
HPRM Ref: 2014/0579

Title:	*Northern Territory-Rizhao City Joint Economic Cooperation Forum*
Destination:	Rizhao, Shandong Province (China)
Date/s:	1-8 November 2016
Travel approved:	6 April 2016
Officer/s travelling:	Alister Trier, Ian Scrimgeour, Lorraine Corowa and Fiona Park

RECEIVED
22 NOV 2016
MINISTER VOWLES' OFFICE

PURPOSE

A delegation from the Department of Primary Industry and Resources (DPIR) travelled to Beijing and Shandong Province, China to participate in the Northern Territory (NT)–Rizhao City Joint Economic Cooperation Forum (Forum) between 1-8 November 2016 and to attend the 23rd China Yangling Agricultural Hi-Tech Fair.

PROPOSED OUTCOMES

The objectives of the visit (as defined prior to the trip) were to:

- Play an active role in the delivery of the agribusiness and minerals streams at the Rizhao Forum
- Communicate the NT's ongoing willingness to be a trusted, long-term and stable supplier of minerals and agricultural commodities to China
- Provide a platform in which NT agribusiness and minerals organisations can identify and directly access potential investing and trading partners
- Support industry representatives included in the delegation

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

Outcome 1 – achieved:

Play an active role in the delivery of the agribusiness and minerals streams at the Forum

The Forum was made up of various elements, including a formal government to government meeting, business banquets, site visits, a morning plenary session, and an afternoon in which Chinese delegates attended breakout sessions focussed on different NT economic sectors. DPIR delivered separate breakout sessions focussed on agribusiness and minerals & energy.

Day Five: Friday 11 November 2016

Theme: Getting your message across & What will you do next.

8:00 AM	**Transfer from Hotel to World Fish**
8:30 Am to 9:00 AM	**Review of Day Four – unresolved issues will be identified** Shaun
9:00AM to 10:30 AM	**Communication from a Managers Perspective** • Distinguishing Management Communication, Outreach and Extension • A simple communication framework Shaun
10:30 AM	Morning Break
11:00 AM to 12:30 PM	Return to the hypothetical program management challenge. Considering and discussing the manager's communication issues (including conflict management) relating to climate change. Colin
12:30 PM	Lunch and Prayers
1:30 PM to 2:45 PM	**Individual Development Planning** **Additional Sessions (as identified during the course)** Note: The final afternoon will be put aside for participants to finalise their IDPs and for a general discussion on the Master Class and the material presented, and to cover material identified by participants requiring further discussion. Shaun
2:45 PM	Afternoon Break
3:15 PM to 5:00 PM	**Continuation Individual Development Planning & Additional Sessions** Shaun
5:00 PM to 7:00 PM	Return to Hotel, Free time and a further opportunity for participants to work on their individual development plans if necessary
7:00 PM	Course Dinner, Presentation of Certificates and formal closure Colin

Day Four: Thursday 10 November 2016

Theme: Human Resources Management and People Management

8:00 AM	**Transfer from Hotel to World Fish**
8:30 Am to 9:00 AM	**Review of Day Three – unresolved issues will be identified** Shaun
9:00AM to 9:30 AM	**Introduction to the Day's Program** Lynne
9:30 AM to 10:30 AM	**Overview of Human Resource Management** Lynne
10:30 AM	Morning Break
10:30 AM to 12:30 PM	**Leadership and management** **People Management in Program Management** • Resourcing the project • Scheduling and planning • Performance management systems Lynne
12:30 PM	Lunch and Prayers
1:30 PM to 2:45 PM	**People Management** **Managing poor performance** Lynne
2:45 PM	Afternoon Break
3:15 PM to 5:00 PM	**Managing Good Performance** **Managing Your Performance** Lynne
5:00 PM to 7:00 PM	Return to Hotel, Free time and Dinner
7:00 PM to 8:30 PM	Questions and Answers session to enable a general discussion of the day's content. Further reflection on the individual development plan Lynne and Shaun

Day Three: Wednesday 9 November 2016

Theme: Financial and Logistic management

8:00 AM	**Transfer from Hotel to World Fish**
8:30 AM to 9:00 AM	Review of Day Two – unresolved issues will be identified **Shaun**
8:00AM to 10:30 AM	**Financial Management** (a series of presentations and practical exercises) **Mark**
10:30 AM	Morning Break
11:00 AM to 12:30 PM	**Financial Management Continues** **Mark**
12:30 PM	Lunch and Prayers
1:30 PM to 2:45 PM	**Project and Program Management Systems** (a series of presentations and practical exercises). **Mark**
2:45 PM	Afternoon Break
3:15 PM to 5:00 PM	**Project and Program Management Systems** **Mark**
5:00 PM to 7:00 PM	Return to Hotel, Free time and Dinner
7:00 PM to 8:30 PM	Questions and Answers session to enable a general discussion of the day's content. Further reflection on the individual development plan **Mark and Shaun**

Day Two: Tuesday 8 November 2016

Theme: Managing the Research Program: An Integrated and Focused Group of Activities

8:00 AM	**Transfer from Hotel to World Fish**
8:30 AM to 9:00 AM	Review of Day One – unresolved issues will be identified
8:00AM to 10:30 AM	**Understanding Research Programs and Program Management**: aligning strategy and projects Shaun
10:30 AM	Morning Break
11:00 AM to 12:30 PM	**Planning and Evaluation: understanding logic models** Shaun
12:30 PM	Lunch and Prayers
1:30 PM to 2:45 PM	**Hypothetical Program Management Challenge** The exercise started on Day One will be continued, this time with a focus on distinguishing between outputs and outcomes, and developing performance indicators Shaun
2:45 PM	Afternoon Break
3:15 PM to 5:00 PM	**Issues in Organising and Resourcing your Research Activities** Colin
5:00 PM to 7:00 PM	Return to Hotel, Free time and Dinner
7:00 PM to 8:30 PM	**You, the Leader.** A brief presentation followed by a period where you can present your own experiences. Reflecting on the Individual Development Plans Shaun

ATTACHMENT B

Agricultural Research Leadership and Management Master Class, Penang, 6-11, 2016

Day One: Monday 7 November 2016

Theme: Managing Research within the Research Institution

8:00 AM	**Transfer from Hotel to World Fish**
8:30AM to 10:30 AM	**Introduction to the Course** • Welcome and Introductions • Faculty – Colin Chartres, Lynne O'Brien, Mark Hardwick, Shaun Coffey • Participants • Overview workshop program • Workshop objectives, including what participants have said in their surveys Colin
10:30 AM	Morning Break
11:00 AM to 12:30 PM	**The General Principles of Management, and How They Are Relevant to You.** Shaun
12:30 PM	Lunch and Prayers
1:30 PM to 2:30 PM	Continuation of **The General Principles of Management** Shaun
2:30 PM to 5:00 PM	**Strategy Development and Strategic Planning** This session will include the commencement of a group exercise that will continue through the week. The exercise will consider hypothetical program management challenge to incorporate adaptation to climate change into a program to improve farm productivity. Colin
3:00 PM	Afternoon Break
3:30 PM to 5:00 PM	Continuation of **Strategy Development and Strategic Planning** Colin
5:00 PM to 7:00 PM	Return to Hotel, Free time and Dinner
7:00 PM to 8:30 PM	**Thinking about your Career**: using an individual development plan to guide your choices. Shaun

Individual Learning Plans

A feature of the Master Class is the requirement that participants create an **Individual Development Plan,** negotiated and agreed with their parent institution, on completion of the course. This process, including post-workshop follow-up will be facilitated by the Master Class leader. It is anticipated that a strong Alumni network can develop, as participants regularly share their progress as a result of participating in the Master Class.

Who should attend?

The program is intended for staff in the CG or similar International Agricultural Research Centres,; and/or in the National Agricultural Research Systems (NARS) in developing countries who are either:

- Managing, or aspiring to manage research programs;
- providing functional support for program management; or
- responsible for capability building.

Participants will be required to:

- Speak sufficient English to undertake the course
- Have the support of their institution to attend the full course
- Have support of their institution to enter into an Individual Development Plan to maximise the benefits of the training to both the individual and the institution
- Share with other participants the results of their efforts at agreed date after the training
- Bring a laptop to the training (internet is provided).

Costs and Registration

CG Centre staff and related international institutions: **US $2950 p/p** (US$2650 if paid by August 12th). Attendees (or their institutions) will be expected to cover their own travel and accommodation costs. A block booking has been made at the Hotel Equatorial in Penang at a discounted rate.

Developing country National Agricultural and Extension Services and related institutions: a one-off fee of **US$300** to partially cover food and accommodation. The Crawford Fund will cover air fares/travel costs up to US$700 for attendees from the least developed countries. Please contact the Crawford Fund to discuss these arrangements.

Attendees will be expected to arrive in Penang (Hotel Equatorial) on Sunday 6th November and to depart on Saturday 12th Nov.

How to Register

The size of the Master Class is strictly limited to ensure personal attention to participants.

Please register your interest by Sept 5th, 2016, stating name (indicate whether male/female), qualifications, email address, and institutional affiliation, arrangements for funding your attendance and a statement by your employer that you have approval to attend. This information should be forwarded by email to:
Ms Marchien van Oostende, Office Manager, The Crawford Fund, PO Box 4477, KINGSTON ACT 2604.
(marchien.vanoostende@crawfordfund.org).

For further information please contact Dr Colin Chartres, Director, Master Classes, Crawford Fund at colin.chartres@crawfordfund.org

For information relating to the program contact Shaun Coffey who will be leading the Master Class at ceo@shauncoffey.org

ATTACHMENT 1

THE CRAWFORD FUND MASTER CLASS IN AGRICULTURAL RESEARCH LEADERSHIP and MANAGEMENT

THE CRAWFORD FUND
For a Food Secure World

WorldFish Centre, Penang, Malaysia
Nov 6-12, 2016

The Crawford Fund

The Crawford Fund is a non-government organisation (NGO) in Australia that promotes and supports international agricultural research for developing countries. The Crawford Fund has than twenty five years of experience in training scientists in agricultural research. We have trained over 10,000 people from 40 countries.

Our Master Class program identifies new areas of knowledge, which are changing the way research is conducted, particularly in developing countries. In addition to courses on cutting edge technical topics such as molecular genetics, biodiversity and biosecurity, the Fund has conducted Master Classes on intellectual property, science communication, the management of technology transfer, and environmentally oriented areas such as sustainable resources management.

Through these years of training, we have identified a need to provide additional skills to senior project and program leaders in research leadership and management.

Call for Participants

The Crawford Fund is calling for applicants to participate in its first five day Master Class in Research Leadership and Management. This Master Class in research leadership will improve management of publicly funded agricultural research systems supporting the development needs of countries throughout the world. The new master class draws on past training and latest thinking and best practice, drawn from both the public and private sector, about how individuals can navigate the path from scientific and technical expertise roles to new positions requiring the leadership skills necessary to lead people, project and program teams, and ultimately research institutes.

The Master Class with be led by Shaun Coffey, an experienced and successful leader of R&D organisations. He was formerly CEO of a leading NZ Crown Research Institute, Chief of one of the largest Divisions of CSIRO, and is Adjunct Professor of Strategy and Leadership in Victoria University of Wellington. He will be assisted by Colin Chartres, Director of Master Classes and Training at the Crawford Fund and formerly DG of the International Water Management Institute; and by others experienced in financial and HR management. The Master Class provides state-of-the-art learnings delivered from a hand-on perspectives by experienced and successful practitioners.

Learning Outcomes

At the end of the Master Class participants will:

- Understand the key processes required to manage research programs.
- Understand and appreciate their roles as leaders in the research environment.
- Appreciate the demands of managing and leading research.
- Understand the importance of effective outputs to create desired impacts.
- Be able to apply processes
    - to identify priorities and establish strategies for agricultural research;
    - to plan and evaluate activities;
    - to manage finances and program logistics: and
    - to identify and access resources.
- Understand the importance of people management, and associated HR processes.
- Appreciate the need for effective communication
- Have a clear understanding of their future development need.

Penang Master Class Group Photo

FOLLOW UP ACTION REQUIRED

No follow up action is required in relation to this overseas travel and the Master Class.

CONCLUSION

The proposed outcomes of this travel were all achieved. The networks established, and skills gained, will significantly improve the research underway by the Northern Territory Government in aquaculture for Indigenous economic development.

Action Officer:	Samantha Nowland	44265
Group Head:	Glenn Schipp	92213
Chief Executive	Alister Trier	92005

ALISTER TRIER **13/12/2016**

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15/12/16

KEN VOWLES

how to communicate scientific information to the general public, the importance of information flow to Directors and Ministers, how to better capture socio-economic information and the importance of creating time and space to produce good science. The program was held at the WorldFish Centre in Penang and during breaks I was able to meet many of the World Fish staff and the Head of Aquaculture (Mr Mike Phillips). This was a great networking opportunity as we undertake similar projects.

What set this Master Class apart was that it was delivered by experienced and successful practitioners in the field. Furthermore, it was extremely multicultural, with there being approximately 30 students from 24 nationalities in attendance. This provided a great networking opportunity with research scientists from all around the World. I hope to use the skills I have learned at this Master Class to successfully manage current and future DPIR research projects and to make a positive difference to livelihoods through fisheries and aquaculture. I presented an overview on the Master Class to colleagues and upper management at the DAC staff meeting held on 28 November 2016.

Please find below two photographs from the Master Class.

Penang Master Class Team Photo

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

OVERSEAS TRAVEL REPORT

MIN.LIAISON

Dept Ref: 16-0818-SEC
Min Ref: 2016/0277 - KEV
HPRM Ref:

Title:	Master Class in Agricultural Research Leadership and Management in Malaysia
Destination:	Penang, Malaysia
Date/s:	6-12 November 2016
Travel approved:	24 October 2016 (refer Attachment A)
Officer/s travelling:	Ms Samantha Nowland

LATE REPORT

Apologies are made for the late submission of this Overseas Travel Report. Ms Samantha Nowland was required out in the field directly on her return from Malaysia. An extension for this report was approved by the Minister's office.

PURPOSE

To report on travel by Ms Nowland, Aquaculture Research Officer, Darwin Aquaculture Centre (DAC) to Penang, Malaysia to attend the Crawford Fund Master Class in Agricultural Research Leadership and Management held on 6-12 November 2016.

PROPOSED OUTCOMES

- Improved management and leadership of the Department of Primary Industry and Resources (DPIR) aquaculture Indigenous economic development research projects;
- To strengthen the DPIR's international research collaborations; and
- DPIR's staff to develop internationally recognised standards of research leadership and management.

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

Leadership and management skills are not formally taught to scientists; however, they are an essential part of project success. By attending this Master Class on agricultural research leadership and management, I was able to learn important 'soft' skills for research project success. For example, prioritising established strategies, evaluation tools and techniques, people management and Human Resources processes and techniques for effective communication.

An Itinerary with all of the subjects covered in the Master Class is at Attachment B. Some of the highlights of the travel included: maximising extension and outreach,

9 December 2016 - This fruit has never left the importer's delivery centre, was held at 55 degrees Fahrenheit and was 20 days from harvest, not excessively old. Ruling out old age of the fruit and low temperature/s at some point in the Australian distribution chain, the treatment and other stress factors or a combination of factors may be involved.

As a comparison, this is shipment seven fruit at another Los Angeles store on 8 December 2016 and it looked acceptable, but obviously not as fresh at shipment number eight.

This indicates there can be considerable variation in marks and other poor appearance within a shipment.

This is other reject fruit from shipment number seven, in the importer's delivery centre on 9 December 2016.

Same display in a Los Angeles store, from another angle. It is right next to the check-out.

Appearance issues

While shipment number eight is fresh and looking great, there was still fruit from shipment number seven on the shelves in other Los Angeles stores and some of it didn't look good. The price on this fruit was $5.99.

Same display at a different angle

Same fruit at a different store

Again attractive looking and great tasting fruit. One customer we spoke with bought two, having bought one the day before, which they greatly enjoyed.

ATTACHMENT E

Australian Mangoes in the United States in early December 2016

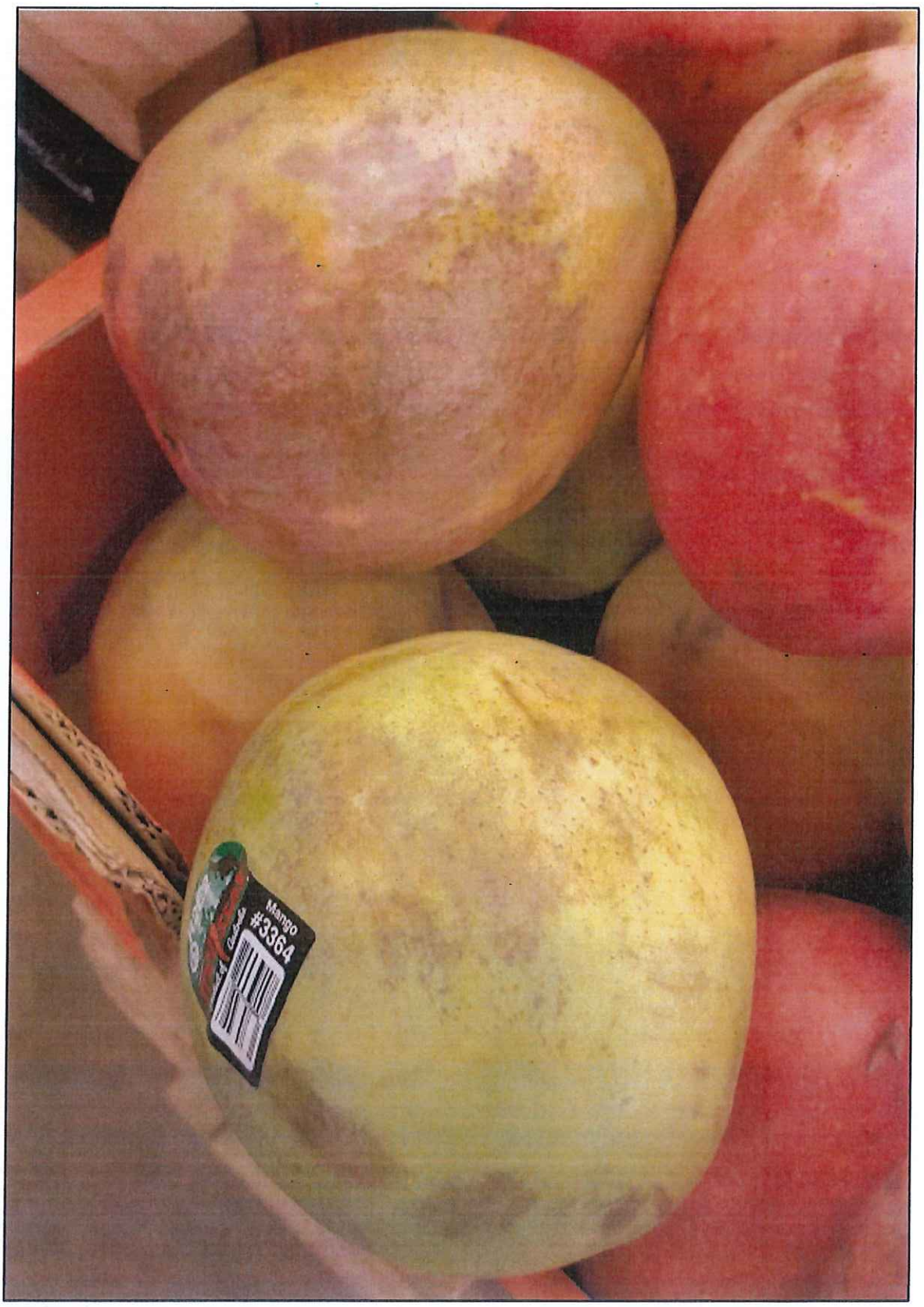
Snap shot of observations number three

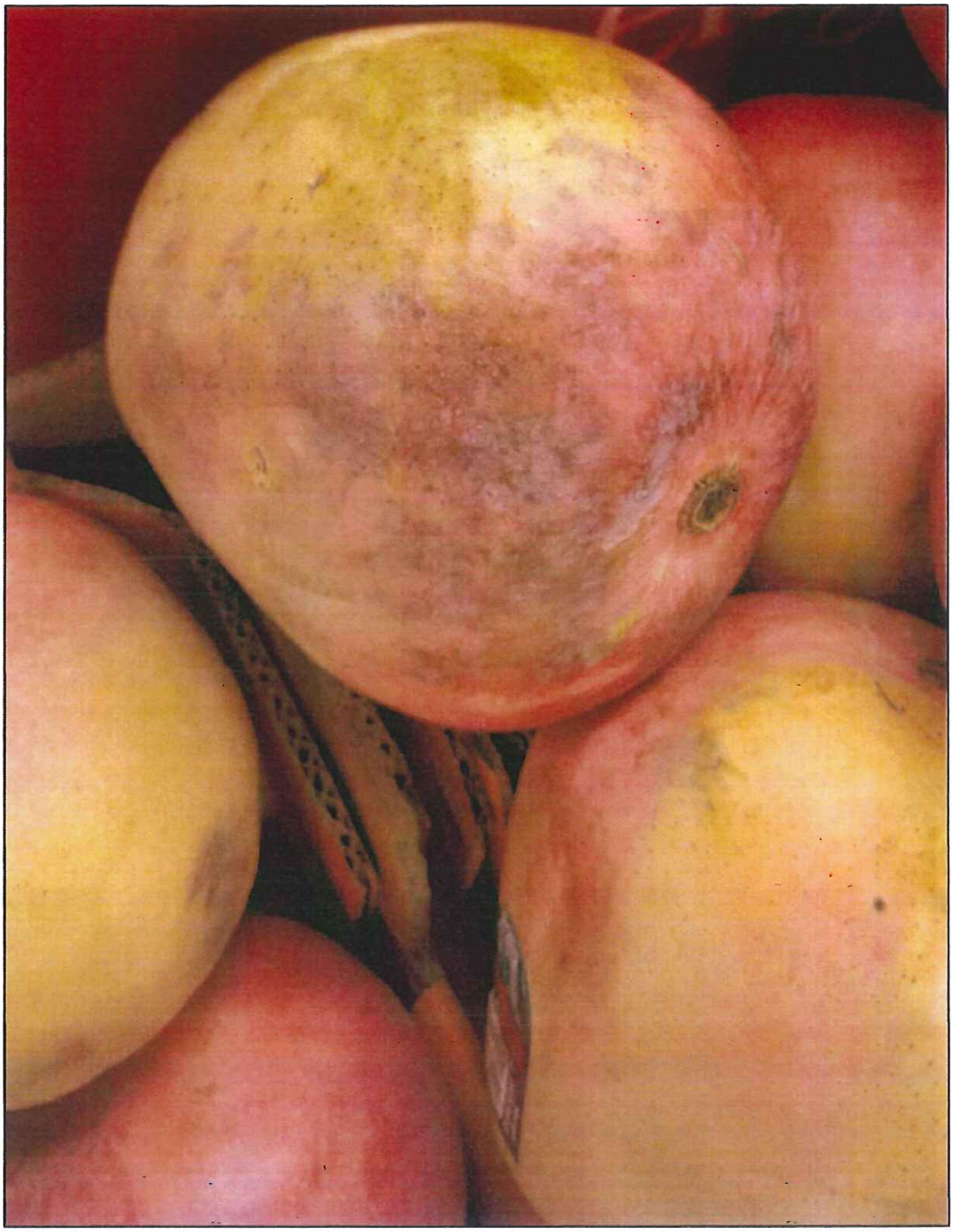
R2E2 at retail in Los Angeles, Friday 9 December 2016

This fruit arrived in the United States (US) on Thursday 8 December 2016 on Shipment number eight. It was delivered to the importers delivery centre at 1.00am on Friday 9 December 206 (there is considerable freight congestion and consequent delays at LAX this was reported in year one and continues) and the fruit was on retail displays by 10.00am the same day, ready for sampling by the importer's merchandising crew the next day (Saturday), if there was any fruit left.

Consumers were buying off the display (at $6.99 each) nine and ten count fruit, probably as good a quality as commercially achievable and on display as fast as possible.

8 December 2016 - The major causes of this poor appearance is being considered. Possible explanations are the old age of the fruit, low temperature/s at some point in the distribution chain, the treatment, other factors or a combination of factors.


Mango
#3364



The displays were typically a mix of Kensington Pride and R2E2. The R2E2s arrived in the stores on Friday 2 December 2016 and were from shipment number six, packed on 15 November 2016 and 26 days old at the time of observation. There was about 10% of fruit with significant visual marks, 10% with no significant marks and 80% with moderate marks. The Kensington Pride had arrived the week prior, probably shipment number five, fruit packed on 9 November 2016 and therefore, 31 days old. They were uniformly poor in appearance with soft skin. However, the taste was attractive and a store manager advised that a customer had bought 20 in one purchase the day before.

Appearance issues

Examples of the visual marks and out of specification appearance.


$1.98
PLU# 4280
$4.98
PLU 6124


LEMON
manbullee

Typical Central Market displays in various Dallas stores on Thursday 8 December 2016

ATTACHMENT D

Australian Mangoes in the United States in early December 2016

Snap shot of observations number two

R2E2 at retail in Los Angeles, Friday 2 December 2016

Probably arrived in the United States (US) on Wednesday 30 November 2016, which would make them from shipment number seven, packed on 21 November and 13 days old. Close to perfect in appearance. Seven count (750 grams) retailing for $6.99 per fruit.

Same fruit, seven days later and now 20 days from harvest.

Some marks are becoming evident, but the fruit is still firm and attractive.

Mixed display, all $4.98 each

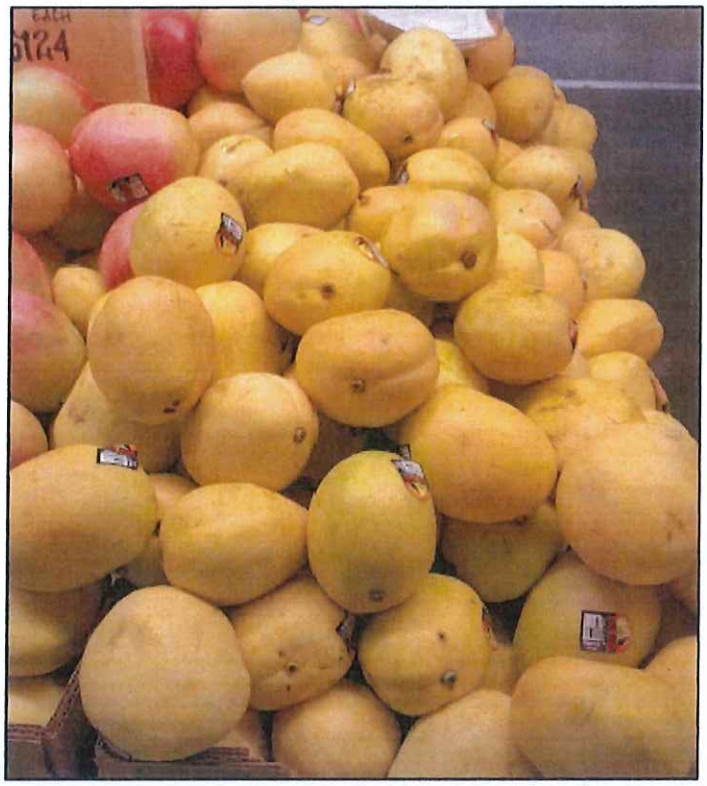
A Kensington Pride only display

Note the marked fruit, which was ripe and soft.

R2E2 appearance of shipment number six

This fruit is 21 days from harvest; extreme example of damage, about 10% of the fruit had some significant marks.

Kensington Pride display



The fruit looked more like lemons or quince and would be unattractive to most potential buyers. Fruit was soft and wrinkled (most fruit) on the outside. However, the one sampled ate very nicely with good slightly acid flavour. This indicates that it had been stored at cool temperature to maintain the flesh condition.

This store had two displays and was probably still selling shipments number four and five, with the new shipment number six still in their cool room. You can imagine the potential problem.

Same store, second display, only Kensington Pride.

Typical Central Market Display in Dallas on Saturday 3 December 2016.

This display is a mix of Kensington Pride and R2E2. The R2E2 arrived in the store on Friday 2 December 2016 and was from Shipment number 76, packed on 14 November 2016 and 21 days old. There was about 10% of fruit with significant visual marks (see below), as opposed to the shipment number seven fruit above in a Los Angeles store. The Central Market Store Manager reported there were marks on arrival with some fruit. The Kensington Pride had arrived the week prior, probably Shipment five fruit, packed on 9 November 2016 and therefore, 26 days old. They were uniformly poor in appearance (see below), looking more like lemons or even quince. They were selling at $4.98 / unit pricing, same as 2015-16 and the same for both varieties, even though the R2E2 (1.3lbs, 590 grams) were almost twice the size of the KP's (0.79 lbs, 360 grams).

Another Central Market store display

ATTACHMENT C

Australian Mangoes in the United States in early December 2016

Snap shot of observations

R2E2 at retail in Los Angeles, Friday 2 December 2016

Probably arrived in the United States (US) on Wednesday 30 November 2016, which makes them shipment number seven, packed on 21 November 2016, so 13 days old (add another day for the dateline). Close to perfect in appearance. Seven count (750 grams), retailing for $6.99/ fruit.

This is the display. Note the mangoes on the floor and behind another item.

ATTACHMENT A

Overseas Travel – Mr Michael Daysh – United States

The tentative program for visit one is:

Date		Location	Activities
6 November 2016	Sunday	Darwin - Brisbane	Travel
7 November 2016	Monday	Brisbane	Observe the inspection and export treatment
8 November 2016	Tuesday	Brisbane–Los Angeles	travel (gain a day)
7 November 2016	Monday	Los Angeles	Observe fruit arrival, talk with inspectors and importer, monitor compliance
8 November 2016	Tuesday	Los Angeles	Observe fruit into distribution centre, discuss fruit with importer
9 November 2016	Wednesday	Retail / tba	Observe fruit in distribution, waiting for Australian mangoes to ripen
10 November 2016	Thursday	Retail / tba	Observe fruit in distribution, discuss fruit with retailer
11 November 2016	Friday	Retail / tba	Observe fruit in distribution and at retail
12 November 2016	Saturday	Retail / tba	Observe fruit at retail
13 November 2016	Sunday	Retail / tba	Observe fruit at retail
14 November 2016	Monday	Retail / tba, return to Darwin	Observe fruit at retail, return to Darwin
15 November 2016	Tuesday		Travel (lose a day)
16 November 2016	Wednesday	Darwin	Travel

CONCLUSION

This visit has confirmed that there is a significant market opportunity in the US for Australian mangoes and that very attractive Australian mangoes can be delivered to and displayed on US retail shelves for US consumers.

To ensure this opportunity is realised Australian mango growers and exporters must continue to pay attention to compliance and other factors that impact on fruit quality.

Action Officer:	Michael Daysh	92300
Group Head:	Scott Wauchope	92166
Chief Executive	Alister Trier	92005

ALISTER TRIER **30/12/2016**

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20/1/17

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4. Was advised that two shipments had to be cancelled prior to export, due to the detection of residues of Prochloraz (Octave, Sportak), a fungicide that is registered for mangoes in Australia, but not in the US;
5. Worked with Melissa's to understand why there was a significant percentage of badly marked fruit in shipments six and seven. On the information available it appears that there may have been a fruit stress event such as rain or heat at the time of harvest in Katherine that manifested in the fruit being badly marked when it arrived in the US at 15–20 days. This resulted in rejections, losses, slowing of sales, and claims;
6. Undertook 30 store visits across Central Market, Pavilion, Bristol Farm, Vons, Gelson, Trader Joe and Walmart brand supermarkets to observe Australian mangoes and mangoes from other sources, and engage with the store produce managers and consumers as appropriate. Melissa's plan for in-store demonstrations in Los Angeles stores on 9-10 December 2016 (which illustrates the effort and detail US importers are making for Australian mangoes), is at Attachment B;
7. Observed a range of Australian mango fruit quality at retail and importer warehouse from very good, to very poor;
8. Observed Australian mangoes at retail that were up to 31 days old; and
9. Reported back to participating exporters and growers via three US market snap shots (refer Attachments C, D and E) and through the regular fortnightly US working group teleconferences.

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

Three Northern Territory (NT) mango growers registered for the US market in 2016-17, up from nil in 2015-16.

Seven shipments of NT mangoes have been made to the US in the 2016-17 season, up from nil in 2015-16. Two further shipments were cancelled, due to the detection of Prochloraz in the shipment after packing, but while still in Australia.

More US retailers are stocking and selling Australian mangoes.

FOLLOW UP ACTION REQUIRED

The HIA Project MG16003 - Monitoring mangoes through the supply chain to the USA–2 provides for a further three monitoring visits to the US, to cover the 2016-17 season, a post-season debrief with industry and stakeholders, and a final report to HIA.

More growers are involved in the US program and the total volume is forecast to grow.

However, there is work to be done on compliance and promptly addressing quality issues.

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

RECEIVED

24 JAN 2017

OVERSEAS TRAVEL REPORT

MIN.LIAISON

Dept Ref: 16-0816-SEC
Min Ref: 2017/0001-KEV
HPRM: P2014/37809

Title:	Monitoring mangoes through the supply chain to the United States of America – Report on trip number one.
Destination:	United States
Date/s:	29 November – 12 December 2016
Travel approved:	24/10/2016 (refer Attachment A)
Officer/s travelling:	Mr Michael Daysh

RECEIVED
30 DEC 2016
MINISTER VOWLES' OFFICE

PURPOSE

To observe and report back to industry on the arrival and retail condition of Australian mangoes in the United States (US) market across the 2016-17 season and the third year of access including:

1. Monitoring fruit quality through the supply chain;
2. Trouble shooting potential issues to pinpoint areas for improvement; and
3. Providing prompt feedback and information for growers and exporters on US requirements and opportunities to ensure an on-going and profitable US market for Australian mangoes.

PROPOSED OUTCOMES

To support grower and exporter activity in the US in the 2016-17 season, for the third year of access, Mr Michael Daysh is conducting a series of up to four visits, funded by Horticulture Innovation Australia (HIA) project MG16003, Monitoring mangoes through the supply chain to the USA–2. These visits will:

1. Monitor fruit quality through the supply chain and provide advice and feedback to growers, exporters and the Australian Mango Industry Association (AMIA);
2. Trouble shoot potential issues with exporters and importers to address and solve problems that may arise; and
3. Provide important and timely information and advice to Australian growers and exporters.

During the first trip for the 2016-17 season Mr Daysh:

1. Met with the irradiation treatment service provider, Steritech in Brisbane. Of the seven shipments made by the time of Mr Daysh's visit, six (or 86%) had non-compliant paperwork, which resulted in delays to the export of the fruit;
2. Met with the major US mango freight forwarder, Mainfreight, in Brisbane. There were no logistics or packaging issues reported;
3. Met with the two major US importers, Giumarra and Melissa's;

have grown up together, to be able to manage this level of bulls without fighting. They produce their own bulls and average one bull per 26 buffalo and one per 17 with cattle. Brahman fertility is 68-72%, whilst buffalo 88-92%. They do milking by hand, once per day, and the calf is separated from the cow late PM. Only two teats are milked, the calf gets the rest. They were the first to produce buffalo products in Colombia. They work co-operatively with one of the Universities on various projects with students, looking at pastures, meat, castration versus entire, TB testing (problems with false positives and false negatives; sounds very familiar to 30 years ago), brucellosis is also an issue and comparing to beef.

Although there are 18 million cattle in Colombia, the buffalo population is increasing at a more rapid rate. They slaughter buffalo at 450kg. They don't milk the buffalo for the first month either. Cattle do not calve until 32 months, buffalo at 24 months. Mating is all year-round, but they get no calves at all between April and June. August to January is the main calving period and is probably due to the effects of feed availability and quality over the dry season.

Murrah Buffalo in yards in normal dress code Hacienda Teatro

Back to Hotel.

Unfortunately, I was not informed that the 11pm bus back to Cartagena was rescheduled back to 10pm, so I had to organise a taxi meaning I only made it to Cartagena at 06:15 just in time for a 07:00 International departure.

Departure: 07:00am Cartagena on Wednesday 30 November 2016.

Transit Airports: Panama City, Houston, Los Angeles and Sydney.

Arrival: Darwin at 24:00 Friday 2 December. Home by 2:00am on Saturday 3 December 2016.

have 1 800 ha set aside for timber production, mainly eucalypts and acacias. Currently there are 72x14ha lots. They are running a total of 2 000 buffalo, of which 850 are breeders and 200 males for meat (460kg target weight). They are breeding Murrahs for sale, for meat and also producing some milk mainly for a more constant cash flow. Although, not an important part of the company's operations. They get CP3 600 per kg Live Weight for meat (around $AU 2.00). Milk yields average 3.3 l/day (machine milked) for eight months (pasture and salt only) and the calf gets the ninth month prior to weaning. The Colombian Government is pushing properties with QA on labour, environment and product. Murrahs came from Brazil and Bulgaria and they have used some local Italian genetics. On this property buffalo are economic, cattle are not.

Young males nearly ready for market

Farm 2

The final visit for day two was to a property Hacienda Teatro (meaning 'theatre' in English). The company owns nine properties in total, this one 880ha with 50% upland and 50% flooded during the wet season. They are 4km from the river, but get heavily flooded on an annual basis.

The company has a total of 13 000ha and is Colombia's biggest coffee producer. They started in 1974 and currently have 7 500 registered Brahman cattle and 3 400 buffalo, which have only started ten years ago. They started with only 60 head on floodplain country, where cattle are not suited and weaned calves at 360kg at nine months of age which sparked their continuing interest. The current owner is 80 years old and doesn't care whether they run cattle or buffalo, as long as they make money. This property was paid for by bartering with coffee from a University that used it as a showcase property, but cattle here only gained weight for three months of the year and maintenance only for another six months. So 500 new buffalo were brought in and two other of their farms also run buffalo. Their collect production and reproduction records and buffalo are more fertile than the cattle and outgrow cattle in all seasons. They currently have 1 600 cows and use registered bulls (don't use AI). They put three to four bulls with 60 cows. They use brothers that

Some of the delectable offerings at Planetarica; Yoghurts & Bocconcini

Farm 1 - Day 3:

Bufalera El Diamante is the company owning Hacienda Pradera in the Cordoba region. It is more hilly country than previously visited and 1 500m above sea level (ASL). They do have some swampy country. 1n 1977 they started with Holsteins, in 1985 converting to Brahmans, in 2000 to buffalo, and then in 2009 they commenced a station program over their farm to attract carbon credit offsets, from EC countries mainly. A second property Hacienda El Diamante is at 1 600m ASL and gets 1 800mm average rainfall. Temperatures range between 30 and 40°C, depending on season. They

and clean, and mozzarella cheese was currently being made. One of the production supervisors was very forthcoming on every detailed aspect of the production process. The five dairies providing milk are on quality assurance programs, starting at the farm. The milk factory provides feedback on quality issues to the farm on a regular basis. When it arrives at the factory each batch is tested for temperature, pH, protein, fat and cell counts. It is then pasteurised at 74°C for 15 seconds. Milk for yoghurt is heated to 91°C for six seconds. After pasteurising they may adjust the calcium content of the milk using calcium chloride. They produce fresh and processed cheeses. For Mozzarella, the process is:

1. Add starter culture - they use Hansen ST-12 or ST-13 for Mozzarella at pH 6.7. They also test/monitor the acidity % through all stages, as well as pH;
2. Rennet is added once pH drops by several pH points (between 6.7 and 6.1);
3. A target pH of 5.1, to start stretching after whey is removed. Minimum pH of 4.9 is not exceeded;
4. 95° water is added to stretch the curd;
5. Once balls of appropriate size are formed, they are dropped into very cold brine bath (17% salt) for cooling; and
6. Then packaged in 1.0% brine at pH3.9, to give a 30-day shelf life.

For mozzarella milk, must be later than 30 days post calving, for proper stretching quality. This milk is separated at the farm and used for products other than Mozzarella. Burrata is also a product line using cream in the centre and wrapped in mozzarella.

August-December is the peak milk period prior to the dry season.

Dulce de Leche is a popular line in South America generally and is made with milk, sugar and sodium bicarbonate, and is heated under pressure, to form a brown caramel product that is used with biscuits and for desserts. For the local market (30%) the price is $10/lb whilst the 70% exported receives $20/lb.

and recorded for each cow and their tag number is entered by keypad, by the staff, as the cow enters the bail and the udder washed and stimulated. The cups are applied and are automatically removed by the computer when the flow drops to a pre-determined level. The cow is then released and replaced by the next coming in from the side race in-door. The cows are milked for 6-9 months depending on their production and dropped of once they go below 4.5L per day. On this farm they milk from 900-1 200 cows daily. One of the dairy staff admitted that around one in every four is given a dose of oxytocin.

During the dry season corn silage is fed at rate of 40-60kg/hd/day to the milking herd, to make up for the lack of good quality feed available from the pastures. Dry and pregnant non-milkers can make use of the swamp areas as they dry out. The maize is produced under irrigation in the dry and is processed and prepared in the long white plastic tunnel type silage systems, stored on top of the ground in the paddock.

The milking facility that we visited was one of three on the property (cows become inefficient milk producers if they have to walk long distances daily). The number milked that day was 378 cows, with an average lactation length of 84 days. The computer records show the best cow at 1 969L at 274 days and 2nd best cow at 1 526 litres in 311 days. The price obtained per litre from the cheese factory is 60c per litre, approximately double that of cow's milk. The owner of this property has a total of 12 000 ha around 1 000-2 000 ha of oil palms and a local TV network, so the investment in this property can be more easily understood.

Calves are reared under shed, in pens of around 3m x 3m, with nine to ten calves per pen. They are fed milk replacer that has a pinkish tinge when reconstituted. It is a Colombian product with 30% protein and the calves are fed out of a calfeteria, with 10 teats available and it is rested on the rail of the pen when they are being fed. Feeds are twice a day.

Silage feeding for dairy cows during the dry season.

Back to the Monteria hotel.

Buffalo Tour Day 3; Tuesday 29 November 2016

The tour group was split today, to lessen the load at each particular venue, especially for the first-up visit to the Planetarica Cheese factory. It is a modern facility that commenced in 2011. They have five dairy farms providing only buffalo milk, no cow's milk is used in any of their products. A large variety of their products were available for tasting prior to entering the factory. It looked well run,

Monterrico Bulls

The second property visited was Hacienda Praga, owned by Inversiones Colbufalos S.A.S. This place was very big and impressive. They have 4 900 breeders using both Murrah and Mediterranean bloodlines. They have 4 500ha upland country (2 500ha very good and the balance, not so good) and 3 000 ha of swamp country, which is useful over the 4-5 months of dry season that was expected in 2 weeks' time, similar to the NT. The main pasture species used are *Brachiaria decumbens, B. brizantha* and *B. humidicola* and mention made also of Mombasa panic. I noticed small amounts of Rat's Tail (*Sporobolus sp.)* which if allowed to remain, will become a menace as is occurring currently in the Top End of the NT. They did say that the buffalo will eat it during the dry when there is nothing else available.

One of the three very modern dairies on Hacienda Praga. All are computer monitored to record production daily for each cow, according to her tag; De Laval equipment

The dairy set-up was most impressive. It was a six-a-side walk-through, fully automated system so that cows can milk at their own speed without holding up the batch. The cows are milked once a day only and the calves removed from the cows and fed milk replacer in yards. The Italian cows seem to have better shaped udders than the Murrah in general. The milking system is fully computerised and measures each cow's milk volume at every milking. The milk flow is monitored

obtained from the red fleshy mesocarp and the palm kernel contains different oil (non-red) and also provides PKC (protein supplement for livestock).

The second and final stop for the day was Hacienda Forteleza, the family property of the current IBF and ACB President, Ms Claudia Roldan. This property supplies breeders to the Colombian Buffalo Industry and runs mainly the Murrah breed with genetic selection. Delegates were shown weaners and breeders out in the paddocks. The farm is heavily subdivided into small paddocks of around 1ha and rotationally grazed using the Voisin System, which is similar to cell grazing in Australia. They have a walk-through dairy which has eight sets of cups that each serve two side-by-side stalls sequentially and each cow is individually milked into a bucket so yields can be measured on a per milking basis. The second stall is filled whilst the first cow is being milked and the cups and collection bucket swapped over. Calves are left on the cows and locked up prior to milking, when required. Some of their buffalo were in stalls for Delegates to to observe and whilst viewing there was a very heavy storm that forced everyone under cover. The farm trades on its good genetics and they source semen from both Brazil and India. Their production figures are 5 litres per day from a single milking, 8% fat, 4.5.-5.0 % protein. Production peaks at 18-19 litres per head. They run 500 breeder cows and 200 heifers.

We had Dinner at this venue and music and drinks flowed copiously! It was 10km back to the Monteria hotels. (GHL Hotel)

Forteleza Murrah buffalo breeders

<u>Buffalo Tour Day 2: Monday 28 November 2016</u>

The first property on day two was quite close to the previous one visited yesterday (next door). Hacienda Monterrico is also a stud breeder of Murrah buffalo, plus a fattening enterprise of 380 head. It was similarly set up to its neighbour, only breakfast not dinner was provided.

Buffalo Carts are widely used in palm oil industry for carting planting material, fertilisers and seed bunches.

The buffalo cart direct to the mill or to truck collection points. The pickers use a saw attached to long poles around six metres in length to drop seed bunches from the palms. The same carts are also used to carry fertiliser and young palms for planting. The Co-op has four nurseries to produce planting material. They harvest 130 000T per year of oil seed and extract 28T per annum of Oil (around 22%), which is 10% of Colombian output. It is then refined at another location 250km in distance into the final products for food, pharmaceutical and bio-diesel industries. The first fruit is produced at two years, up to seven years and is very productive after that at 25 T/ha seed yields. The oil is reddish until refined at 48% of saturated fats but do not contain trans fats. The oil is

2. Effect of Heel Height (HH) on claws overgrowing of Mediterranean Italian buffalo; Ms Emanuela Parlato, Italy.

Overgrowing claws are a major welfare issue in intensive housing systems in Italy. It is mainly due to soft pasture, hoof infections on concrete and the lack of walking, to cause normal abrasion to hooves. Therefore, trimming is recommended three times per year. In a survey in relation to 740 cows both claws overgrowing (CO) and milk yields (MY) were measured. Mean MY was .2466.9 ±426.4 kg. The HH ranged from 1.5 to 8.5centimetres (cm). Affected cows - 3.80cms mean and unaffected cows .4.34 cms mean HH. The HH reflects the angle of the claws; the longer the toes, the shallower the angle and the lower the HH. The highest milk production came from cows in the 4.0-4.5cm range. Both are heritable traits and it was suggested that selecting for HH between 4.0 and 4.5 will reduce the incidence of OC and improve MY.

Buffalo Tour Day 1: Sunday 27 November 2016

Departure from hotel, after check-out at 07:00.

From Cartagena headed north, then east, then south towards Monteria.

The first stop was a palm oil plantation belonging to Groupo Empressia Oleoflores. This company has 50 000 hectares (ha) under oil palms running as a co-operative enterprise with small (<50ha), medium (50-500ha) and large producers >500 ha, all supplying to a central mill that extracts the oil from the seed collected. A mill was located on this farm. Colombia currently produces 2% of the world's palm oil supply. The expansion of the industry has been linear over the last ten years. They are utilising many unproductive low-lying areas (not clearing rainforest) and this plantation uses buffalo to pull carts of the palm seed to the mill. These are generally bulls and they maintain that they are more sustainable than vehicles in this type country with no compaction that you would get with motorised transport.

issue appears to be the reduced number of primordial follicles in buffalo compared with cattle (40 000 vs 133 000)

Ovum pick-up (OPU) is becoming more popular with MOET decreasing and OPU increasing in usage in Brazil which has probably the most experience in reproductive technologies. OPU can be non-surgical, non-invasive and more repeatable without detriment to the cow and without the long term effects of the drugs needed for Multiple Ovulation. Other advantages include being able to collect eggs in cows up to four months pregnant and also non-cycling cows.

5. Adaptability of water buffaloes to intensive grazing systems etc. in Campana Riograndense. Humberto Sorio, Brazil.

Buffalo uptake of radioactive substances from the environment into their milk is lower than ovine, caprine or bovine species. Buffalo are more efficient grazers than cattle, due to the width of their incisor jaw compared with cattle (6-8cms for cattle versus 12-14cm in buffalo). However, buffalo need more shade and water.

Congress Day 3: Friday 25 November 2016

08:00-12:00 - Meeting of the General Assembly of the International Buffalo Federation (IBF).

It was a fairly robust meeting, where some tensions surfaced between the South Americans and the Secretariat (Italian), over the changes to the Constitution of the IBF that was voted upon via email during the past year. The outcome of the meeting was that the new Constitution (2016) was now null and void and new changes would need to be submitted by interested parties and a new vote taken to amend the existing 2008 Constitution. The new amendment had given the Secretariat a lot more unilateral power than previously existed. This had upset the South Americans and they got their way with the vote. The Assembly also voted the new venue for the 2019 - 12th WBC between Turkey (Istanbul) and India (New Delhi). Turkey won the vote 25 to 20. China had also put in a bid; however, they had missed the six months prior to the meeting deadline.

PM Presentations.

1. Business Management in Colombia bubaline activity. Dr Luis Trujillo, Colombia.

The buffalo population was estimated at 652 579 in 2016 by this writer. The daily milk production in Colombia is over 17M litres per day, of which 400 000 is buffalo milk. 58% of the total milk production is sold raw in the country.

In the buffalo industry:

- Software usage is only around 20%;
- Individual animal identification is only 24% and 88.2% of producers have not used or don't know about it; and
- Costs of production unknown by 90-99% of producers.

Economic Indicators for buffalo Industry:

- There is a big variation in the prices obtained by producers: $0.650-$1.400l depending on end market. ie raw milk, pasteurizers, cheese makers;
- Calving Intervals - 412 days average (310 day gestation and 102 day non-pregnant);
- Lactation lengths - 256 average; and
- Production costs - $0.559/litre average Range $0.300 -$0.750/litre

These indicators are essential knowledge for farmers to be able to make progress.

cosmetics, medicaments, plastics, animal fibres, textile and fabrics, clothing and footwear, leather, construction equipment and materials, cement and software, among others.

A highly agrarian economy at the start of the 20th Century, it is now around 74% urbanised with 8M people alone in the capital Bogota. It is the third largest economy in South America and 28th in the world.

Presentations attended:

1. Value generation of agro-industrial businesses: Jens Mesa Dishington, Colombia

The Association of Colombian Breeders of Buffalo (ACB).

This Association was the principle organisation behind the 11th International Buffalo Congress. It has many members and runs a sustainability scheme for members. It has a range of levels of Seals of Approval. They are Bronze, Silver and Gold according to breeder's compliance with certification for sustainability, welfare (staff and animal) and quality of produce. It seems to be a very active and pro-active organisation for a rapidly growing industry.

Congress Day 2: Thursday 24 November 2016

Presentations attended:

1. The buffalo genome and genetics control of a complex phenotype; Professor John Williams, University of Adelaide, Australia, the only other Australian participant.

Genomics is likely to be the next big advance in improving the productivity of livestock in the future. Using current selection methods takes around seven years to achieve results from progeny testing. Genome assisted genetic selection will be able to calculate the Estimated Breeding Values (EBV) of an embryo basically saving that seven years.

Advances in genomics have been rapid:

- Human genome sequenced in 2001;
- Cattle genome sequenced in 2009; and
- Buffalo genome sequenced in 2014.

65 buffalo of four breeds were completely genotypes Mediterranean, Murrah, Jafarabadi and Nili Ravi. The team IBGC developed a Single Nucleotide Polymorphism (SNP) array of 90 000 during 2014. This will have huge potential when fully studied. It will help to identify in-breeding (the result of poorly managed genetic selection, which tends to increase in the number of recessive problems).

2. Nutritional management and reproductive performance of bubaline species; Dr Gianluca Neglia, Italy

This presentation emphasised the importance of high starch diets in reducing fertility in buffalo. This is due to damage to liver function.

3. Buffalo Resources in Latin America and threats on its sustainability; Dr William Gomez Vale, Brazil.

This presentation pointed to the consequences of inbreeding in South America where numbers are increasing at a rapid rate in many countries.

4. Advanced Reproductive Technologies in Buffalo: Dr Bianca Gasparini, Italy

Multiple Ovulation Embryo Transfer (MOET) has a current pregnancy rate of 30% with transferable embryos of 2.5-3.0 per cow treated with a very high rate of variability between cows. The main

ATTACHMENT B

Report World Buffalo Congress (WBC)

Held in Cartagena, Colombia 23-29 November 2016

Officer Attending: Mr Barry Lemcke

Departure: 00:15 Monday 21 November 2016 from Darwin Airport.

Transit Airports: Sydney, Los Angeles and Panama City.

Arrival: Cartagena, Colombia on Tuesday 22 November 2016 at 1am.

Congress Day 1: Wednesday 23 November 2016

Day one of the scheduled program turned out to be a bit of a shambles due to the Colombian Minister for Agriculture not arriving until late afternoon – he was supposed to be there at 10.15am. There were three lecture theatres operating simultaneously, the White Room, the Green Room and the Yellow Room. Afternoon sessions were swapped to the morning, causing some earmarked presentations from the previous evening's perusal of the program to be missed in the confusion. The geography and positioning of the Rooms also took some time for the brain to digest fully.

Colombian Situation:

For the country as a whole between 1995 and 1998, they suffered a negative trade balance. From 1998 there has been a positive trade balance. Since 2014 the commercial balance has been favourable, due to the main agricultural commodities of coffee, cocoa, tropical fruits, palm oil, cattle and dairy products. Milk product exports amounted to 19 000 tonne (T). The European Union has granted open access for agricultural and livestock products. There is a Government Instituto Colombiano Agropecuario (ICA), which appears to be an equivalent of Austrade in Australia and it facilitates access to international markets.

Export orders in 2016:	Agricultural	721 total	(seven to Australia)
	Livestock	264 total	(three to Australia)

- 500 000 buffalo in Colombia (more than Italy) 3 480 buffalo sites;
- 23 million (M) head of livestock;
- 950 000 people employed in agriculture (15% of workforce), 22% in Industry and 63% in services;
- Population 48.7M people;
- Land Area: 1.142M km^2;
- Six natural land regions. Congress and tour confined to western coastal provinces. Andes dominates the central area and the east dominated by the Orinoco and Amazon plains;
- Borders with Panama, Venezuela, Brazil, Ecuador and Peru;
- Straddles the equator from latitudes 12N to 4S;
- US$1.42 /kilogram (kg) live weight (LW) for cattle/buffalo to the producer;
- US30¢ / litre for cow's milk to the producer; and
- ** Colombia produces 400 000 litres of buffalo milk, per day.

Colombia is rich in natural resources and its main exports include mineral fuels, oils, distillation products, precious stones, forest products, pulp and paper, coffee, meat, cereals and vegetable oils, cotton, oilseed, sugars and sugar confectionery, fruit and other agricultural products, food processing, processed fish products, beverages, machinery, electronics, military products, aircraft, ships, motor vehicles, metal products, ferro-alloys, home and office material, chemicals and health related products, petrochemicals, agrochemicals, inorganic salts and acids, perfumery and

THE 11th WORLD
BUFFALO CONGRESS
From the tropics to the world

REGISTRATION PROCESS

The congress consists of 4 events that require individual registration. Pre-congress, congress, official dinner and Buffalo tour. On our page you will find on " REGISTRATION", registration platform. Note that you can register for the congress and the different activities separately.

PAYMEN METHODS

It is recommended to make the payment went through credit card directly on the registration form. Remember to inform your bank that made a payment on the other country to activate your card.

For more information contact us:
registro@wbc2016.net -or official page www.wbc2016.net

We look forward to your assistance

Best regards,

Claudia Roldán

CLAUDIA ROLDÁN
President
International Buffalo Federation (IBF)
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11TH WORLD BUFFALO CONGRESS REGISTRATION FEE			
EVENT	CATEGORY	COLOMBIA	OTHER COUNTRIES
CONGRESS November 23,24,25 2016	Public	$ 1.2000.000.00	U$ 500
	Students	$ 500.000.00	U$ 200
	Companion	$ 400.000.00	U$ 150
OFFCIAL DINNER 24 Noviembre 2016	Public	$ 310.000.00	U$ 100
PRE-CONGRESS COURSE NOVEMBER 21, 22 2016	Reproduction	$ 1.085.000.00	U$ 350
	Voisin rational grazing	$ 930.000.00	U$ 300
	Theoretical cost course	$ 930.000.00	U$ 300
BUFALO TOUR 27,28,29 Noviembre 2016	Public	$ 1.085.000.00	U$ 350

Conference registration includes admission to academic program, lunch, material support, snacks and welcome cocktail. Companion fee includes admission to commercial sample, lunch, snacks and welcome cocktail. Pre-congress fee includes material support, admission to academic program, lunch and snacks. Buffalo tour includes accommodation in a double room shared. Official dinner: White clothes

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THE 11th WORLD
BUFFALO CONGRESS
X CONGRESO MUNDIAL DE BUFALOS
CARTAGENA • COLOMBIA • 2016
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RESEARCH AWARDS:

More than 160 research papers from various countries of the world, which will be displayed on posters throughout the congress, were received.

GUVERMENT DELEGATIONS MEETING
November Wednesday 23rd, 2016 10:15-12.30 H

Worktable with delegates attending governments to addressing health aspects that facilitate multilateral market opening.

ASSEMBLY OF IBF (International Buffalo Federation).
November ,Thursday 24, 2016. 17:00 H

Plenary meeting of representatives of all member countries of International Buffalo Federation.

CULTURAL EVENTS

- **WELCOME COCKTAIL – November, Wednesday 23rd, 2016**

- **OFFICIAL DINNER – November, Thursday 24, 2016**

BUFALLO TOUR BY REGIONS SUCRE AND CORDOBA
November 27, 28,29 2016

Tour that aims to show the various bubaline production systems in Colombia and the use that is given to buffalo. Will visit an oil palm plantation where the buffalo is used in the work of harvesting the fruit, bubaline production known for their selection breeding and supplying high dairy production and pure genetic material to Colombia and neighboring countries; control program participants and genealogical records and genetic evaluations of the Colombian Association of Buffalo Breeders.

To the guild of the countries that you represent it would be an honor and shows of support the institutional linkage have, besides being is an opportunity to strengthen trade ties.

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ATTACHMENT A

THE 11th WORLD
BUFFALO CONGRESS
From the tropics to the world

Medellín, October 5, 2016

WBC2016-932

Greetings from the committee of World Buffalo Congress.

An event that brings together producers, industrialists, traders, researches, teachers and students of activity related to bubaline career , plus government representatives, with delegates from more than 30 countries and 60 collaborating entities in commercial and institutional samples.

A generator of commercial, institutional and academic alliances space, as will be present important representatives of research centers and institutes devoted exclusively to bubaline research.

In the Congress the following activities are ahead:

Pre- congress courses November, Monday 21st and Tuesday 22 2016

PRE-CONGRESS COURSE	SPEAKERS
Biotecnology and reproduction	Pietro Baruselli/M.V., MSc., Dr., Luigi Zicarelli/ M.V., Gianluca Neglia/ M.V., Dr., Nelcio Antonio Tonizza de Carvalho/ M.V., MSc, Dr., Gustavo Ángel Crudeli/M.V., MSc, Dr. Jesús Alfredo Berdugo/ M.V., MSc, Giuseppe Campanile/ M.V., Esp.,Dr., William Gomes Vale/ M.V., MSc., Dr., Bianca Gasparrini/ M.V., Dra., Humberto Tonhati/ Zoot., MSc, Dr
Voisin rational grazing	Humberto Sorio Jr. Ing. Agrn, Esp. / Mariano Gutiérrez Ramírez, Zoot.
Theoretical cost course	Luis Alberto Sánchez Trujillo Zoot. Esp. AFAGRO. Colombia.

CONGRESS
November Wednesday 23rd, Thursday 24 and Friday 25 2016

Alternate will have three conference rooms and in plenary. There will be thematic blocks breeding and genetics, innovation and commercialization, health environment, climate change, management, etiology, food and nutrition. I mostly lecturers are leading researchers from countries as China, India, Bulgaria, Turkey, Italy, Argentina, Brazil, Venezuela, Mexico, Colombia, Australia, United States of America, Philippines.

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- attended an all-country representatives' meeting with the Colombian Minister for Agriculture, to discuss broad trade issues.

FOLLOW UP ACTION REQUIRED

Submit a detailed Congress and Tour Report (refer Attachment B) for dissemination to interested groups such as the NT Buffalo Industry Council Inc; the Australian Buffalo Industry Council (ABIC); and internal Department of Primary Industry and Resources reference purposes.

CONCLUSION

An extremely successful Congress was achieved by the Colombian Association. It is, however, a pity that the Australian developing buffalo dairy industry could not stage or duplicate a similar event in Australia (there is great interest among overseas Delegates). This is due mainly to the large geographical spread of the current 12 active dairy producers and too small an organisation (ABIC) to be able to spread the substantial load that such a Congress would entail. Maybe in another 10-20 years it will be possible!

Action Officer:	Barry Lemcke	92263
Group Head:	Neil MacDonald	39746
Chief Executive	Alister Trier	92005

ALISTER TRIER **21/12/2016**

NOTED

KEN VOWLES 27/1/17

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

OVERSEAS TRAVEL REPORT

Dept Ref: 16-0795-SEC
Min Ref: 2016/GBO1-KEV
HPRM Ref: P2015/00001

Title:	Attendance of Mr Barry Lemcke, Buffalo Research Officer, at the 11th World Buffalo Congress
Destination:	Cartagena, Colombia
Date/s:	21 November - 2 December 2016
Travel approved:	24 October 2016 (refer Attachment A)
Officer/s travelling:	Mr Barry Lemcke

PURPOSE

As a result of receiving a Departmental 2014 Star Award Prize funds were made available for personal development, and as a member of the Technical Services Team, servicing the cattle and buffalo live export trade to Vietnam, the funds were utilised to attend the 11th World Buffalo Congress.

PROPOSED OUTCOMES

To establish new contacts and maintain existing ties with key buffalo researchers and producers throughout the world, to convey the Northern Territory (NT) Buffalo Industry experiences to interested Delegates, and to pick up on experiences of others in the world industry in solving issues related to buffalo meat and dairy farming in the NT.

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

The 'Asociacion Colombiana De Criadores De Bufalos' (Association Colombian Buffalo or ACB) is to be commended for delivering a very successful Congress program, that was attended by around 780 Delegates from 29 different countries.

The Post-Congress tour attracted 170 Delegates with visits to six farms and one cheese factory.

During the Congress Mr Lemcke:

- renewed contact with New Zealand producer-customer of NT buffalo from 2007-08, running a successful cheese-making operation;
- made contact with Italian semen suppliers that we use and obtained their latest catalogues and recommendations;
- attended the International Buffalo Federation Meeting which voted on the Constitutional Amendments proposed and the venue of the next congress (Istanbul, Turkey in 2019);
- made new contacts with various countries such as Chile, Guatemala, Costa Rica, United States, Trinidad, Italy, India, Bolivia and Argentina; and

supplied to the project, so the farmers will have to rely on Artificial Insemination (AI) and the young bulls already there growing up.

- The Dinas staff asked for assistance to improve their AI system and for pregnancy-testing training. Help with AI had already been considered for the Project so that was agreed, subject to the project being extended until 2018. Pregnancy training could also be arranged though the logistics of assembling sufficient cows in one place would be a challenge.
- It was explained that the proposed pasture course in the NT to which departmental staff had been invited, was not supported by the Indonesian members of the Red Meat Committee. Alternative ways of delivering this training are being considered.
- An honest discussion was held about the performance of the Dinas staff assigned to assist the project; good in some areas, poor in others.

Visit to Breeder project

- Because of time constraints, the sample of eight farms inspected was not representative of the whole project. Nevertheless, it was encouraging Cattle condition was very good throughout.
- More calves had been born from AI than expected
- The immature bulls delivered earlier this year are growing up and putting on weight faster than expected. One was reported to be mating.
- Some farmers were getting the message about weaning, some were not. The size of the unweaned calves (up to 300 kg at ten months) was causing a lot of admiration but these growth rates would be at the expense of a second calf.
- The most encouraging sign was the Dinas staff has started to remove cows from poor farmers who were not feeding them adequately and giving them to the better cooperatives.
- A potential applicant for a position assisting Mr Greg Smith with data collection was identified.

Action Officer:	Neil MacDonald	39746
Group Head	Neil MacDonald	39746
Chief Executive	Alister Trier	92005

ALISTER TRIER **21/12/2016**

NOTED

KEN VOWLES

03 MAR 2017

CONCLUSION

A short summary of information learnt at each meeting held during the week, is as follows:

Australian Ambassador

- An up-to-date description of the Indonesian business environment and the Indonesian beef industry.
- The Ambassador stressed that the beef trade was "all about price". Reducing the domestic price of beef was the primary job description of the Director-General of Livestock Services and this depends greatly on the price of Australian cattle.
- A discussion of areas of trade with Indonesia that could be expanded, notably education, training and tourism. Charles Darwin University has the potential to capture a bigger Indonesian market, especially as they are the only University to integrate vocational training and undergraduate studies.
- Investment in Australia - there would lots of potential investors for shovel-ready projects. Aquaculture would be of particular interest.

Director-General of Trade and Livestock Services staff

- Discussion of some of the issues facing the Indonesian Government.
- Discussions about trade and availability of Australian cattle for breeding.
- Requested an update on the East Kalimantan Project (which will be prepared by DPIR and communicated through Mr Dean Merrilees).

Pak Dadang, Director of Livestock for East Kalimantan

- Introductory meeting for the Minister.
- He said the East Kalimantan project was 'going very well'.

Juang Jaya feedlot

- This is a very well set up and run feedlot.
- Target weight gain for cattle is 1.7 kilograms/day which they achieve by varying the diet to overcome issues of nutritional variability in the feed ingredients.
- Most of the cattle in the feedlot were already finished and should have gone off to slaughter, but as there had been no supply for feeders for three months to maintain a continuing supply to the market.
- Managers reported that they had not made a profit for some time and they were pessimistic about the prospects for the coming years.

Mr MacDonald's meeting with East Kalimantan Livestock Services staff (Dinas)

- The Dinas staff had a realistic understanding of the project, in terms of both appreciation of progress made and challenges remaining.
- The Dinas staff was updated on a possible extension of the Project for a further year, with a decision due in February 2017.
- The Dinas staff was evasive when the issue of tracking down more bulls was raised. It seems clear that ownership issues will prevent more bulls being

PROPOSED OUTCOMES

- Familiarisation tour by the Minister of the Indonesian beef industry, including meetings with key government and industry personnel.
- Supervision visit to the East Kalimantan project

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

- Successful meetings with the Australian Ambassador to Indonesia, Mr Paul Grigson; the Director-General of the Indonesian Department of Trade; representatives of the Director-General of Livestock Services in Jakarta on 5 December 2016; and the Director of Livestock for East Kalimantan in Samarinda, Pak Dadang Sudarya, on 6 December 2016.
- A successful dinner in Jakarta on 5 December 2016, where eight senior Indonesian cattle importers and two graduates of the NTCA Indonesian student exchange had an opportunity to meet the Minister.
- Visit to the Juang Jaya feedlot near Lampung, South Sumatra on 9 December 2016. This is a well-established facility, 80% owned by the Consolidated Pastoral Company (CPC). During the visit the Minister was able to see the cattle, most of which were finished and ready for market, the feed resources and mill, the farming area, and discuss the operation with the feedlot managers.
- On 7 December 2016, the Minister had the opportunity to see a wet market in East Kalimantan.
- On 7 December 2016, Mr MacDonald had a very useful meeting in Samarinda with senior staff from the East Kalimantan Department of Livestock Services.
- On 8 December 2016, Mr MacDonald and Mr Kemp visited the East Kalimantan Breeder Project, south of Balikpapan. Eight farms in the Bubalu area of Penajam regency were inspected. Mr Sullivan was unable to accompany them that day, as he was sick. The inspection was generally pleasing. A summary of the conclusions from that day are provided below. An Itinerary of the travel is provided (refer Attachment B).

FOLLOW UP ACTION REQUIRED

- Further communication will be conducted, whenever possible, with the Department of Livestock Services, preferably at Director-General level.
- The Director-General of Livestock Services will be approached by the Indonesian Co-Chair of the Red Meat Partnership, to seek his endorsement for an extension of the East Kalimantan project.

BUDGET

The cost of Mr MacDonald's trip, totalling $3 932 and was fully paid by the external funding provided to the East Kalimantan Breeder Project by the Federal Government on behalf of the Indonesia-Australia Partnership for Food Security in the Cattle and Red Meat Sector.

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

RECEIVED **OVERSEAS TRAVEL REPORT**

- 7 MAR 2017

Dept Ref: 16-0740-SEC
Min Ref: 2016/0300-LEV
HPRM Ref:

MIN.LIAISON

Title:	To accompany Minister Ken Vowles MLA on a courtesy visit to Indonesia including a visit to the East Kalimantan Project
Destination:	Jakarta, East Kalimantan Province and Lampung, Indonesia.
Date/s:	4-11 December 2016
Travel approved:	6 October 2016 (refer Attachment A).
Officer/s travelling:	Mr Alister Trier and Mr Neil MacDonald

RECEIVED
22 DEC 2016
MINISTER VOWLES' OFFICE

PURPOSE

To accompany the Hon Ken Vowles MLA, Minister for Primary Industry and Resources on a courtesy visit to Indonesia for meetings with Senior Indonesian Government Officials and industry leaders, and to conduct a supervision visit of the East Kalimantan Project.

BACKGROUND

Minister Vowles chose to visit Indonesia in December 2016 as his first official overseas visit, focussing on the cattle industry and the BIMP-EAGA Friendship Games. He was accompanied by Mr Rohan Sullivan representing the Northern Territory Cattlemen's Association (NTCA) and Mr Stuart Kemp representing the NT Live Exporters Association (NTLEA). Mr Steve Rossingh, Chief of Staff, accompanied the Minister throughout the visit and Mr Alister Trier, Chief Executive, Department of Primary Industry and Resources (DPIR) accompanied the Minister for the first day in Jakarta.

The live cattle trade to Indonesia, of major importance to the economy of the NT, is currently facing a number of challenges. The high price of Australian cattle is severely impacting on the domestic price of beef in Indonesia. To counteract this, the Indonesian Government has permitted the importation of frozen buffalo meat from India, which is expected to have a major impact on the demand for cattle from Australia.

The Indonesian Government has also introduced a regulation requiring importers from 2018, to import and manage one breeder per five feeders. These two new policies are expected to further reduce the profitability of the feedlot sector, which has already been severely impacted by high cattle prices. In recent months, personnel changes within the Indonesian Department of Livestock Services have resulted in reduced communication with the NT, so it is hoped that the Minister's visit will encourage further effective strategic dialogue.

DPIR is currently supervising a project in East Kalimantan in which 2 000 heifers are being managed by nearly 1 000 small-holder farmers. For project management, Mr MacDonald tries to visit East Kalimantan approximately once every two-to-three months.

Figure 3: 3-4 day old FMD lesion in the foot of a cow. Feet lesions cause 'severe lameness'.

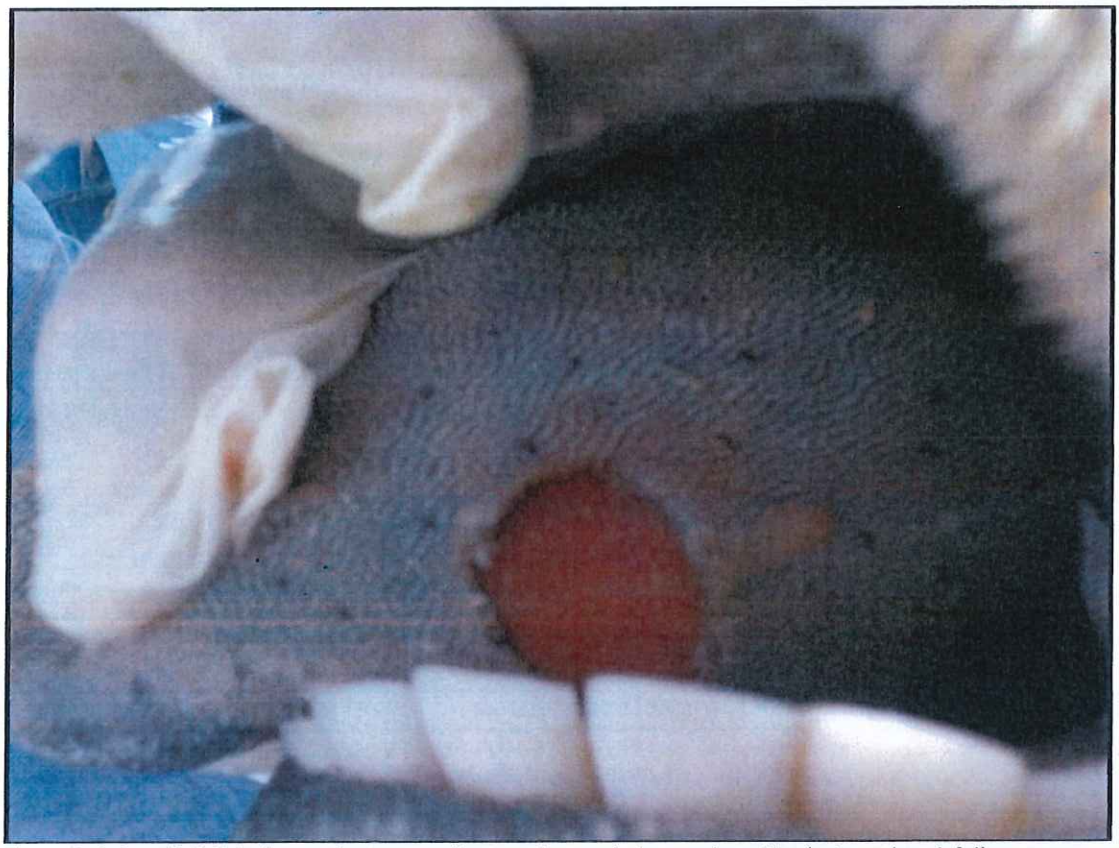


Figure 4: 2 day old FMD lesion on the tongue of a cow. Tongue lesions make eating 'extremely painful'.

Overseas Travel Report - Elizabeth Stedman – Nepal

Photographs

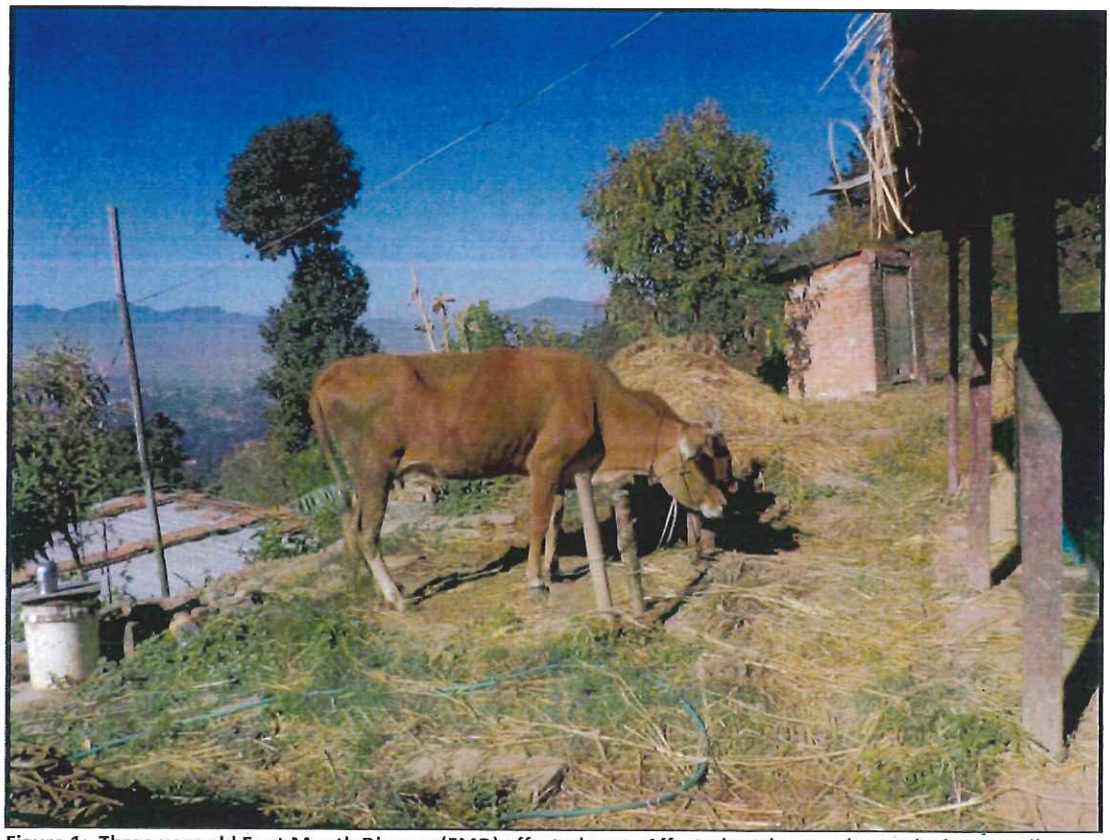


Figure 1: Three year old Foot Mouth Disease (FMD) affected cow. Affected cattle were 'severely depressed'.

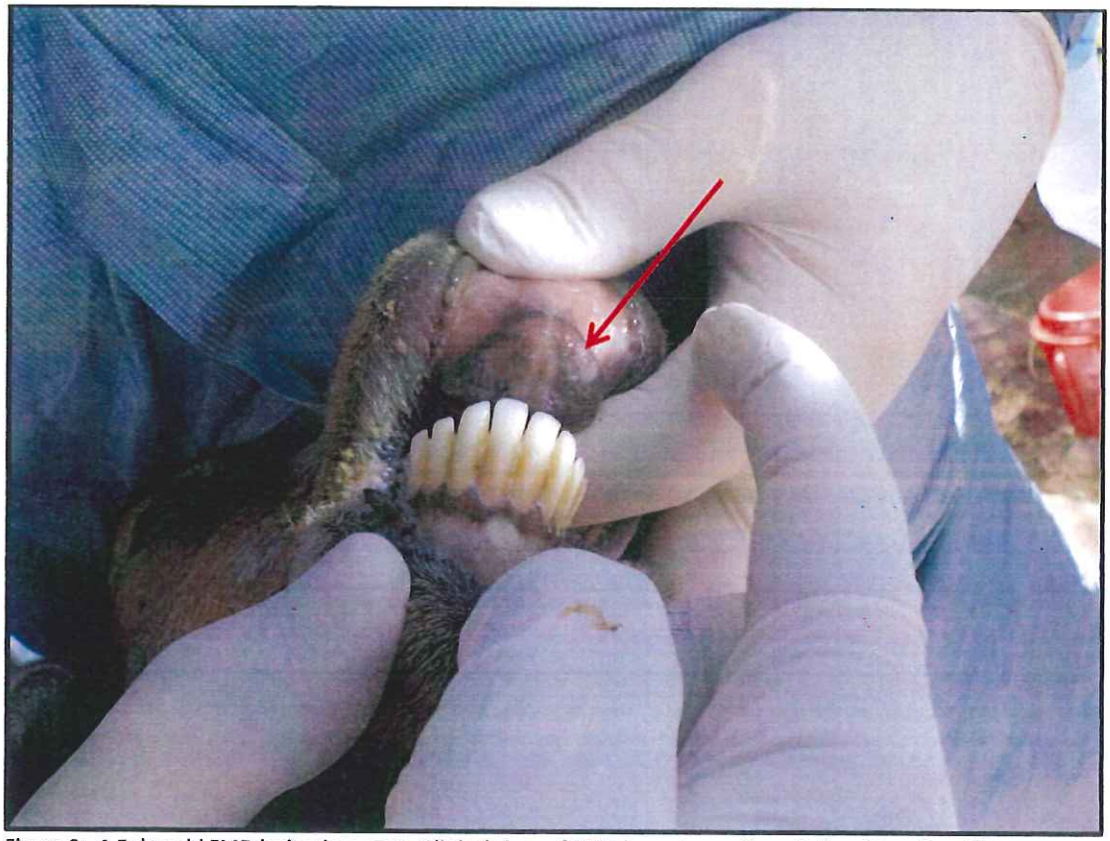


Figure 2: 4-5 day old FMD lesion in a goat. Clinical signs of FMD in goats are 'less obvious' than in cattle.

FOLLOW UP ACTION REQUIRED

Dr Stedman will:

- Give a presentation to the Litchfield Small Farmers Group, highlighting the dangers of swill feeding and how small-scale livestock owners can implement biosecurity practices on their blocks;
- Prepare a report of the course for publication in the Department of Primary Industry and Resources Newsletters (Top Paddock, Katherine Rural Review, Barkly Beef, Alice Springs Rural Review); and
- Prepare a short FMD awareness photo presentation for potential publication on livestock related pages of the departmental website.

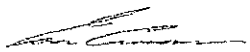
CONCLUSION

FMD is an exotic disease, which could have devastating economic and social impacts in Australia, particularly for the NT cattle industry. Early detection of a FMD incursion into Australia would be essential, to reduce the potential impact of this disease.

Australia estimates that a small FMD outbreak, controlled in three months, could cost around $ 7.1 billion (B), while a large 12-month long outbreak, could cost as much as $16B; early detection could make a big difference.

Learning about a disease from textbooks and videos is no replacement for seeing the real thing first-hand. Dr Stedman has gained valuable skills and confidence in diagnosing and tracing FMD in a number of species. These skills will prove vital to early detection and control efforts, if an incursion of FMD was to occur in the NT.

Action Officer:	Kevin de Witte	92130
Group Head:	Michelle Rodan	92390
Acting Chief Executive	Ian Curnow	92027



IAN CURNOW **06/12/2016**

NOTED

15/12/16

KEN VOWLES

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

OVERSEAS TRAVEL REPORT

MIN.LIAISON

Dept Ref: 16-0730-SEC
Min Ref: 2016/0264-KEV
HPRM Ref:

Title:	Report on Foot and Mouth Disease Real-Time Training
Destination:	Nepal
Date/s:	12–20 November 2016
Travel approved:	29 September 2016 (refer Attachment A)
Officer/s travelling:	Dr Elizabeth Stedman

PURPOSE

To update you on Dr Elizabeth Stedman's recent travel to Nepal to participate in the Australian Government Department of Agriculture and Water Resources funded Foot and Mouth Disease (FMD) real-time training course, delivered by the United Nations Food and Agriculture Organisation's European Commission for the Control of FMD.

PROPOSED OUTCOMES

Dr Stedman completed the United Nations Food and Agriculture European Commission for the Control of FMD's Real-Time Training Program (KTC20) in Kathmandu, Nepal.

Dr Stedman will raise general FMD awareness in the Northern Territory (NT) by sharing her learning with other stakeholders, including producers, veterinarians, veterinary students, other departmental employees and industry bodies.

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

This training has given Dr Stedman practical, hands-on experience and confidence in examining and diagnosing FMD in cattle and other animals in the field, and at various stages in the disease process. Dr Stedman has been able to develop skills in lesion aging and epidemiological tracing, while seeing first-hand the devastating effect of this disease in Nepal (refer Attachment B) and learning of the effectiveness of vaccination programs.

Dr Stedman's increased knowledge will enhance post-border early detection and response to any incursion of FMD in the NT's ruminant and pig populations, ultimately strengthening Australia's national FMD preparedness.

Bulls selected for Herd mating duties from the yearling bulls group (21 months of age) to relieve pressure on the current 2 herd bulls

Day 9: Sunday 16 October 2016.

The near 2 year old bulls were yarded early for weighing and assessment and 7 chosen for mating duties. A list of younger yearling bulls was also provided for putting with the yearling heifers, without weighing, as time was short and departure for Buon Ma Thout (BMT) imminent.

At 0900hrs departed for BMT. The Jetstar Pacific flight was delayed in arrival by an hour and 20 mins, which amounted to a close-run connection at HCM city for the Singapore flight which was 10 mins prior to check-in closure after a gallop from the domestic terminal. The Singapore-Darwin leg was a more leisurely wait with a 2305hrs departure and arrival at Darwin at 0500hrs on 17 October (Mon).

Newly planted grazing pasture for breeder herd future use

The planted pastures were identified as Ruzi grass and Guinea grass that they called Mombasa Guinea. They said that they had also planted Pangola grass from seed, but could not show me any. So this will be a raincheck for identification by photo when they manage to find it! As Pangola does not produce viable seed, it is suspected that it will be one of the other seeding *Erianthas.* The paddock was quite thickly established for both the Ruzi and Guinea. It was better looking on old burn pile patches. The Guinea is only a short variety and where drier looked a little coarse and unpalatable compared with the Ruzi grass. I suspect that the soil will become gradually depleted in nutrients unless there is a concerted effort to return manure to the fields in larger quantities. Since the last visit an extra shed has been built and instead of feedlot pens and troughs it is being used to dry the manure cleaned from the yards. The local Department of Environment will not allow wet manure spreading back on the paddocks. Other capital improvements include rooves over all the silage bunkers and 3 grain silos are being constructed in the first shed bay which will be used to store maize grain which can be bought cheaply at certain times of the year and this will help contain concentrate costs in the future. Their abattoir is little used except for emergency slaughtering and at Chinese New Year for beef gift offerings to the staff and locals.

The final effort for the day was to scrutinize the penned bull group for likely bull-power for the herd. They are currently only using 2 bulls over 300+ cows. The DPIR officer suggested that yearling mating is a viable option and to use yearling bulls for this purpose. As it was becoming dark, it was postponed to a yard job for early tomorrow. The DPIR officer also downloaded their Excel recording files to get some idea of weight and fertility progress with the herd. After the evening meal, the records were looked at and some calculations made of bull growth rates for aiding selection for mating duties. The other criteria were scrotal size and polledness preferred. It was pleasing to calculate that average daily weight gains for the better bulls ranged from .88 to 1.02 kg/head/day since birth.

Six cattle trucks arrived during the afternoon to load the last of the SEALS livestock to go to the markets; BMT abattoir and the balance to supply Animex contracts. Total count was around 113 head and the last 17 were picked up during the Saturday morning.

Day 8: Sat 15 October 2016.

An early inspection of the feedlot sheds enabled a reasonably accurate count of all the current cattle resident on the facility. This includes imported heifers converted to breeder stock and all their progeny born locally which includes bulls and heifers up to 22 months of age.

Approximate count:

Category:	No. of head.	
Cows with calves at foot:	207	
Dry and pregnant cows:	124	
Yearling Heifers:	111	
Weaner Heifers:	34	
Yearling Bulls:	101	
Weaner Bulls:	33	
Poddy Calves:	4	
Mating Bulls: (Droughtmaster?)	2	1 fat Light brindle-coloured Brahman and 1 fat Red Bull
F/Holstein milking Cows	2	
TOTAL	**618 {Plus calves (207)}**	

The milking of the 2 Friesian/Holstein dairy cows is done twice daily and 4 poddy calves are the first recipients, then the kitchen. Yields appeared to be around 4 litres and 8 litres for each cow for single milking and they have around one month to go before due for drying off.

In the afternoon an inspection was made of the grass pastured area that they plan to electric fence to the north of the feedlot on the other side of the dam system. The fence would be around 1700 m in perimeter with another 900m of subdivision/internal fencing. It was suggested that they use a 6-wire boundary fence for security (cattle and human) and the internals could be 3-wire. They will opt for home-made concrete posts instead of steel pickets despite the extra cost as they feel that the steel pickets will be too easily souvenired by passing locals compared with concrete.

An example of the Belgian Blue male progeny at 13 months of age. The owner intends it as only a terminal cross for meat production and not for future herd inclusion.

A discussion with Mr Nhi ensued about grazing management of planted pastures, particularly in not grazing right down to the crowns and always leaving a good bulk of leaf to maximise the speed of regrowth of the sward.

The dams were inspected to show where heavy storm events had washed away earth walls, so concrete spillways were constructed to stop any further blow-outs. One more dam wall is to be constructed next dry to finish the inter-connected system. The dams have been stocked with fish for local (in-house) consumption and are getting to very big sizes already. Plenty of fish activity can be seen.

Herd management aspects were then discussed extensively for the rest of the day to determine the best options for the herd going forward. His aim is to establish a 2000 head breeder herd to supply slaughter cattle for the local market which is currently using hot boning/wet marketing, (550-600kg liveweight) but Mr Nhi envisages the Government eventually upgrading to more sanitary production of refrigerated meat for the local market, possibly within a five-year period. This would increase production costs due to refrigeration requirements but would significantly decrease the public health and food safety issues of current production.

They have observed that the cattle let out on pasture get pregnant more quickly than shedded cows.

Local farmer colour preferences are for red, brown or black, with prejudices against whites.

The trip was then made to the hotel, checking out and heading for Haiphong airport to catch the 1455hrs VietJetAir flight to Buon Ma Thout. Arrival at 1700hrs, went shopping for feedlot supplies, had dinner locally and 2 hours to M'Drak Red Star feedlot with Mr Nhi. It was interesting that the Supermarket in BMT had fresh chicken, pork and fish but no beef displayed!

Day 7: Friday 14 October 2016.

An early inspection of the feedlot revealed cattle all very well fed and looked after.

The balance of the SEALS steers and spayed heifers from their 2nd shipment were in the eastern half of Shed 1 and all ready for slaughter; approximately 110 head. One shed was completely empty. The rest contained locally born progeny or heifers retained for breeding. Some cows have calved twice since the first shipment.

The balance of slaughter steers and heifers left at feedlot and transported to market the next day.

There was a mob of cows and calves in the paddock adjacent to Shed 1 down the slope. What was interesting was seeing 6 or so head of cattle voraciously eating a *Mimosa pigra* shrub next to the fence. Admittedly, there wasn't a great deal of grass left in the paddock and when the feed wagon started dispensing feed in the sheds, they were lined up at the back gate waiting to be let in and giving plenty of voice at the same time.

The grazing paddocks were viewed from a distance but the cattle and mud were blocking access, so inspection was delayed until later on.

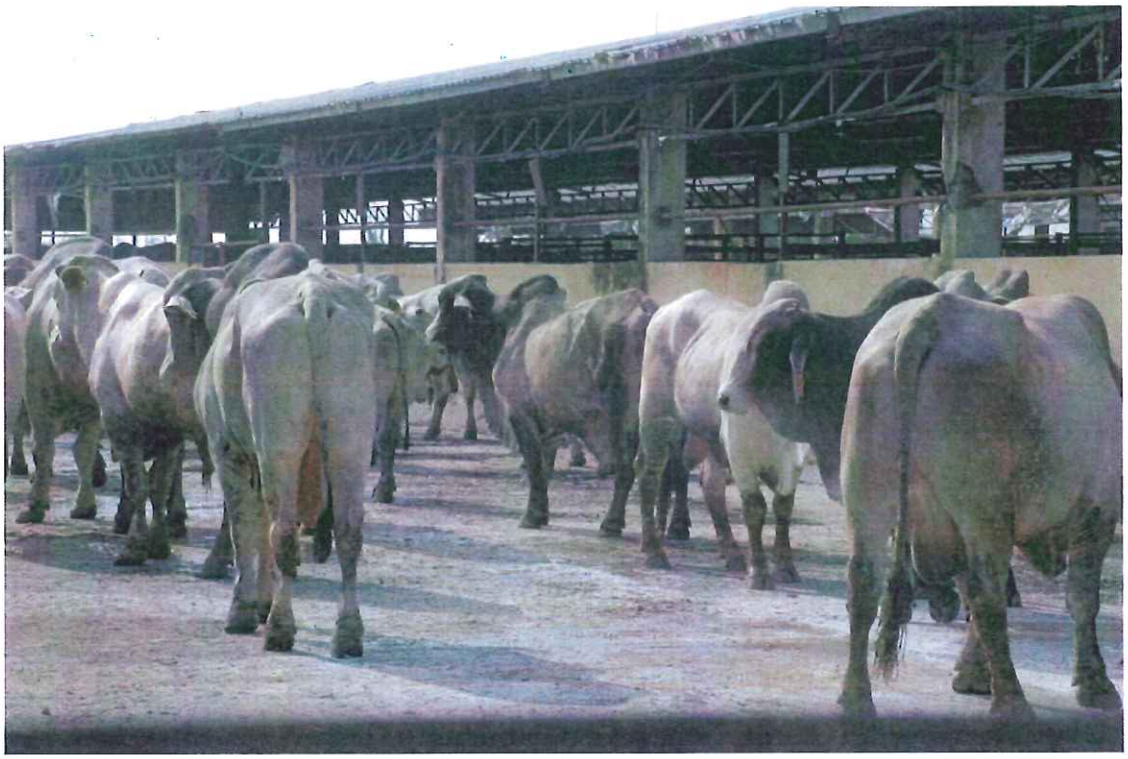
An inspection was made of the resultant progeny from their current AI program that is using Belgian Blue and Droughtmaster semen.

all pens by midday and all stock checked for sick animals. There were small numbers in all pens that were still a bit "tucked up" but the majority had eaten well over the last 24 hours. String ties from the maize bundles delivered were still being passed through the fodder chopper and removed from the feed when put in the troughs but just thrown into the pens where they could still be consumed. This is a problem that needs to be addressed. Four of the water troughs at the far end of the pens on 2 sheds were empty or low. All other management aspects appeared in good order. Another issue is that the concentrate is hammer-milled very finely, virtually to flour consistency and should be more coarsely ground if possible.

Day 6: Thurs 13 October 2016.

Out to feedlot by 0800 to greet Quarantine vets:

They wanted 50 buffalo bloods and 50 cattle bloods. The buffalo were the closest so they were chosen as first cab off the rank. Bad choice!! By 1230hrs 15 buffalo had been bled. For every one bled about 3-4 others escaped the head bale. The buffalo were usually in a hurry and if their horns hit the side of the head bale (not opened wide enough) then the head lifts up and backwards and the shoulders are into the head bale. The average Vietnamese stockman is not strong enough to hold the buffalo wriggling through and escaping bleeding. A lasso around the buffalo's horns was used to slow the buffaloes speed down but again the strength of the stockman (3 of) was insufficient to stop the escaping buffalo so the rope gradually became shorter as a knife was the only solution. The second Vet managed to collect about 3 urine samples with his small bucket on the end of a long pole whilst wandering around the pens.



It was suggested that maybe the cattle should be tried next and leave the balance of the buffalo until later. The cattle would have been much easier to catch and bleed. Instead the vets called it a day and rebooked for tomorrow. The only long-term solution for the buffalo is for the vets to be happy with a smaller sample size or a baulk gate installed in the race past the head bale to slow the buffaloes speed a fraction.

This is a significant improvement in operator safety from an OHS standpoint.

All the shipment of cattle and buffalo had been tagged with GC (Global Compliance) electronic tags as well as the standard NLIS tags used in Australia. A local company was contracted to supply readers and personnel to carry out the count of livestock delivered to the feedlot. 456 head of buffalo were delivered (2 deaths on board) and a total of 796 cattle.

All troughs had about 200mm of green chop maize in all troughs prior to stock arrival. Within 3-4 hours there were significant numbers of stock eating from the troughs. Cattle and buffalo were all in pretty good condition on arrival.

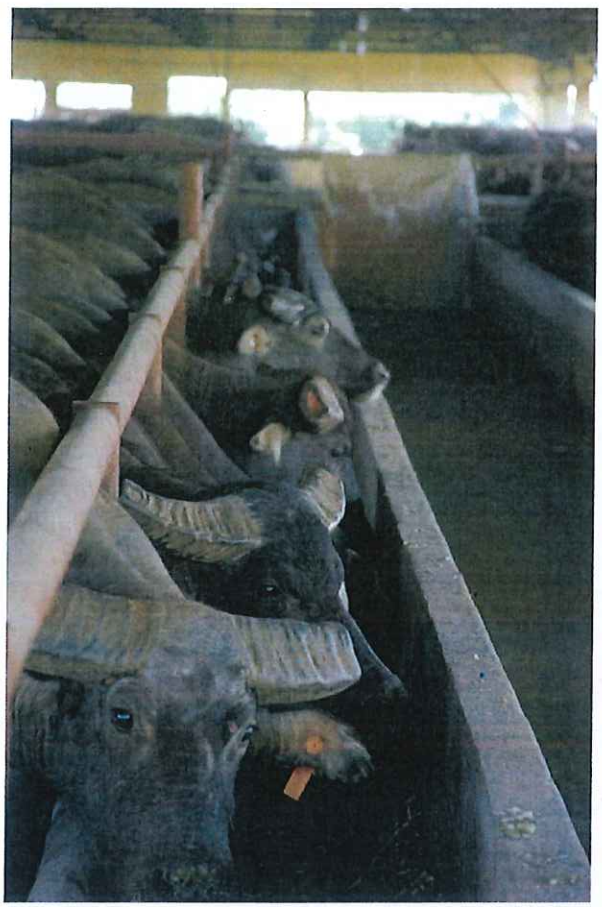
Day 4: Tues 11 October 2016

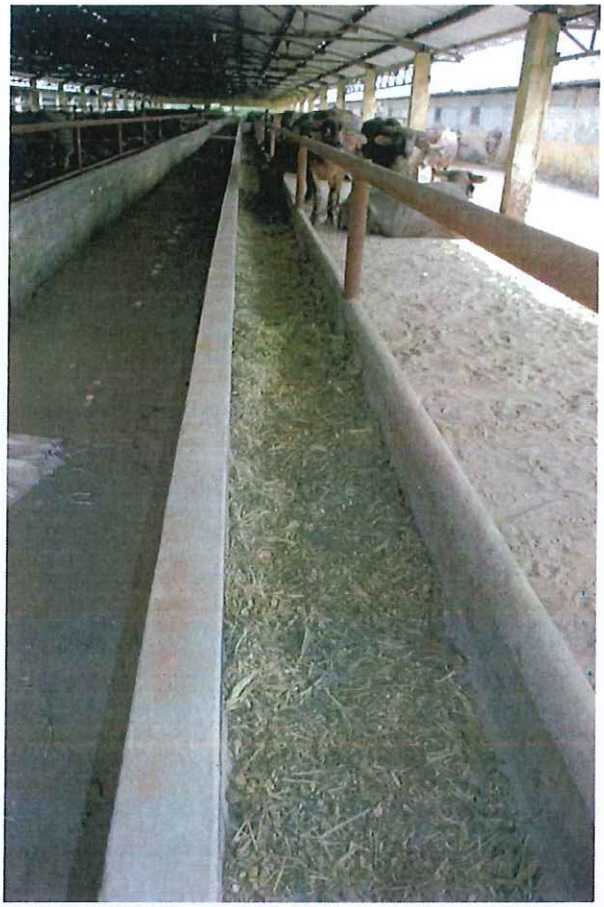
Cattle delivery to the feedlot commenced at 0450hrs (0300hrs at ship) and finished with a total of 54 truck journeys using 11 trucks by 1415hrs.

20 tonnes of stock cubes supplied by the exporter were then delivered to the feedlot. Further supplies of fresh maize (with cobs) were being processed by a new fodder chopping machine with higher capacity for feeding out that afternoon.

Day 5: Wed 12 October 2016

Inspection of feedlot operations by SEALS and DPIR staff:





Cattle and buffalo had consumed virtually all of the supplied fodder from day 4 which was a good indication of the health of the delivered stock. There were 5 head in the hospital pen; 2 steers (with leg wounds) and 3 bulls (1 badly lame) and the others OK. Feed had been fully delivered to

ATTACHMENT C

REPORT ON VIETNAM VISIT 8-16 OCTOBER 2016

B Lemcke: Overseas Technical Services, Livestock Industry Development, DPIR

Day 1: Sat 8 October 2016

3 Flights from Darwin to Haiphong via Singapore and Ho Chi Minh City

Day 2: Sun 9 October 2016

Customs papers not cleared so Livestock carrier GL Lin Xui delayed port entry for 35 hours off the coast

Day 3: Mon 10 October 2016

Inspection made of the Animex feedlot prior to the docking of the Lin Xui at 5pm

Unloading commenced at 2000hrs and the first truck of buffalo (buffalo unloaded before cattle as they occupied the upper decks) arrived at the feedlot at 2130hrs. 21 truckloads of buffalo were delivered by 0445hrs. They were transferred to 6 pens after scanning with 3-5 trucks per feedlot pen. Trucks carried 20-24 depending on the size of the buffalo. The trucks used are no longer body trucks, but are now semis with shipping containers converted to cattle transporters by removing the roof of the container whilst retaining a narrow strip of approximately 20mm around each edge and across the centre to allow for operator access to help get out stubborn livestock. The side-opening full height doors are retained at the rear of the container and this is a much safer closing system than the previous body trucks that had bottom hinged ramps that needed to be lifted by hand from within the loading platform whilst fully exposed to the cattle (or buffalo) just loaded. The truck ramps were usually flat metal sheeted and had no cleats and had to be covered with rubber matting before loading commenced and removed before ramp closer which increased the time taken to close up the crate.

Quarantine Arrangements:

On no account should any local cattle be allowed on the feedlot, ever. Maintain strict property Biosecurity and ensure that cattle allowed into paddocks are not able to engage or make contact with any other non-feedlot cattle of any other origin across a boundary fence.

Do not purchase any local bulls (however pretty!) to put into the herd. Disease dangers are far too high.

Enterprise Evaluation: Plan, Do, Measure, Review.

Any breeding plan should not be static, but able to be flexible if conditions change. It should be noted however that some effects take a considerable time to come to fruition and get the desired result especially with breeding and selection practices. Do not be afraid to trial a different strategy with a separate group, but always maintain a comparison group to run concurrently to enable a measurable outcome to be observed.

Pasture Management:

Simplest pasture management strategy is to allow growth to full normal height and graze down to about 40% level then lock up to allow regrowth. Grazing too short and not leaving a moderate amount of leaf available for regrowth lengthens the time period for regrowth quite considerably.

Apply manure and/or fertilizer to paddock at the end of each grazing session.

Resources: Staff, Capital, Feed, Land, Machinery, Knowledge.

Recording: There should be routine recordings of weight and body condition score BCS (1-9) to benchmark feedlot performance. Critical recordings, however, for breeding are:

Calf Birth weight/date– within 2 days of birth

Calf weaning weight (6 months of age)

Yearling weight (12 months after weaning)

Slaughter weight /date

Bull mating weight (Start and End of mating)

Cow weight at weaning

Cow weight at start of mating

Maintain a Bull breeding register (Book or Computer where the Start and End dates of joining, tag Nos. of bulls and cows in each group are recorded.

Reproduction Efficiency Indicators:

Calving Interval: **No. of days between successive calves**

Days to Calving: **No. of days between start of mating and next calf born**

Kg of calf weaned per Cow mated.

Weaning rate percentage: (No. of Calves weaned /No. of cows mated x 100) %

Disease Prevention:

Vaccinations needed:

5 in 1 or 7 in 1 of calves at weaning and 6 weeks later for booster

Regular faecal worm egg inspections by in-house veterinary staff to ensure that there are no nematode outbreaks.

Haemorrhagic Septicaemia vaccinations

Vibriosis (Campylobacter) vaccine: Bulls: Yearly vaccinations prior to mating

Heifers: 2 shots 4-5 weeks apart (6 weeks before mating). If abortions are prevalent and frequent returns to bull.

Any other vaccines recommended necessary in Vietnam by Veterinary Dept for cattle herds.

culled should there be a poor pregnancy test result at any pregnancy test with a large percentage of empty cows greater than 2 months post-calving.

Bull Selection: Select bulls by calculating their average daily weight gain (ADG) since birth and measuring testicle circumference (SC). Also look at the dam history of calving and look for cows with shortest calving intervals. These can be graphed in Excel and selection is made easier to visualize by selecting bulls on the top RHS of the scatter plot i.e. combination of high LWG and high SC.

Culling:

1. Cows that fail to get pregnant within 18months of previous calf. This can be gradually reduced over time as the herd becomes more efficient to increase pressure on herd fertility
2. Bulls a maximum of 4 years of mating in the herd.
3. Heifers not pregnant by 30 months of age and 450kgs live weight.
4. Bulls or cows with visible defects;
    a. Long dangly prepuce
    b. Bottle teats
    c. Prone to mastitis
    d. Deformed hooves where walking is hampered if not cured by trimming
    e. Aggressive behaviour to staff except with cow at birth of calf

Feeding:

Feed according to need nutritional requirements

- Lactating cow has highest requirement
- Post-Weaning for 1st 2 months then reduce concentrate percentage so fatness does not become a problem
- Late pregnant cow needs good nutrition for the rapidly growing foetus (final 2 months) but also needs adequate exercise on a daily basis.
- Non mating bulls; no concentrate needed. Spike feed for 1 month prior to mating.

Identification:

Ear tags can be lost at any time. A single tag is high risk for losing track of pedigrees in the herd.

Alternative methods:

- A second duplicate ear tag in the opposite ear (not total solution as both tags are possible to lose in the same period between recordings).
- Permanent solutions:
    - Ear Tattoos especially if white paste is available for dark skinned cattle; equipment required is ear tattoo pliers and numbers with tattoo paste
    - Fire-branding numbers on rump at weaning, a calf branding cradle and calf race would need to be added to yards

Suggested Mating Strategy:

Maintain a viable group size of approximately 100+ breeding cows depending of shed capacity and breeding herd total numbers.

Breeding Group 1, 3, 5 etc Calendar:

January 1: Start of mating

March 31st: End of mating Start of calving round 2 –year 2

May 31st: Pregnancy test round 1 mating

July 1: Start round 2 mating End of calving Round 2 -year 2

August 1: Weaning calves Round 1

October 1: End of mating round 2 Start of calving

November 30: Pregtest round 2 mating, Weaning calves Round 2 year 2

December 30: End of calving

Breeding Group 2, 4, 6 etc Calendar:

April 1: Start of mating

June 31st: End of mating, Start of calving round 2 –year 2

August 31st: Pregnancy test round 1 mating

October 1: Start round 2 mating End of calving Round 2 -year 2

November 1: Weaning calves Round 1

January 1: End of mating round 2 Start of calving

February 30: Pregtest round 2 mating, Weaning calves Round 2 year 2

March 30: End of calving

Weaning Practices:

Wean at around 6 months or 220 kg whichever comes first. Wean calves earlier at lighter weights down to 120 kg if necessary when cows are in poor condition.

Bull Usage: The number of bulls used affects the in-breeding potential. Use of a minimum of 3 bulls per hundred breeders is recommended. The total number required can be reduced by creating a controlled mating period of 3 months (maximum 4 months) and a rest period of 3 -2 months so that weaning can be achieved in batches at 6 months of age. Bull selection can be assessed if these groups are run together until 24 months of age. Breed own bulls or Imported bulls only.

So for group calendars above, bulls would move from Group 1 to Group 2 then to Group 3 and then Group 4 and so on until whole herd is covered and 3 years has expired. The bull group would be

Red Star Herd Management Plan: October 2016.

Aim of herd: *To produce 550-600 kg bulls suitable for the local Vietnamese market at 2- 2.3 years of age.*

Herd target number: *2000 head of breeders by 2020*

Current Herd numbers (Oct 2016):

Category:	No. of head (Approx.)
Cows with calves at foot:	207
Dry and pregnant cows:	124
Yearling Heifers:	111
Weaner Heifers:	34
Yearling Bulls:	101
Weaner Bulls:	33
Poddy Calves:	4
Mating Bulls:	2

Group Segregation:

Group segregation depends on yard space and trough length and size of the animal. However the following groupings are recommended.

Lactating cows and calves: Lactating cows and calves have the highest feed requirements to enable good milk production.

Dry Cows (pregnant): Between weaning and calving, time to gain weight and condition prior to calving.

Late Pregnant Cows for calving down: Last 2 months of gestation: keep well exercised; going out to paddocks on regular basis. They can calve out in paddock (better) or in yards at night. Leave plenty of space to comfortably lie down if in yards. Keep up exercise daily and don't let get over-fat.

Yearling heifers: Preparation for first mating. Run with yearling bulls once 330 kg weight has been attained.

Yearling Bulls: Select the top bulls to mate with yearling heifers. Mate with yearling heifers with at least 4 bulls per 100 heifers

2yo Heifers:

2yo Bulls:

Weaners Male and Female:

Non-Mating Bulls:

2. Red Star appears to be well positioned in their breeding herd aspirations. Further visits are unlikely to be necessary in the future, except for the practical construction of electric fences for herd pasture grazing that they plan to implement. Red Star may require another 100-200 breeder heifers to import from the NT to hasten their breeding herd build-up in the near future.

3. No follow-up visits to these two companies are currently planned, although any future requests will be considered and are likely to be combined with other tasks in Vietnam.

4. A detailed Report on the visit to Vietnam is also attached for your information (Attachment C).

CONCLUSION

The visit was successful in providing evidence that demonstrates to the NT Government that these two Vietnamese importers are functioning to the required standards. This augurs well for continuing supplies of both slaughter and breeding cattle and buffalo into the future into Vietnam. This is the major outlet for buffalo and larger cattle currently available to NT exporters.

It is important that NT exporters do not oversupply the market and cause pricing issues for Vietnamese importers. This has occurred to some extent over the last 18 months due to some companies with large vessels flooding the market, which has lowered the returns for the Vietnamese feedlot companies.

Action Officer:	Barry Lemcke	92263
Group Head:	Neil MacDonald	39746
Chief Executive	Alister Trier	92005

Date: 28/10/2016

NOTED

9/11/16

KEN VOWLES

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

OVERSEAS TRAVEL REPORT

MIN.LIAISON

Dept Ref: 16-0707-SEC
Min Ref: 2016/0176-KEV
HPRM: P2015/00001

Title:	Report on overseas travel for Mr Barry Lemcke to Vietnam to assist with Buffalo and Cattle Exports
Destination:	Animex P/L (Haiphong) and Red Star P/L (Dak Lak) Northern and Central Vietnam
Date/s:	8-16 October 2016
Travel approved:	28 October 2016 (refer to Attachment A
Officer/s travelling:	Mr Barry Lemcke

PURPOSE

To provide technical assistance to two pioneer importers of Northern Territory (NT) cattle and buffalo in Vietnam, in particular to oversee the importation of a large buffalo shipment (458 head) to a company which encountered large losses on a previous shipment in December 2014.

PROPOSED OUTCOMES

1. To ensure the welfare of new shipment of NT cattle and buffalo unloaded in Haiphong for the Animex Feedlot which was previously in temporary suspension.

2. Check on progress of the breeding operation at Red Star (Dak Lak) and provide a Breeder Management Plan. A copy of the Draft Red Star Herd Management Plan – October 2016 is attached for your information (Attachment B).

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

1. The Ship MV GL LIN XUI was successfully unloaded within 22 hours of docking of 456 Buffalo (2 died on board) and 796 cattle. There were no mortalities within the first 24 hours and the required forage and concentrate was fed out in a timely manner on all days observed.

2. The breeding program at Red Star is progressing well with all stock in good condition. The farm is well supplied with forage currently and is renewing its storage reserve of silage currently from excess supplies. A draft Breeder Management Plan was emailed to them for comment on 21 October 2016.

FOLLOW UP ACTION REQUIRED

1. Animex appeared to be well prepared for this shipment and are probably unlikely to require future assistance from the Department of Primary Industry and Resources (DPIR) except possibly in the building of their new feedlot to the north of Haiphong, where they will produce a lot of their own fodder. Animex plan to continue to purchase NT cattle and buffalo into the future.

ATTACHMENT C

ITINERARY FOR NEVILLE HUNT - TRAVEL TO TIMOR LESTE

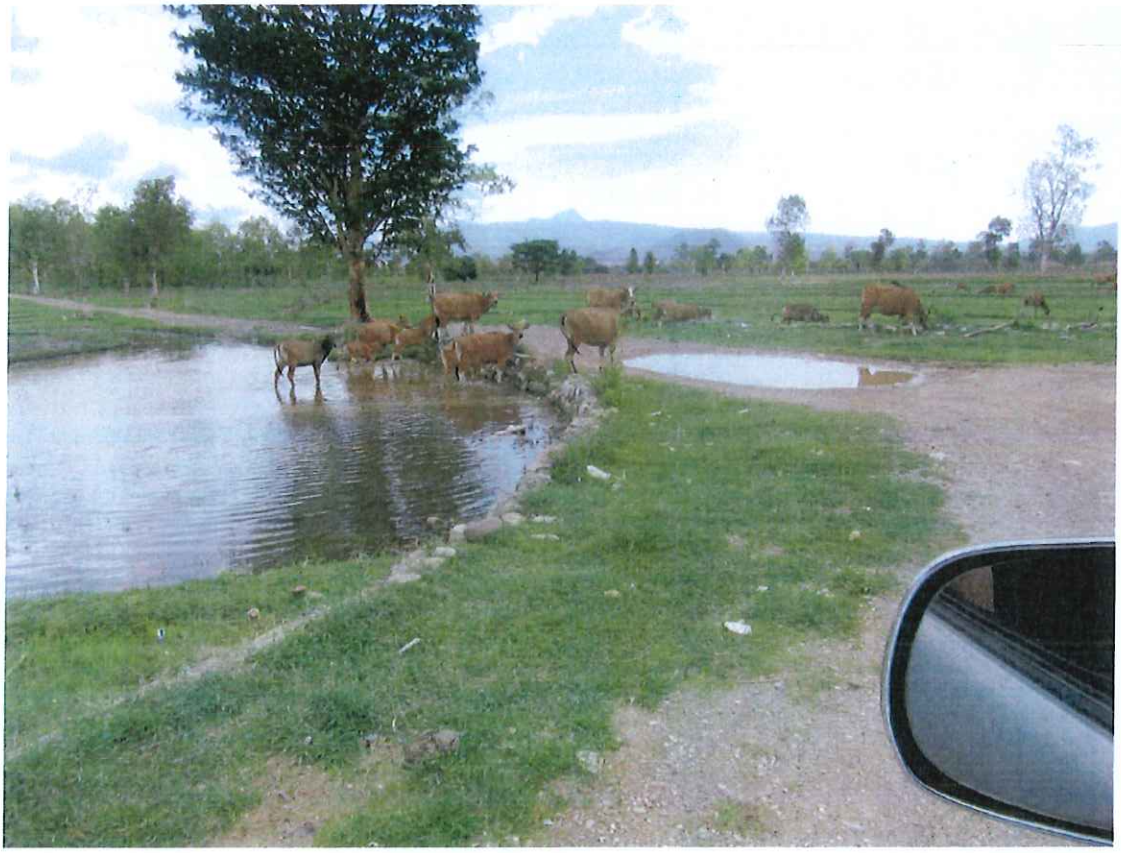
FOR THE PURPOSE OF

COLD CHAIN AUDIT FOR THE TIMOR LESTE VILLAGE POULTRY HEALTH AND BIOSECURITY PROGRAM

2 OCTOBER - 12 OCTOBER 2016

2 October	Depart Darwin for Dili
3 October	Vehicle pick up. Dili to Aileu return. Assess facility and systems.
4 October	Dili to Lautem, Lautem to Lospalos and Lospalos to Dili. Assess facility at Lospalos and implement monitoring at Lautem.
5 October	Dili. Meeting with Lospalos staff on leave in Dili. Brief visit to central storage at Veterinary Diagnostic Laboratory.
6 October	Dili to Maliana and return. Assess facility at Maliana.
7 October	Dili. Return visit to Laboratory to institute major changes.
8/9 October	Report preparation. Return vehicle.
10 October	Dili. Discussions with National Director of Veterinary Services re outcome of visit and future directions.
11 October.	Dili. Discussions with Chief of Department of Medicines and Veterinary Equipment.
12 October.	Depart Dili for Darwin.

Bali cattle near Maliana

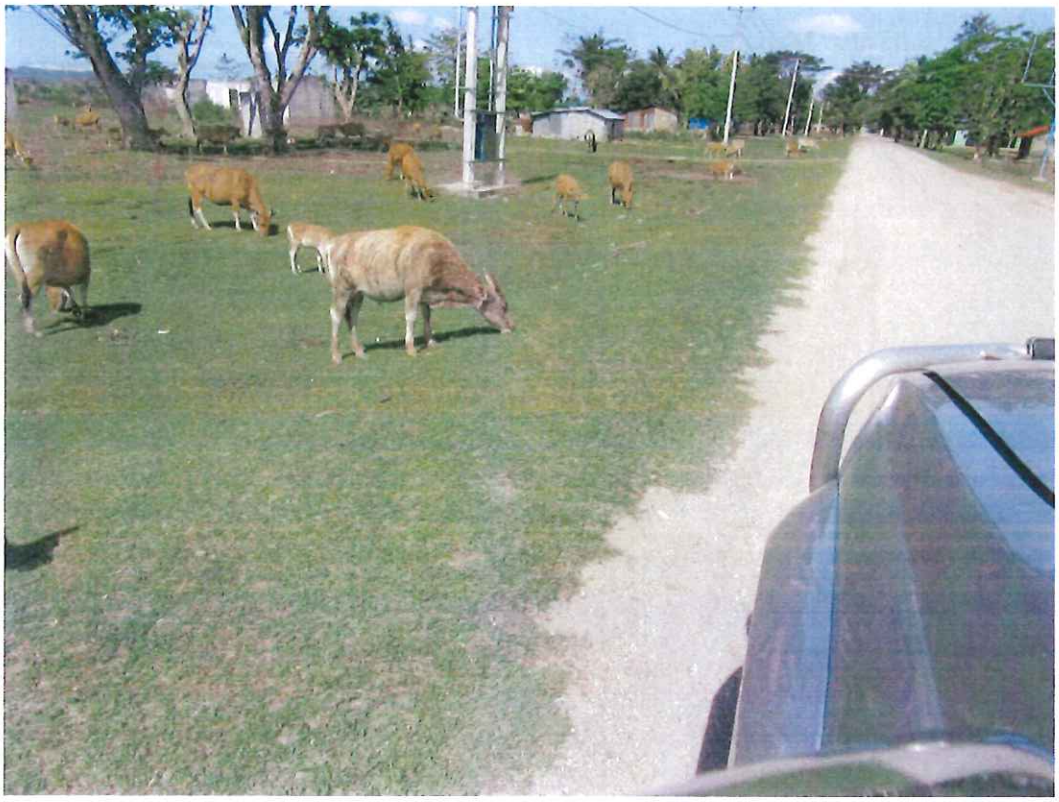


Timor Leste MAF staff near Maliana

ATTACHMENT B

Sheep near Lautem

Bali cattle near Lautem



Following the previous visit, the vaccine stored at the central location was moved to the Veterinary Diagnostic Laboratory, which has an emergency power supply. However, the emergency generator is currently not working, and attempts to find someone to repair it have, so far, been unsuccessful.

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

- This project work has continued building relationships between TLMAF staff and BVL staff, enhancing Australia's disease intelligence in the region;
- Technical knowledge transfer to Timor-Leste, to improve their poultry health and biosecurity practices; and
- This activity is part of our efforts to demonstrate to Timor-Leste our willingness to assist them.

FOLLOW UP ACTION REQUIRED

Vaccine cold storage facilities are increasingly being developed in Timor-Leste. For these facilities to operate at an optimal level, it is important that Standard Operating Procedures be developed, applied and periodically assessed.

While internal audits are beginning to be applied, it is highly desirable that visits such as this continue to assist implementation and maintenance of the vaccine cold chain. DoAWR have asked if a further assessment can be made before the conclusion of the project.

CONCLUSION

The aims of this trip were all successfully accomplished to the mutual benefit of the NT Government, DoAWR and the TLMAF.

More detailed information can be supplied upon request.

Action Officer:	Lorna Melville	92251
A/Group Head:	Karen Timms	92394
Chief Executive	Alister Trier	92005

ALISTER TRIER 26/10/2016

NOTED

28/10/16

KEN VOWLES

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

OVERSEAS TRAVEL REPORT

MIN.LIAISON

Dept Ref: 16-0688-SEC
Min Ref: 2016/0169-KEV
HPRM Ref: 2010/0320

Title:	East Timor Village Poultry Health and Biosecurity Program
Destination:	Timor-Leste
Date/s:	2-12 October 2016
Travel approved:	21 September 2016 (refer Attachment A)
Officer/s travelling:	Mr Neville Hunt

PURPOSE

This department's Berrimah Veterinary Laboratory (BVL) is part of a new Australian Aid Project - the Timor-Leste Village Poultry Health and Biosecurity Program (TLVPHB). The TLVPHB has three components:

1. Village Chicken Health and Management;
2. Effective Poultry Vaccine Cold Chain; and
3. Poultry Biosecurity Strengthening.

The program is jointly managed by the Australian Department of Agriculture and Water Resources (DoAWR) and the Timor-Leste Ministry of Agriculture and Fisheries (TLMAF).

Under the program, the DoAWR has contracted the BVL to undertake a cold chain assessment in Dili and the TLVPHB's three pilot villages, to assess the current compliance and to identify issues impacting on effectiveness and sustainability.

Also provided for your information are photographs from the travel (Attachment B) and a copy of the Itinerary (Attachment C).

PROPOSED OUTCOMES

On 21 September 2016 you approved Mr Neville Hunt, Senior Technical Officer, Department of Primary Industry and Resources, to travel to Timor-Leste to undertake work as part of the TLVPHB project.

Visits were made to four sites, currently used as regional repositories of vaccine stocks and two sites proposed for that role. Three MAF staff accompanied Mr Hunt to these locations and were made familiar with methods used for assessments of the cold chain and in particular, the use of follow-up questions additional to the template format used.

Assessments were made of previous training inputs in relation to optimum cold storage of vaccines. Implementation has been sporadic, and only one site visited has yet attained a satisfactory level.

ATTACHMENT C

Itinerary

Mr Neil MacDonald's travel to East Kalimantan

16-23 September 2016

Friday 16 September 2016

- Left Darwin in evening and travelled to Denpasar.

Saturday 17 September 2016

- Travelled to Balikpapan, via Jakarta.

Sunday 18 September 2016

- Visited farms in Babulu and Long Ikis districts.
- Overnight at Tanah Grogot.

Monday 19 September 2016

- Met Head of Agriculture, Department for Paser Regency, at Tanah Grogot.
- Visited farms in Kuaro, Long Ikis and Long Kali districts.
- Overnight at Tanah Grogot.

Tuesday 20 September 2016

- Met Head of Agriculture, Department for Penajam Regency.
- Visited farms in Kuaro and Long Ikis districts.
- Overnight at Balikpapan.

Wednesday 21 September 2016

- Visited farms in Sepaku district.
- Planning meeting with Project Manager.
- Travelled to Jakarta in evening.

Thursday 22 September 2016

- Met with Dr Valeska, Meat & Livestock Australia, Jakarta Office.
- Met with Mr Dick Slaney, Coffey International Program Manager.
- Met with Ms Laura Timmins, Agricultural Counsellor, Australian Embassy.
- Met with Mr Mark Bruny, Northern Territory Department of Business representative, in Indonesia.
- Overnight in Jakarta.

Friday 23 September 2016

Flew from Jakarta to Denpasar, then on to Darwin. Drove home to Katherine.

Excellent feed under the trees

A more typical plantation

Delivering grass by motorbike

King grass being cultivated

Very quiet cattle – Witri and her mum

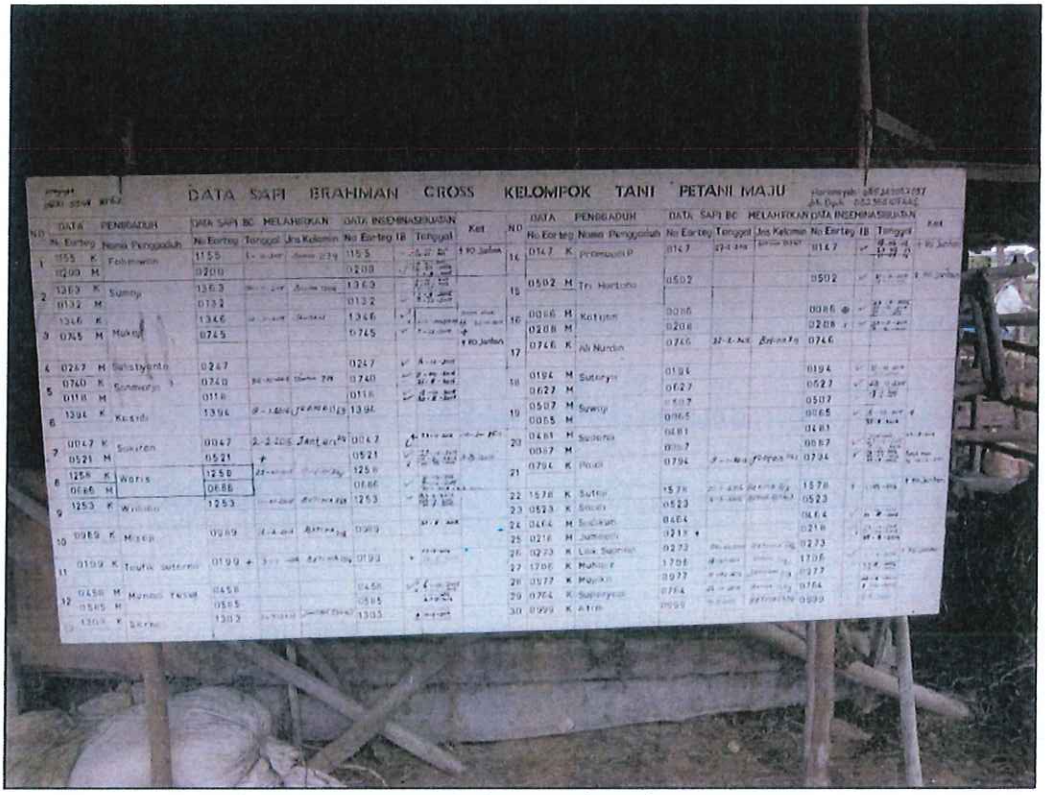
Perfect grazing – unfortunately all plantations are not as good as this

Wet cows were almost all skinny

These cattle were grazed during the day and also fed on their return in the afternoon

One of the South Kalimantan bulls – they all looked like this

Well housed and in good condition



Record at Cooperative including number of inseminations

Good looking weaner, obviously with a *Bos taurus* father

Cow on the left has had a weaner taken off. The one on right is dry so should be in better condition

Dry cow in front, wet cows behind

ATTACHMENT B

EAST KALIMANTAN - SEPTEMBER 2016 - NEIL MACDONALD

Two cows about to calve – good condition and successful artificial insemination

Great big weaner sucking on his skinny mum

- At some sites, cattle ticks are proving to be a major issue and are discouraging the farmers from allowing the cattle to graze freely.
- Data collection needs to be greatly improved.

Action Officer:	Neil MacDonald	39746
Group Head	Neil MacDonald	39746
Chief Executive	Alister Trier	92005

ALISTER TRIER **04/10/2016**

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business representative in Indonesia, to get intelligence on changes to the Indonesian Government policy on importation of live cattle and the likely effect of those changes.

FOLLOW UP ACTION REQUIRED

- Implementation of the Project's operational plan for the next six months. Most of the activities will be conducted by the Project Manager without requiring visits from DPIR staff.
- There is an urgent need to improve data collection (this will require DPIR Staff input and visits).
- DPIR Staff will draft a 'Best Practice Guide' for management of imported Australian cattle by April 2017.
- The Provincial Government asked DPIR for assistance to prepare a projection of potential financial return on the project.
- An application to the Australian Government for extension of the Project for two more years (April 2017 - April 2019) has been submitted.
- The application also asks for funding to adapt and use Indonesia's Animal Health Data System (known as iSIKHNAS) to accept and report breeder data. If successful, this will require DPIR Staff input.
- It is anticipated that over the next year a visit to East Kalimantan by DPIR Staff may be required approximately every two months.

CONCLUSION

There has been a great improvement in the condition of the cattle since the last visit in March 2016. There are now no significant animal welfare concerns and the focus of the Project has now shifted onto production. In that regard, there are still some major challenges. Conception rates are low, for quite obvious reasons. The main conclusions from this visit are:

- There are no functional bulls available on the farms. The Indonesian Government and East Kalimantan Government have each imported bulls from other provinces in response to this problem. However, the 60 bulls bought by the Indonesian Government from South Kalimantan are immature and in very poor condition. It will be at least 12-months before they are able to be effective. The 120 bulls imported by the Provincial Government from Sulawesi have not been distributed to the farms. The Project Manager is trying to track them down and arrange for their use.
- The Project has been relying on artificial insemination (AI), which is never as effective as using a bull. There are also issues of heat detection, timeliness of insemination and handling of the straws. The Project plans to employ a consultant to study the AI system and advise on ways of improving it.
- Early weaning is essential to get the heifers back in good condition; ready to re-conceive and this is not a traditional practice for the Indonesian farmers. The message is starting to get through, but the weaning is still not early enough.
- Mortality of cows (5%) and calves (19%) over the ten months the cattle have been on the farms is about twice that expected in the longer-term. Most of the mortality was early in the project related to problems in Quarantine on arrival, but the health issues will be investigated further.

DEPARTMENT OF PRIMARY INDUSTRY AND FISHERIES

OVERSEAS TRAVEL REPORT

Dept Ref: 16-0581-SEC
Min Ref: 2016/0095-KEV
HPRM Ref:

Title:	Supervision visit for the East Kalimantan Breeder Program
Destination:	East Kalimantan and Jakarta, Indonesia
Date/s:	16-23 September 2016
Travel approved:	26 July 2016 (refer Attachment A)
Officer/s travelling:	Mr Neil MacDonald

PURPOSE

To observe the progress of the East Kalimantan Cattle Breeder Importation Project (the Project), whilst supervising and providing support to the Project Manager.

BACKGROUND

The Project is funded by the Australian Government, on behalf of the Indonesian-Australia Partnership for Food Security in the Red Meat Sector (the "Red Meat Partnership") and managed by the Northern Territory (NT) Department of Primary Industry and Resources (DPIR). The Project Manager is employed through a contractual arrangement with Austrex, one of the livestock exporting companies. A total of 2 000 heifers were imported in October 2015 and distributed to 47 farmer cooperatives, each comprising 25 farmers, in November 2015.

PROPOSED OUTCOMES

- Supervise and provide support to the Project Manager;
- First-hand report on the welfare and performance of the imported breeders in their small-holder farms for the Australian Government and other stakeholders; and
- Provide advice to the East Kalimantan Provincial Government on their importation program.

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

- Thirty farm cooperatives were inspected in East Kalimantan, which represents about half of the cattle imported in October 2015.
- Issues were identified and a report to the Red Meat Partnership was prepared on return.
- A plan for the next six months for the Project was worked out with the Project Manager.
- Meetings held with the two district managers of the East Kalimantan Department of Agriculture.
- Discussions were held in Jakarta with the local head of Meat and Livestock Australia, the Agricultural Counsellor at the Australian Embassy and the NT's

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28 July 2016

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Department of Mines and Energy
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Re: **SPE Reserves, Resources and Definition Workshop**
15 – 18 August 2016 • DoubleTree by Hilton Hotel Kuala Lumpur, Malaysia

Dear Mehrdad Rezazadeh,

On behalf of the Programme Committee for the 2016 SPE Workshop on "Reserves, Resources and Definition", we would like to formally invite you to **lead a discussion** in **Session 9: NOC/IOC's Reserves Management with PRMS/SEC** at the above workshop scheduled on **15 – 18 August 2016** in **DoubleTree by Hilton Hotel Kuala Lumpur, Malaysia**.

This invitation is based on your reputation as a leading professional in your field and your ability to provide critical information in this effort to share knowledge throughout the oil and gas industry.

One of the key responsibilities you will have as a **Discussion Leader** is to stimulate a maximum of discussion among attendees and a minimum of formal presentation. The format of the Workshop is different from the standard SPE conferences as it does not require any written papers to be submitted, and only a **one-page abstract** is required. The presentations are informal and each presentation, followed by a group discussion, is limited to a total of **30 minutes**. The Workshop is intended for all participants to contribute actively to the discussion, to share knowledge and information.

We would be grateful to have you join us in making this workshop a valuable platform for sharing current and future best practices. We very much look forward to your participation for this workshop.

Please do not hesitate to contact us if you require further information.

Sincerely yours,

Jenny Chong
Senior Event Manager, SPE Asia Pacific

Enclosed: Workshop Brochure, Discussion Leader Pack

C.C Norbashinatun Salmi Muhd Nordin, PETRONAS (Workshop Co-Chairperson)
Doug Peacock, Gaffney, Cline and Associates (Workshop Co-Chairperson)

The Department's attendance in the SPE Reserves, Resources and Definition workshop in Kuala Lumpur, Malaysia achieved its objectives by gaining further expert knowledge regarding SPE-PRMS and its applications on petroleum resource management.

Action Officer:	Mehrdad Rezazadeh	95388
Group Head:	Victoria Jackson	96030
Chief Executive	Alister Trier	95332

ALISTER TRIER **22/09/2016**

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16/10/16

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10. In the "Reservoir Management Plan" of the producing oil and gas fields, a development strategy needs to be clearly stated and the regulator is required to assess it in accordance with the policies of the government. For example if the strategy of the government is to achieve net ultimate recovery there has to be an approval regime within a Petroleum Resource Management Regulations for "Reservoir Management Plan" and a comprehensive guideline to achieve this policy. Currently the "Schedule of Onshore Petroleum Exploration and production 2016" does not provide an approval regime to implement the petroleum resource management policies of the government.

Outcome 4: To ensure the Northern Territory is recognised as a preferred exploration destination at SPE Reserves, Resources and Definition Workshop.

The workshop and the presentation was a good opportunity to inform the international oil and gas community of the quality of Northern Territory petroleum resources particularly for oil and gas companies within Asia Pacific region. The Northern Territory is located on the doorstep of the growing economies of the Asia Pacific region and holds substantial resources of petroleum; this has made Northern Territory an ideal location for the oil and gas companies in the Asia Pacific region.

FOLLOW UP ACTION REQUIRED

- The following guidelines are required to be updated as per the discussions in this report:
    - Reporting Petroleum Reserves and Resources Guideline
    - Reporting a Discovery Guideline
    - Reservoir Management Plan Guideline

- It is required to develop a guideline for the principles of minimum criteria for a proposed technical work program either for grant of exploration permit or for renewal of exploration permit as per the PRMS. Approval regime is required to be amended in the current Petroleum Act in a way to provide the right of refusal of renewal applications if the operator does not provide an acceptable technical work program.

- Current resource estimates are out-dated and in some cases there are inconsistencies in the reporting, there is a need for development of a petroleum resource estimates data base.

- There is a need to provide approval regime for the "Reservoir Management Plans" in the development of the "Petroleum Resource Management Regulations" to implement petroleum resource management policies of the government.

CONCLUSION

Despite a lower than usual appetite for new exploration opportunities in the current investment environment, there was still strong interest shown in the quality of petroleum resources of the Northern Territory.

There is a need to improve the guidelines regarding petroleum resource management as per the discussions in this report.

3. If the operator has not identified a Prospect, and thus the exploration is still in the either Lead or Play sub-classification phase, therefore there is no technical reason to request operator to drill more than one well in the next exploration period.

4. In every exploration permit, the work program must include activities to progress the definition of any discovered petroleum accumulation to at least a "Contingent Resource" classification as per the PRMS.

5. Acceptable reporting standards as per the current guideline of petroleum resource/reserve reporting are as following:

    a. SPE PRMS
    b. United States Securities and Exchange Commission (SEC)
    c. Australian Securities Exchange (ASX)
    d. Australian Securities and Investments Commission (ASIC)

    Below recommendations have been provided:

    i. It is recommended to remove ASIC, because ASIC does not provide any additional requirement rather than the others to fulfil a particular purpose of the government resource management.
    ii. It is recommended to consider adding Canadian Oil and Gas Evaluation Handbook (COGEH) as an acceptable standard. Since some titleholders in the Northern Territory are from Canada this recommendation might be a valid one. More study is required to identify risks and benefits of introducing COGEH as a new acceptable format of resource reporting.
    iii. In some cases SEC contradicts PRMS, more consideration is required if an operator submits a resource estimate report which complies with SEC.

6. Based on current guideline, using analog is considered a recommended method for resource estimates however in PRMS it is not clearly stated under what conditions we are able to accept that a Play/Lead/Prospect is analog to another one. More emphasis is required to be stated in the updated guideline in accordance with the table 2.

7. It is a good practice to include requirement of independent reserves auditor report in the guideline. This requirement has already been addressed in the "Schedule of Onshore Petroleum Exploration and Production Requirements 2016". Independent reserves auditor report enables government to quantify the prospectivity of each permit or the licence by the reliable independent data.

8. In order to avoid exaggerating assumptions which can lead to exaggerating estimates in the discovery reports, every discovery report needs to be accompanied with an independent reserves auditor report.

9. In accordance with SPE-PRMS, discovery in Unconventional resources can be announced not only by bringing the hydrocarbon to the surface but also by sampling and logging. It is recommended to keep this requirement in the guideline.

The outline of the presentation was as following:

- Introduction of Northern Territory's onshore prospective petroleum basins
- Resources and reserves estimates of Northern Territory
- Reporting requirements of petroleum reserves and resources
- Reporting requirements of a petroleum discovery
- Reservoir Management Plan requirements

The following key feedback received during the presentation and the discussions in the workshop:

1. There is a need to update the current resource reporting guideline in a way to classify the Play, Lead, Prospect sub-classifications in the best estimate prospective resources classification. Currently, the operators are not required to classify their prospective resource estimates and therefore it is unknown that how much of the estimates are within the Play sub-classification, in Lead sub-classification and in Prospect sub-classification.

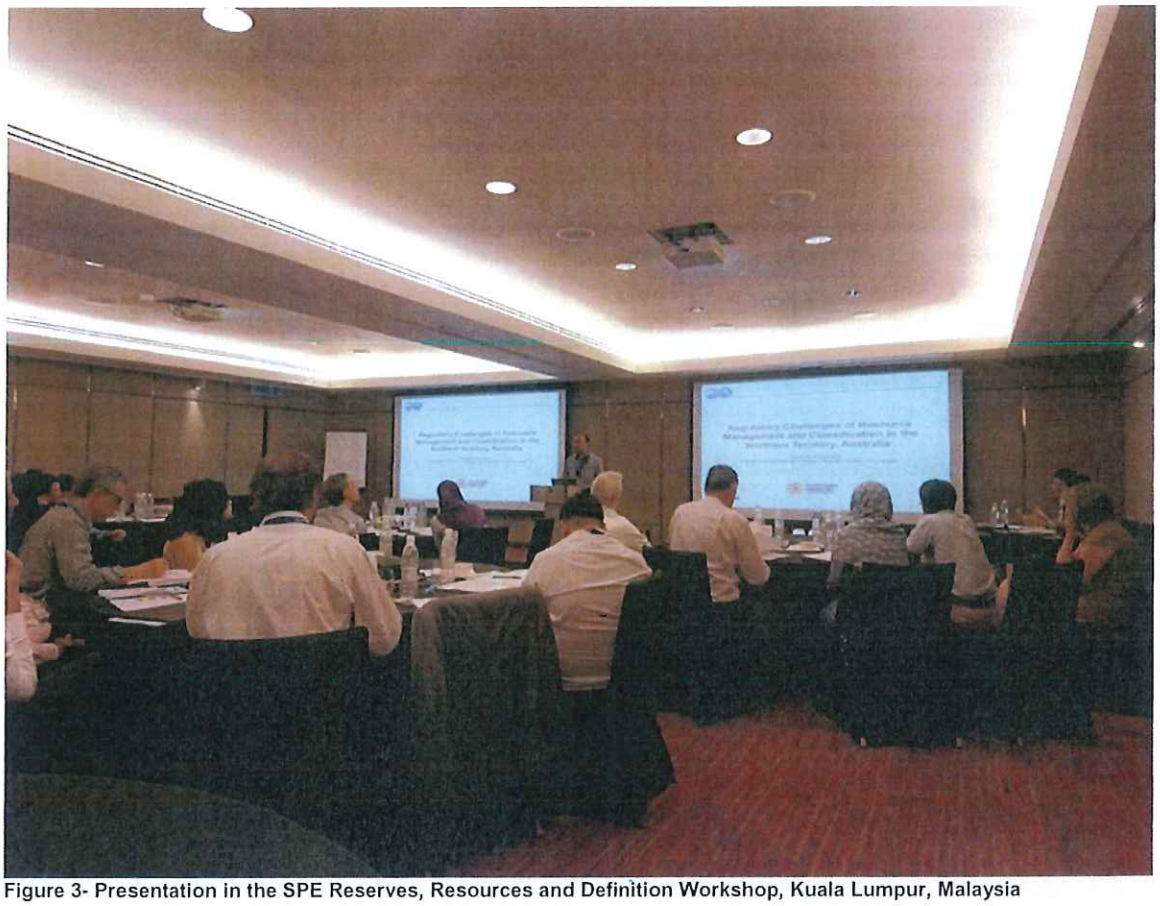

Figure 3- Presentation in the SPE Reserves, Resources and Definition Workshop, Kuala Lumpur, Malaysia

2. One of the current issues during assessment of proposed technical work programs is a lack of policy and guideline on what is the minimum number of the wells accepted for a proposed work program for the renewal period. If the operator submits resource estimates and identifies the Prospects in accordance with SPE-PRMS, if a Prospect has a considerable amount of resource, then it must be drilled in order to de-risk the Prospect.

- reasonable assessment of the future economics of such development projects meeting defined investment and operating criteria
- reasonable expectation (i.e. high degree of confidence) that there will be a market for all or at least the expected sales quantities of production required to justify development
- evidence that the necessary production and transportation facilities are available or can be made available
- evidence that legal, contractual, environmental and other social and economic concerns will allow for the actual implementation of the recovery project being evaluated.

Reporting Non-Sales Quantities

- Sales quantities are stated according to their delivery specifications at a defined price.
- Sales quantities are equal to raw production less hydrocarbon shrinkage and non-sales quantities.
- Non-sales quantities include petroleum consumed as fuel, flared/reinjected or lost in processing, plus non-hydrocarbons that must be removed prior to sale.
- If sold as "wet gas" then no liquid reserves (condensate)would be quoted.
- If sold as "dry gas" then need to report reserves separately for dry gas quantities and condensate.

Reporting Fuel, Flare and System Losses

- Flared gas and oil and other losses are not included in either product sales or reserves.
- Reserves statements should clearly state if deduction has been made for fuel and system losses.
- Some regulatory guidelines may allow lease fuel to be included in reserves, in such a case, such fuel quantities should be reported separately from sales and their value must be included as an operating expense.
- The recommended practice is to exclude fuel from reserves.

Outcome 3: To discuss the challenges of the current reporting practices of shale oil and gas resources in the Northern Territory with the PRMS experts and define a best practice for consistent Petroleum Resource reporting in the Northern Territory.

On 28 July 2016, SPE Asia pacific on behalf of the technical committee of the workshop invited Mehrdad Rezazadeh to lead a discussion in Session 9: NOC/IOC's Reserves Management with PRMS/SEC. Please refer to the attached invitation letter. Mehrdad Rezazadeh delivered a presentation with the title of "Regulatory Challenges of Resource Management and Classification in the Northern Territory, Australia".

	SPE PRMS - 2007	SEC - 2009
Volumes	Range	Range
Economic Test	Forecast prices and costs	12-months historical average price No inflation
Methodology	Deterministic Probabilistic (defined percentages)	Deterministic Probabilistic (defined percentages)

Table 1- SPE PRMS comparison against SEC

What is the best practice of using analogs method in Unconventional Resources?

As in conventional accumulations, undiscovered recoverable volumes are classed as Prospective Resources and are estimated contingent on their discovery and commercial development. PRMS recognizes that the hydrocarbon type and/or the reservoir may not support a flowing well test but the accumulation may be classed as "discovered" based on other evidence (e.g. sampling and/or logging).

It is not uncommon to recognize very large areas where prior drilling results have identified the presence of a discovered resource type that, based on analogs, has production potential. Where technically feasible, recovery techniques are identified, but when economic and/or other commercial criteria are not satisfied (even under very aggressive forecasts), estimates of recoverable quantities are classified as Contingent Resources and sub-classified as Development Not Viable. If the recovery processes have been confirmed as not technically feasible, the in-place volumes are classified as Discovered/Unrecoverable. As the play and technologies mature and development projects are better defined, portions of estimated volumes may be assigned to the Contingent Resources subclasses that recognize this progressive technical and commercial maturity. Typically, Reserves are only attributed after pilot programs have confirmed the technical and economic product ability and after capital is allocated for development.

Analogs are similar but not identical, key analog similarities follow:

Parameter	Explanation
Geological and Reservoir Architecture / Rock properties	Depth, Structure configuration, depositional environment, lithology, heterogeneity, thickness, porosity, permeability
Reservoir Fluid Properties	Initial reservoir pressure and temperature, density, viscosity, saturation
Reservoir Drive Mechanism	Solution gas drive, gas cap drive, water drive
Development Plan	Well type, well spacing, stimulation method and recovery factor

Table 2- Acceptable conditions of use of Analogs

Requirements for Commerciality

Discovered recoverable volumes (Contingent Resources) may be considered commercially producible, and thus Reserves, if the entity claiming commerciality has demonstrated firm intention to proceed with development and such intention is based upon all of the following criteria:

- evidence to support a reasonable time table for development

SPE-PRMS is the most common petroleum classification system worldwide; ASX disclosure rules are based on SPE-PRMS and Australian jurisdictions adopted this classification system for the resource/reserve estimate reporting. In the SPE-PRMS, resources are categorized as reserves or Contingent Resources or Prospective Resources. These categories can be further sub-categorized based on uncertainty as 1P, 2P, 3P or 1C, 2C, 3C or low, best high reflecting the uncertainty of hydrocarbon volume presence and recovery. These categories can also be classified based on chance of commerciality, a risk factor is assigned to each sub-class. The 2-axis PRMS system with some more details is illustrated in figure 2.

The reason SPE-PRMS is the popular petroleum classification system worldwide and within Australia is that it understands oil and gas business, securities regulators, government resource management regulators and is adaptable to financial standards and energy studies. It can create a platform for internal business decisions, can meet public reporting requirements and is designed in a way to comply with government regulations.

PRMS Major Principles:

1. The System is "Project–Based".
2. Classification is based on project's chance of commerciality. Categorization is based on recoverable uncertainty.
3. Base case uses evaluator's forecast of future conditions.
4. Provides more granularity for project management.
5. Estimates based on deterministic and/or probabilistic methods.
6. Applies to both conventional and unconventional resources.
7. Reserves /resources are estimated in terms of the sales products.
8. Net Resources are allocated based on contractual entitlement.

Comparison of SPE-PRMS against SEC (US Securities Exchange Commission)

SEC is not only important within the United States of America (USA), but also important abroad because many foreign companies have supplemental listing on US stock exchanges as ADR's (American Depositary Receipt) top access investors, these companies must disclose reserves and associated value according to SEC/FASB (Financial Accounting Standards Board) rules. While PRMS is an international system promulgated by SPE and other professional societies, SEC is a US system. PRMS is a guideline and provided definitions which are not binding whereas SEC is a rule book that all companies must report exactly the same way.

	SPE PRMS - 2007	SEC - 2009
Intended Purpose	General application – not country specific	Securities reporting in USA
Reserves	Proved, Probable, Possible	Proved, Probable, Possible
Resources	Contingent and Prospective	Not permitted (unless required by law)
Proved reserves	Reasonable Certainty	Reasonable Certainty (similar to PRMS, recognizing reliable technology)
Producibility	Production or formation test (Analog permitted in some cases)	Use of "reliable technology"

The "SPE Reserves, Resources and Definition Workshop" was held in Kuala Lumpur, Malaysia as part of the OGRC's roles to disseminate reserves and resources information to other organizations, agencies, and companies involved in reserves matters. The workshop was attended by 56 participants representing 23 organizations from 9 countries; the majority being from the Asia Pacific region. Mr Rezazadeh represented the department at the workshop.

OGRC has 15 members worldwide and most are based in North America, three are based in Asia Pacific region, and one each from Australia, Singapore and China. Fruitful discussions were had with participants in relation to the global resource classification systems and the best practice of resource reporting.

<u>Outcome 2</u>: To undertake research on the best practice of regulating the petroleum resource management by examining the SPE-PRMS and the application guidelines in detail.

There are different resource classification systems/guidelines available worldwide:

- SPE/WRC/AAPG/SPEE Petroleum Resource Management System (SPE-PRMS) -2007
- SPE-PRMS Application Guidelines - 2011
- United States of America Securities and Exchange Commission (SEC)
- Canadian Oil and gas Evaluation Handbook (COGEH)
- United Kingdom Statement of Recommended Practices (SORP)
- Russian Ministry of Natural Resources (RF)
- China Petroleum Reserves Office (PRO)
- Norwegian Petroleum Directorate (NPD)
- United Nations Framework Classification (UNFC)
- Australian Stock Exchange Reporting Requirement (ASX)

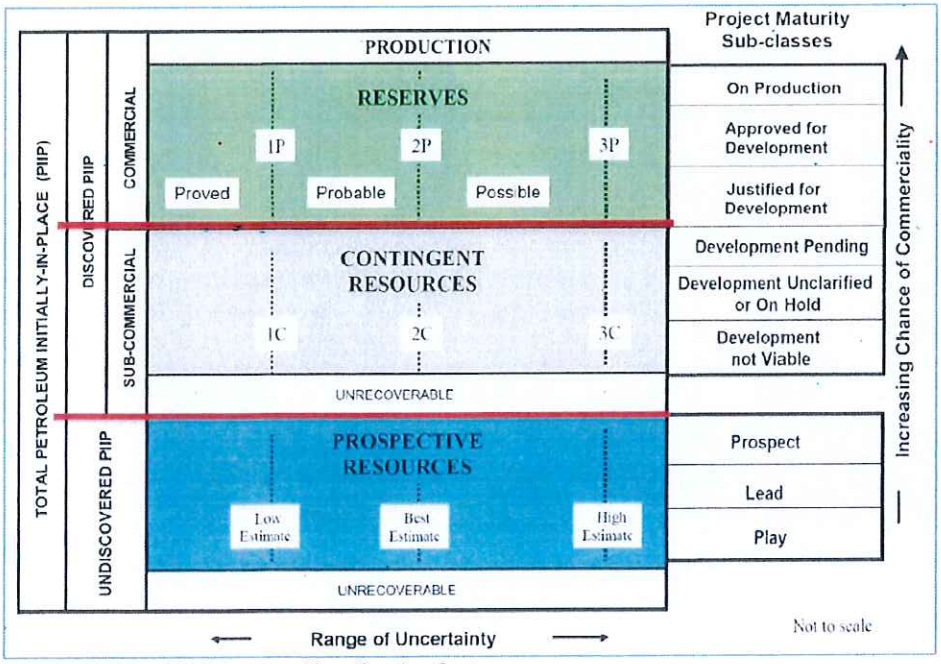

Figure 2- SPE PRMS Resource Classification System

3. discuss the challenges of the current reporting practices of shale oil and gas resources in the NT with the PRMS experts and define a best practice for consistent Petroleum Resource reporting in the NT; and

4. ensure the NT is recognised as a preferred exploration destination at the SPE Reserves, Resources and Definition Workshop.

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

Outcome 1:

To reinforce and develop relationships with SPE Oil and Gas Reserves Committee (SPE-OGRC) members and national/international oil and gas companies in Asia Pacific region.

With more than 168,000 members in 144 countries, the SPE is the largest individual-member organization serving managers, engineers, scientists and other professionals worldwide in the upstream segment of the oil and gas industry.

SPE's mission is to collect, disseminate, and exchange technical knowledge concerning the exploration, development and production of oil and gas resources, and related technologies for the public benefit; and to provide opportunities for professionals to enhance their technical and professional competence.

SPE has different committees in different sectors of the upstream oil and gas industry. OGRC members are highly-experienced international experts in reserves and resources estimation. The committee is responsible for programs dealing with oil and gas reserves and resources matters, including reserves and resources definitions, terms, recommended practices, and standards.

Figure 1- SPE Reserves, Resources and Definition Workshop, Kuala Lumpur, Malaysia

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

OVERSEAS TRAVEL REPORT

Dept Ref: 16-0494-SEC
Min Ref: 2016/0039-KEV
Trim Ref: 2016/0285

Title:	Society of Petroleum Engineers Reserves, Resources and Definition Workshop
Destination:	Kuala Lumpur, Malaysia
Date/s:	14 – 19 August 2016
Travel approved:	22 June 2016
Officer travelling:	Mehrdad Rezazadeh – Senior Petroleum Engineer

PURPOSE

The then Department of Mines and Energy organised for Mr Mehrdad Rezazadeh, Senior Petroleum Engineer, to travel to Kuala Lumpur, Malaysia to attend the Society of Petroleum Engineers (SPE) Reserves, Resources and Definition Workshop.

Issues discussed at the workshop included:

- existing guidelines of SPE- Petroleum Resource Management System (PRMS)
- example applications of SPE-PRMS; and
- resource assessment issues in the PRMS.

Mr Rezazadeh was invited by SPE Asia Pacific to lead a discussion in session 9: "NOC/IOC's Reserves Management with PRMS/SEC". Mr Rezazadeh accepted the opportunity to become a discussion leader and delivered a presentation titled: *Regulatory Challenges of Resource Management and Classification in the Northern Territory, Australia.*

Consistent reporting of petroleum resources in the Northern Territory (NT) is of strategic importance to the Territory to be accurately informed about the potential of petroleum resources. Optimising the potential benefits that can flow from oil and gas industry development in the NT can only occur by careful planning based on the most accurate and up to date information available. A consistent and standardised way of reporting petroleum resources in line with the SPE-PRMS system is the best way to achieve this.

PROPOSED OUTCOMES

The objectives of attending the workshop were to:

1. reinforce and develop relationships with SPE Oil and Gas Reserves Committee (SPE-OGRC) members and national/international oil and gas companies in Asia Pacific region;

2. undertake research on the best practice of regulating the petroleum resource management by examining the (SPE-PRMS) and the application guidelines in detail;

Thank you

Questions

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Opportunities and Constraints #2

Sector	Problem	Researchable Areas
	Poor yields	Nutrition & Irrigation
		Canopy management
		Weed control
	Poor orchard spraying	Chemical groups & mode of actions
		Pest & disease ID
		Application methods
		Safety
Markets	Market access problems	new supply chain models
		Value added products
		Utilise waste
		Improve supply chain links/networks
		Improve relations - growers/buyers etc
Support network	Poor innovation adoption	Innovative extension system/model (BAFTEX
		Improve access to practical information
		Access to finance
		Cluster development
Policy	Poor infrastructure	Roads
		Shipping and logistics
		Freight (handling and cost)
		Storage facilities
		Traceability
		MRLS - compliance
		FPA aligned with business
		High production input costs

Conclusion

Key messages:

1. Varietal improvement
2. Some common pests and diseases
3. Philippines: Agricultural clustering supported by barangay extension technicians(?)

Summary Research Projects (current & past)

- PCAARRD: Enhancing Productivity of the Mango Industry (current)
- PCAARRD: Mango Comprehensive Technology Program (2001)
- PCAARRD Mango Information Network
- PNRI: Integrated Fruitfly Management in Guimaras
- DA: Action Program on Enhancing the Productivity and Quality of Carabao Mango
- DA active in regulatory, training (FFS, POT etc), product development,
- ACIAR: 3 projects (ICM, postharvest, Value Chains)

PCAARRD, DA, and ACIAR projects focus on quality and quantity improvements

Opportunities and Constraints #1

Sector	Problem	Researchable Areas
Input	Poor varieties	Florida types for export
		Coordinate international breeding
		Certified planting material
Production	Poor quality	Disease management
		Anthracnose & SER
		Use & rego of Strobilurins
		Pest management
		Fruit fly, Cecid Fly
		Postharvest
		Ambient dips
		Handling & storage
		MRL management
		Latex burn

Trade #2

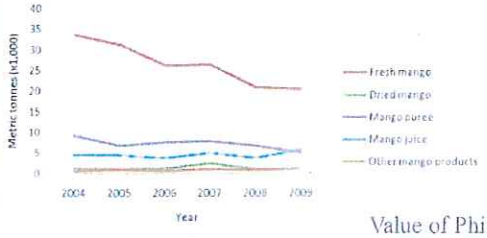
Figure 1: Philippines Mango Exports (fresh or dried) by top 5 destinations (volume), 2010 to 2014

Notes: Based on official Philippines export data
Source: TradeData, 2015

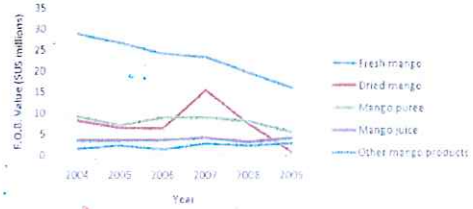
Mango imports are small volume and value and intermittent

TRADE #3

Quantity of Philippine Mango Exports, 2004-2009



Value of Philippine Mango Exports, 2004-2009



Message: Smallholder farmers cannot compete with larger farms and suppliers in the increasingly competitive international market chains

Source: PCAARRD (2011)

Mango incomes are low

Labourers pay is 4,800peso/mth

Farmer selling to contractor

- 200 trees @ 50kg/tree @ 20P/kg @25% contract = 4,500P/mth.
- 200 trees @ 50kg/tree @ 30P/kg @ 25% contract = 7,000P/mth.

Target

- Higher yield >50kg/tree (currently av. around 40kg/tree)
- Higher price >30peso/kg

Source: Ian Baker 2016

Trade #1

Table 1: Philippines - Exports (Volume), 2010 to 2014

Countries/ tonnes	2010	2011	2012	2013	2014	% Growth (cum)	Annual Avg	% share of total exports
HongKong	5,737.0	16,846.0	15,219.3	13,826.5	14,042.2	19.6	13,134.2	51.7
SouthKorea	513.8	1,605.4	2,486.7	2,761.6	7,446.0	70.7	2,962.7	10.1
Japan	4,252.3	5,159.0	4,785.9	3,219.3	4,112.0	-1.1	4,325.7	14.8
U.S.A.	1,858.2	5,205.1	2,705.5	2,754.1	4,057.9	17.2	3,312.2	11.3
China	525.4	524.3	527.3	764.1	1,934.1	29.8	855.1	2.9

Table 2: Philippines - Exports (Value), 2010 to 2014

Countries/US$	2010 '000	2011 '000	2012 '000	2013 '000	2014 '000	% Growth (cum)	Annual Avg	% share of total exports
USA	11,714	26,750	21,448	18,407	27,837	18.8	22,832,800	28.3
Japan	11,722	18,128	15,151	10,593	21,160	12.5	15,247,000	19.0
Sth Korea	1,168	4,405	6,851	8,270	19,919	76.3	8,124,200	10.1
Hong Kong	9,750	15,122	11,039	10,817	16,122	19.6	12,578,000	15.6
China	1,153	2,518	3,007	5,257	12,066	82.0	5,220,200	6.6

Production #3

Decline due to:

1. extreme weather and pest & diseases... and high cost of inputs
2. poor orchard management - growers 'give up' orchard to contractors who want short term gains not sustainable orchards.

Price

Prices are volatile and seasonal

a. Exporter – PhP65.00/kg for Export grade mango

b. Wholesaler – PhP52.00/kg for Hong Kong grade mango

c. Wholesaler – PhP48.00/kg for small Hong Kong grade mango

d. Wholesaler – PhP45.00/kg for local Manila grade

e. Processors – PhP 30.00/kg for process grade

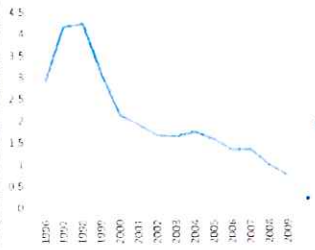
Based on farm-gate prices in September 2015 in Davao Region (southern Philippines)
Source: Phil Currey, UQ

Production #1

MANGO: Trend on Total Volume, Area and Yield (2005-2011)

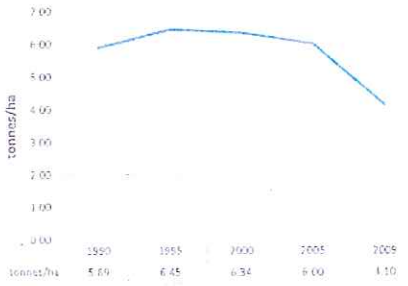
Note: National production decline but Mindanao increasing (2011)

PRODUCTION #2



Mango production in the Philippines'
(ratio of profit over cost : declining terms of trade)

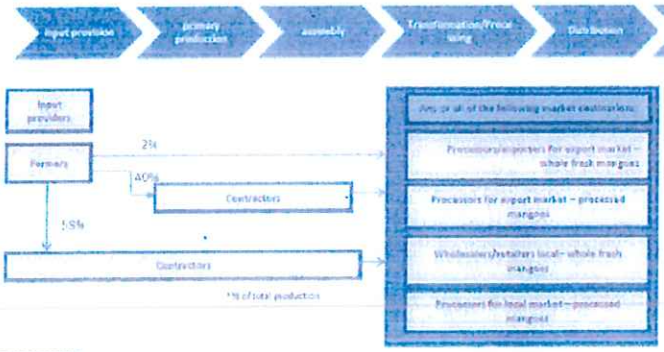
Philippines' mango production in tonnes/ha



Message: Declining terms of trade – static sale price, farm inputs increasing, yields declining

Source: Bureau of Agricultural Statistics 2011

Market Chains



Source: Buguis 2014

74% of growers own less than 1ha

Output share contracts 70:30

Increasing processing (25% of total production)

Increasing sales through supermarkets

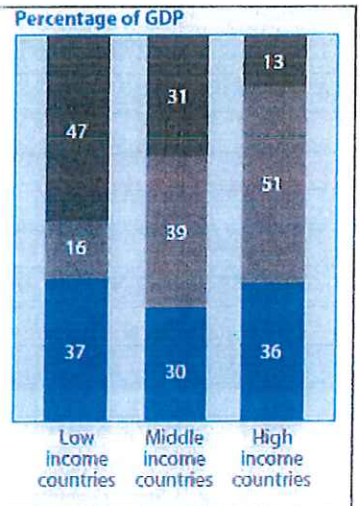
Less than 4% exports

Main Exports to Japan, HK, Sth Korea, Singapore, USA

MARKETS #2

The business environment of smallholder farmers in the Philippines

- Large growth in supermarkets ...however, wet markets have a lasting market niche
- Informal and unregulated activity dominates the market environment (i.e. 'pole-vaulting' is common)



Source: Ayyagari, Beck, and Demirgüç-Kunt (2003)

Country study: Philippines

AGB/2015/015: Analysis of mango markets, trade and strategic research issues in the Asian Pacific

Report leader: Dr Ernie Brown, PCAARRD

John.Oakeshott@aciar.gov.au

Sector Overview

1. Policy: Recognized in the DA (HVCDP & MRDC) and DOST-PCAARRD
2. Production: No.3; 885kMT (2014); increasing production area; 1.6 ha av. farm size; Carabao
3. Socioeconomics: $US470M GVA; $US144M export; 2.5 million poor farmers; adversarial supply chain
4. Industry Players: Input suppliers, growers, sprayer-traders; wholesalers/consolidators/assemblers; processors; exporters; wholesalers; wholesaler-retailers; retailers; consumers

Acknowledgment

The presentation was supported by a grant from Assoc Prof Dr Robin E Roberts from Griffith Asia Institute, Griffith University and we gratefully acknowledge the financial support given by her and her University to attend this workshop.

8. Conclusions and Recommendations (*cont.*)

- **Market:**
  - 79.6% Cat Hoa Loc and 39% Cat Chu for domestic markets, the remaining for Chinese markets
  - Low and fluctuated prices
- **Value chain and transactions:** 7 channels with following participants:
  - Farmers selling 45% of mango at farm gate & transporting 44 % to traders
  - Collectors: small , family business trading by cash
  - Wholesalers: trading by cash or credit with verbal agreements (not contract)
  - Cooperatives, companies
  - Retailers: shop, vendor, traditional market, supermarket
  - Consumers: in big cities

➔ ***Recommendations: develop export market, secure prices and simplify value chain to increase returns for farmers and other participants in the chain***

8. Conclusions and Recommendations (*cont.*)

- **Other related policies/supports from Government:**

- Mango product traceability and branding
- Exbishtion and market promotion and net work
- Better infrastructure investment (road, channel, electricity... in growing area)
- Credit policy with low interest rate for farmer/cooperative/interprises related to agribusiness.
- Tax reduction if applying new technology for fruit storage and processing
- New ASEAN community and TPP: International cooperation is needed

➔ ***Recommendations: develop Mango data base for sharing information and technologies to improve a mango supply chain of each member country***

7. Opportunities and constraints *(cont.)*

- **Opportunities**

- Master projection plan for fruit development from Government to 2020 vision 2030 (Decision 1648/QD-BNN-TT dated 17 July 2013)
- Degree No. 1003/QĐ-BNN-CB date 13/05/2014 of MARD, approved the Project improvement of agricultural product processing to increase high value added and reducing postharvest losses.
- New export markets developed for fresh and also processed mango products(Korea, Japan, New Zealand, EU…)
- Participation in TPP of Vietnam

8. Conclusions and Recommendations

Production and postharvest

-Application of GAP, IPM and year-round flowering manipulation

-Some advanced handling techniques applied for exporting mangoes to some difficult markets .

- Postharvest handling systems in general are poor and post harvest losses are still high

➔ ***Recommendations: develop adequate plans/strategies/policy and research programs to expand production area, accelerate co-operative, and improve safety, quality and post harvest/processing technologies***

7. Opportunities and constraints

- **Constraints:**

  - The main research works only focused on Cat Hoa Loc variety for fresh mango, no study on the processing of Cat Chu, which is favourite for export markets

  - There is a lack of deeply researches on the application and large scale production of bio-control agents, plant extracts, safety/environmental friendly chemicals for flowering manipulation, pest and disease management.

  - Vietnamese mangoes show poor quality, non-uniformity and lower average yield than those produced in other ASEAN neighbors, so they can not meet the long shipment requirements.

  - The requirements of quality and safety standards from export markets have not been studied thoroughly.

7. Opportunities and constraints *(cont.)*

- Week linkages between each actor in mango supply chain; Insufficient information network/system that contains all data and status about variety, cultivation, weather, production and market as other developed countries. → difficult to propose an appropriate and sufficient plan/strategy for mango production in Vietnam
- Advanced mango packhouse is limited with high postharvest loss
- Lack of research fund for Mango from Government for Institute/Universities
- Lack of appropriate policies for scientists/researcher involved agricultural activities, including fruits and mango.

Mango price across variety and grade

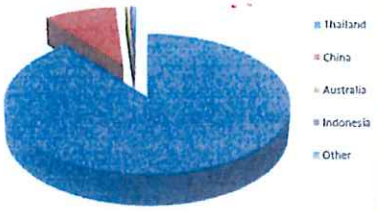
Variety	Average Price (VND/kg)	Class A price (VND/kg)	Class B price (VND/kg)	Class A %	Class B %
Hoa Loc	36,000	45,000	29,300	63	36
Cat Chu	14,000	18,700	9,300	93	7
Other varieties	11,000	15,000	4,000	N/a	

Source: Research analysis

5. Mango trade

Export volume

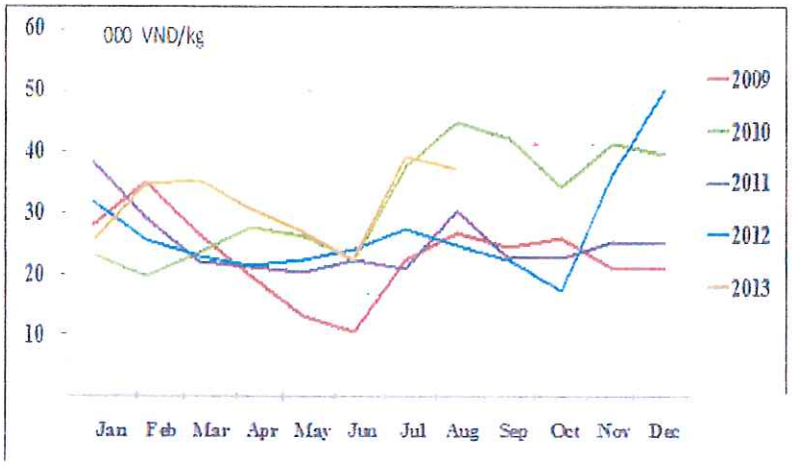
Import volume



Source: TradeData 2015

Mango handling and markets

Mango price seasonality

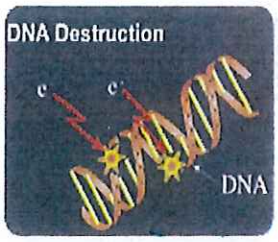


Source: Thu Duc Market Management Board, HCMC

Post-harvest

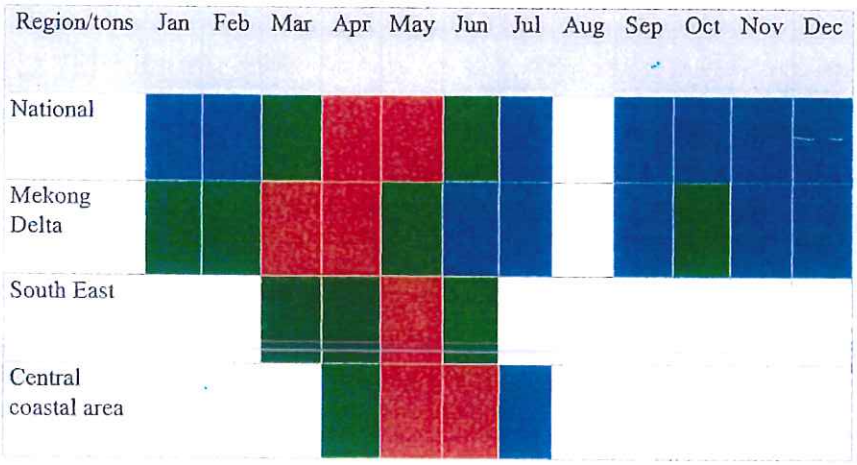
- Removing the stalk to stop the burn from the corrosive sap
- Packing: single-layer tray partitioned into single-fruit compartments
- Washing and dipping in fungicide or hot water to control anthracnose and fruit fly.
- Grading by size and appearance
- Keeping refrigerated at approx. 12°C
- Postharvest loss at 25-30%, short self-life
- Applying VHT or irradiation for exporting to difficult markets
- Not many processed mango products available but there is a new trend in processed fruit and vegetable products
- High post harvest loss (25-30%), short self-life
- Ununiformed quality and not enough volume for exports

Mango handling and markets



IRRADIATION: minimum absorbed 400 gray for sterilizing target pests

Mango Seasonality



Harvest and post-harvest handling

Harvest

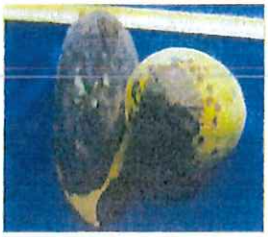
- Manually harvesting: mango is handpicked by climbing or picking device
- Assessing maturity: appearance (color, aroma, size, shape), length of time after flowering and experiences of growers

Mango cultivation in Vietnam

- **Mango diseases**: start to apply IPM but still overuse chemicals to control

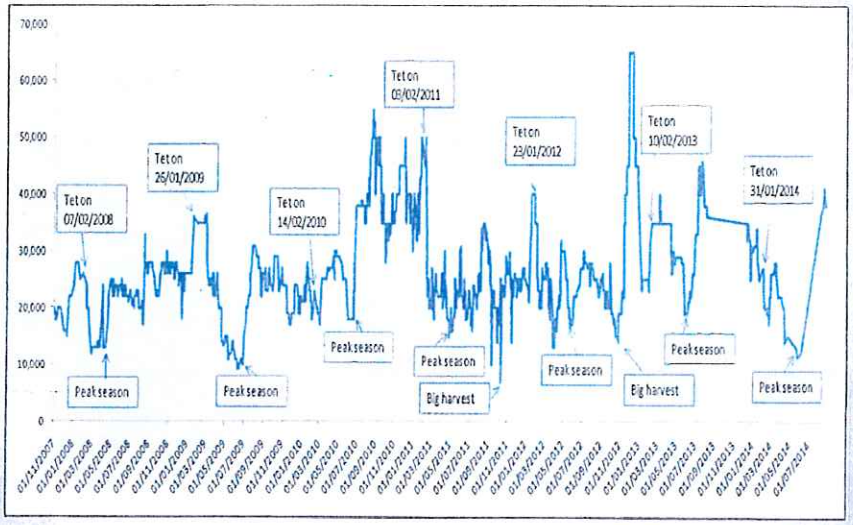
Black spot (*Xanthomonas*)

Fruit necrosis (*Botriodiplodia, Alternaria*)



Anthracnose (*Colletotrichum gloeosporioides*)

4. Mango price trend and volatility



Source: Thu Duc Market Management Board, HCMC

Mango cultivation in Vietnam

- **Fertilising**: inorganic and organic fertilisers including bio-fertilisers but no test of the soil nutrient status and mango nutrient requirement.
- **Year-round flowering induction**: apply Auxin and Gibberellic acid

Mango cultivation in Vietnam

- **Mango pests**: start to apply IPM but still overuse chemicals to control

– Thrips
(*Scirtothrips dorsalis*)
– Leaf cutters
(*Deporaus marginatus*)
– Trunk borers
(*Chlumetia transversa*)
...

Thrip and thrip damage

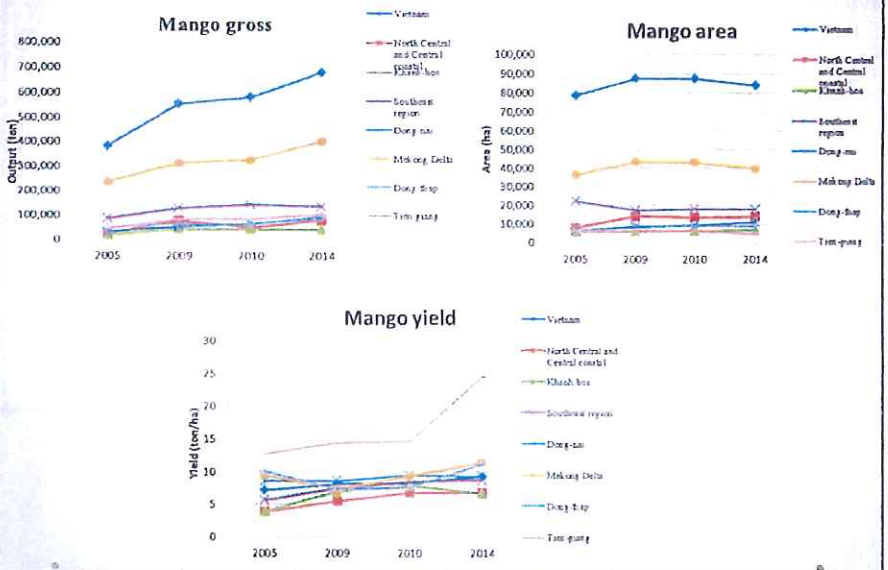
Mango cultivation in Vietnam

- ~ 84,000 ha (1,200 ha certified GAP)
- 20 varieties: Cat Hoa Loc, Cat Chu, Buoi mango
- High input cost (cost of seedlings, chemicals and fertilisers)
- Could not be mechanized
- Conventional cultivation habits
- Poor infrastructure and harsh environment conditions
- Low income
- Small scale household (0.4- 0.6 ha, 150-240 trees)
- Year-round flowering manipulation
- Implementing IPM

Mango cultivation in Vietnam

- **Canopy-density management and irrigation**:
  - Khanh Hoa farms: 100 trees/ha, not well pruned, not well irrigated
  - Mekong Delta farm: 200 trees/ha, well pruned (better for fruit bagging, flowering manipulation and tree care), irrigated but need to face to salinity

3. Mango production in Vietnam



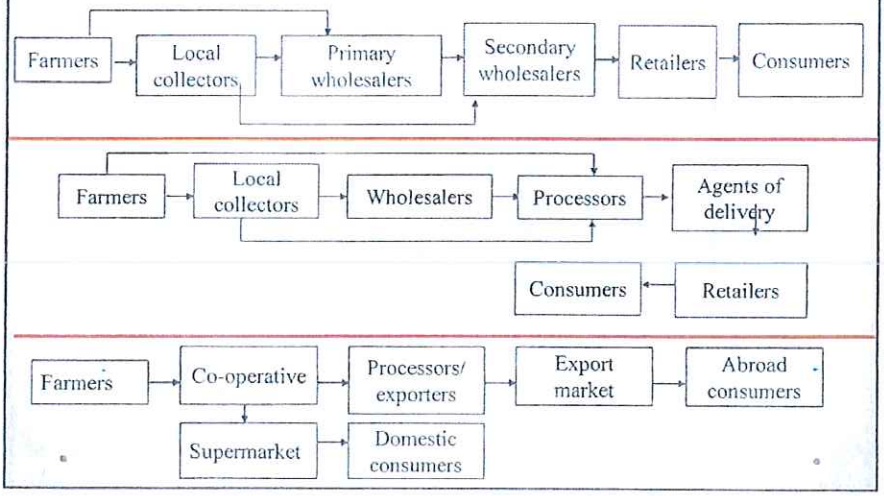
Source: General Statistics Office, Ministry of Agriculture and Rural Development (MARD)

Major mango varieties in Vietnam

- **Cat Hoa Loc**:
  - the best variety (good quality, taste, aroma, low fibre content and sweet – Brix of 19-22%)
  - ~100kg/tree/year, 450 – 600 g/fruit
- **Cat Chu**: popular variety,
  - Good taste, aroma, very less fibre, sweet (Brix of 18%)
  - Very productive, ~400kg/tree/year, 350 – 450 g/fruit
- **Buoi mango:**
  - ~120-150 kg/tree/year but easy fruit setting
  - Strong smell, 300 – 400 g/fruit

2. Vietnamese Mango Market Chain *(cont.)*

- Channels (*cont.*)

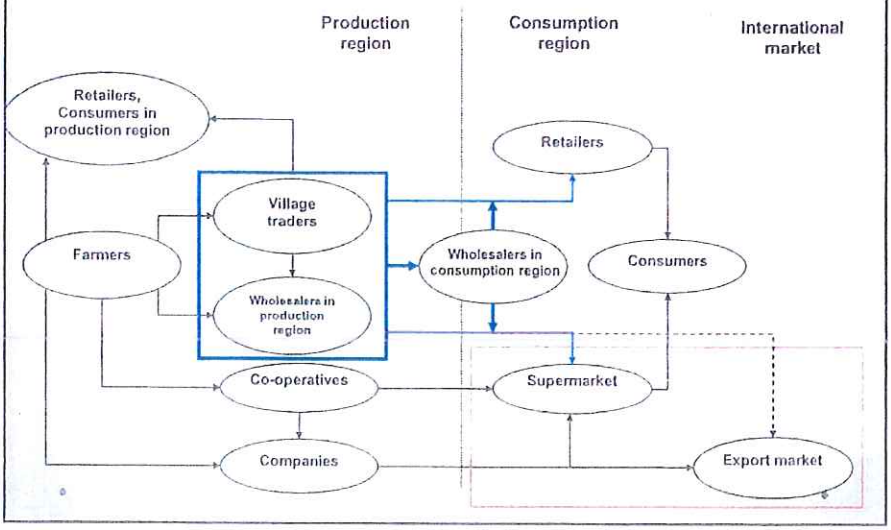


2. Vietnamese Mango Market Chain *(cont.)*

- **Transactions:**
  - Direct payments mostly by cash or credits (payments were delayed several days/weeks)
  - Mostly based on verbal agreements not a contract (good relationship and trust)
  - Prices depend on prevailing market prices, amount of mango supply, mango variety, quality, set prices

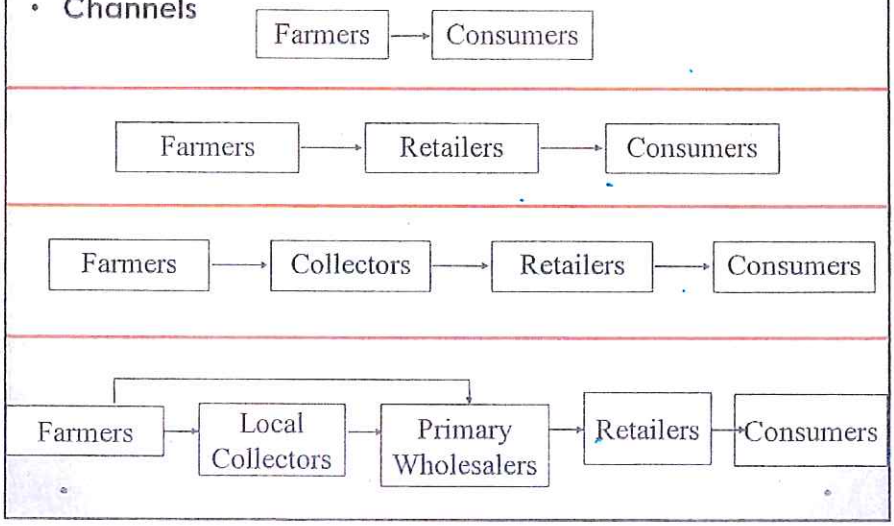
Disadvantage: unsure and no guarantee verbal agreements, fluctuated prices, lack of finance…

2. Vietnamese Mango Market Chain (*cont.*)

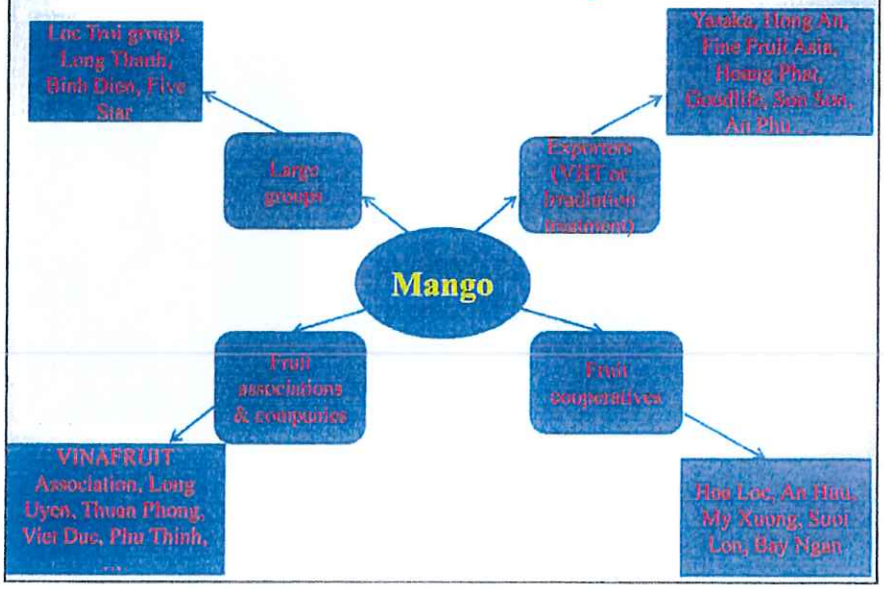


2. Vietnamese Mango Market Chain (*cont.*)

- Channels



Industry players: some key suppliers



2. Vietnamese Mango Market Chain

- **Chain Participants**
  - **Farmers**: 73% farms produced 5-10 tonnes/ha, 96% farms were self-harvested, 76% farmers waited until mangoes matured to harvest
  - **Cooperatives**: established since 2000, large scale, mostly applied GAP, exchanged skills and techniques, got better prices
  - **Collectors**: small and family-scale traders, trading about 98 tonnes/year, linking between farmers and wholesalers
  - **Wholesales**: also family business, usually not as companies
    - Local wholesales: play roles in mango industry vs. secondary wholesales
  - **Companies**: processors and exporters, play a role to increase mango value
  - **Retailers**: 93% retailers purchased mangoes from the wholesaler markets
  - **Consumers**: most of consumers are in cities, purchased 1-3 kg/time, 4-8 times/month

1. Overview of mango production in Vietnam

- **Policy Framework:**
  - Mango: fruit tree for sustainable socio-econonic development
    - Primary/major income source of 78% of surveyed households (105.4 million/year/household)
    - Net income: 2, 000 VND billion/year (~ US$ 100 million)
    - Contribution to resolve unemployment in Vietnam

1. Overview of mango production in Vietnam *(cont.)*

Production Landscape:

- Top five fruit crops in Vietnam with 84,046 ha and 679,063 tonnes (year 2014)
- Flowering manipulation for year-round production of mango is directed by MARD: successful but limited
- Mainly at smallholder scale (93.8 % of household < 0.5 ha)

Farm size (ha)	% of households in the Mekong Delta Region	% of households in Vietnam
< 0.5	93.18	92.28
0.5 ha to < 1	5.35	4.87
1 ha to < 2	1.26	2.05
>2	0.21	0.8

VIETNAM

Mango producing provinces in Vietnam

- **Area : 329,560 km²**
- **Latitudes : 8°30'N-23°23'N**
- **Longitudes: 102°10'E-109°30'E**
- **Population: 90 mil. (75% living in rural)**
- **Provinces & cities: 64**
- **Capital: Ha Noi**
- **Ethnic groups: 54**
- **Language: Vietnamese**
- **Agr. land: 9 mill. Ha**
- **Agr. + Forestry + Fishing : ~ 23% GDP**

AGRGRICULTURAL PRODUCT EXPORT

- Total Vietnam export value in 2015: >USD 162.11 billion, increased 7.9% compared to the year 2014 (Customs Trade Statistics, 2016)
- Main Agri. Export products (export value more than USD 1 billion) are Rice (World No. 2), Coffee (No. 1), Cashew nut (No.1), Pepper (No. 1), Rubber (No.4), Fruit and Vegetable, Tea, Wooden Products…
- The export turnover of agricultural products in the first 6 months of the year 2016 : USD 15.05 billion, increased by 5.4% compared to last year and the expected total export in 2016: USD 40 billions (source: MARD, 2016)
- Main markets are China, US, EU, ASEAN, Japan…

Australian Government
Australian Centre for International Agricultural Research

Country Study: Vietnam

Analysis of mango markets, trade and strategic research issues in the Asia – Pacific (AGB/2015/015)

Nguyen Duy Duc; Le Minh Hung
Sub-Institute of Agricultural Engineering and Postharvest Technology (SIAEP), 54 Tran Khanh Du, District 1, HCMC, Vietnam

OUTLINE

1. Overview of mango production in Vietnam
2. Vietnamese mango market chain
3. Mango production in Vietnam
4. Mango price
5. Mango trade
6. Research and development
7. Opportunities and constraints
8. Conclusions and recommendations

Thank you

Opportunities and constraints

Issues

- Production
- Sorting & grading
- Storage
- Packaging
- Transportation

Opportunities

- Creation of Post-harvest infrastructures
- Setting up of processing units / hubs
- Encouraging cooperative sector
- Export development
- Utilization of waste material

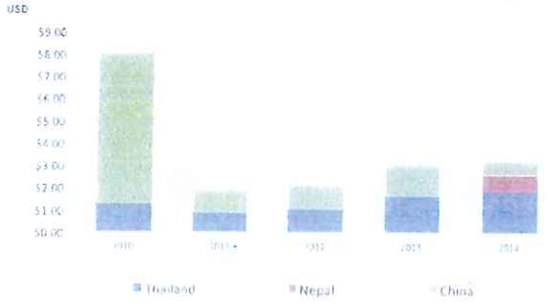
Research priorities

Focus on Production (national level)

- Effective management, enhancement, evaluation & valuation of genetic resources
- Development of technologies related to efficiency – breeding & development of cultivars
- Increasing value of production by reducing variability in yield, quality, crop loss & marketability through technology engagement
- Developing systems for productive use of nutrients, water and reducing impact of pest & disease
- Develop production systems minimizes waste and maximizes reuse of waste

Import markets (price)

India mango imports (fresh or dried) by top 3 destinations (price/kg), 2010-2014



Source: TradeData, 2015

Country $US/kg	2010	2011	2012	2013	2014	% change (cum)
Thailand	1.27	0.86	1.02	1.61	1.84	44.9
Nepal					0.75	-
China	6.67	1.01	1.06	1.34	0.61	-90.9

Summary Research Projects

World Bank, Asian Development Bank (ADB), International Finance Corporation (IFC)

- Crop production – rejuvenation for old & unproductive orchards, optimum spacing, integrated nutrient management, integrated pest management, grafting
- Postharvest – hot water treating, air drying & packed in CFB boxes, with storage assessments achieving successful storage up to 2 to 3 weeks under low temp conditions
- Fruit fly specific and stone weevil projects
- Current
  - Canopy architecture for higher productivity
  - Optimizing water productivity & nutrient dynamics
  - Breeding programs – develop hybrids for processing sector

Export markets (price)

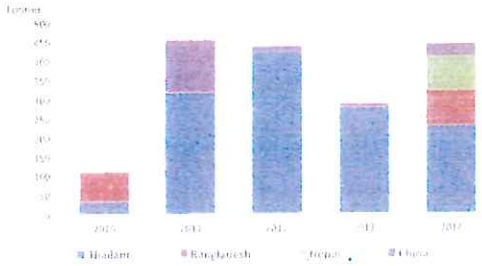
India mango exports (fresh & dried) by top 3 destinations (price/kg), 2010 to 2014

Notes: Based on official India export data
Source: TradeData 2015

Country $US / Kg	2010	2011	2012	2013	2014	% Change
Netherlands	1.22	1.18	1.06	1.13	1.25	2.5
UAE	0.88	0.97	0.69	1.20	1.12	27.3
Kuwait	0.90	0.91	0.84	1.14	0.98	8.9

Import markets

India mango imports (fresh or dried) by top 4 destinations (volume), 2010-2014



Source: TradeData 2015

Country / tonnes	2010	2011	2012	2013	2014	Annual Avg	% change (cum)	% share of total imports
Thailand	31	315	421	276	228	254	635	61.8
Bangladesh	75	6	-	7	90	36	20	8.7
Nepal	-	-	-	-	89	18		4.3
China	0	130	15	2	33	36	-75	8.8

Price

Quality Price Differentials Across Mango Grades

Besides all this other characteristics that are preferred by traders and fetch better price of the fruit is:

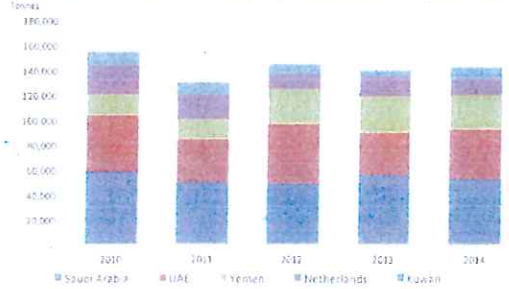
- Physiologically mature;
- Commencing ripening with 30 to 50% coloration;
- Significant area of red color on the fruit shoulders;
- Relatively firm;
- Uniform shape;
- Free from disease, decay, sunscald, cracks, bruises, latex stains,
- insect and mechanical damage;

Mangoes meeting the above mentioned quality parameters are considered good and get the highest price. The size differentiation in grading of mango is in four classes such as:

- Each fruit in Size A grade with 100-200gm
- In Size B Grade each fruit weigh 201-350 gm
- The fruit size in size Grade C is 351-550 gm
- In size grade D fruit weigh 551-800 gm

Export markets

India mango exports (fresh & dried) by top 5 destinations (volume), 2010 to 2014



Source: TradeData, 2015

Country / tonnes	2010	2011	2012	2013	2014	Annual Avg	% change (cum)	% share of total exports
Saudi Arabia	58,055	49,706	48,499	55,744	52,115	52,824	-10.2	19.2
UAE	45,792	34,471	46,324	34,004	40,219	40,562	-12.2	18.7
Yemen	16,117	15,970	27,532	26,848	26,993	23,092	67.5	10.6
Netherlands	23,882	19,818	12,804	16,161	14,080	17,349	-41.0	8.0
Kuwait	10,159	9,076	6,767	4,405	8,596	7,801	-15.4	3.6

Production - seasonality

Region/ tonnes	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
India												
Uttar Pradesh												
Andhra Pradesh												
Karnataka												

Legend: High
Low

Source: Indian Horticulture Database, 2014

Price – seasonality

- Totapuri and Bainganpalli (Safeda) – March to September
- Chaunsa, Langra & Dasheri – April to May
- Fruit in all major markets – April, May & June
- High fruit prices in period March to April
- Export pricing – problematic – domestic prices achieving premium status

Production – main varieties

Alphonso

Kesar

Banganpalli

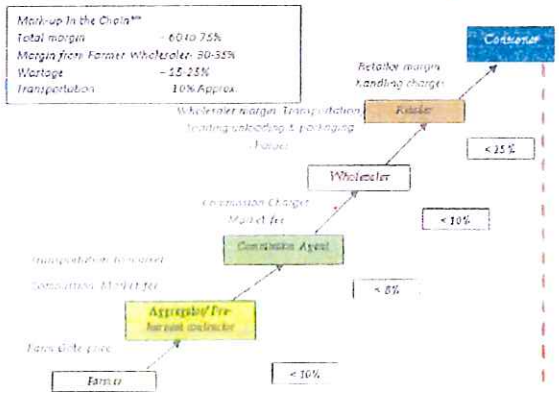
Chaunsa

Dasheri

Production systems

- Land preparation
  - High density planting
- Propagation
  - Propagated on rootstock
  - Raised seedlings are used for grafting
- Climate & soil requirements
  - 1100 meters above sea level
- Training & pruning
  - Challenges with orchards over 50 yrs
- Nutrients & water management
  - Farmer knowledge of nutrients limited
- Weed management/intercultural operations
  - Focus on sunhemp, cowpea & berseem to help prevent soil erosion
- Insect pest & disease
  - Anthracnose – challenging
  - MRL challenge related to exports
- Farmers & crop protection
- Harvesting

Market Chains, Participants & Transactions



**Based on the study of Global Agri-system Pvt. Ltd in 5 metros

Production landscape

- Total production steadily increasing (million tonnes)
- 2005 12.6 m
- 2013 18.4 m

- Leading state Uttar Pradesh
- 2005 to 2013 (+ 60.9%)

- No. 2 Andhra Pradesh
- Growth 2005 – 2013 (+34.8)

- No. 3 Karnataka
- Growth 2005 – 2013 (+41.9)
- Slowed, 2010 – 2013, unfavorable weather conditions affected yield

Sector Overview (continued)

- Fruit processing is an emerging sector
- **Raw fruits** – chutney, pickle, mango powder, green mango beverages
- Contracts with – Parle Agro (Frooti – 85%), Pepsico (Tropicana), Coca-Cola (Minute Maid), Marico, & Godrej
- **Ripe fruits** – pulp, juice, nectar, slices

Market Chains

Chain Participants

- Farmers - pre-production & related activities
- Farmers/Producers - selling to pre-harvest contractors
- Aggregators – collects direct farms, some cases complete purchase of all fruit, involved in all post harvest related activities
- Commission Agent – in contact with the wholesalers
- Wholesalers – main purchasing agents markets, at own or on behalf of other big traders
- Retailers – purchase predominantly from wholesalers with some transactions through Commission agents direct

Sector Overview

- Globally, largest producer of mango
- Second highest fruit crop following banana
- Market share 40.5% (global production)
- Dedicated government programs to enhance mango production & trade
- Focus: technology transfer, capacity building, area expansion, development of postharvest infrastructure

Government agencies with a stake in mango R&D

- National Horticulture Board
- Ministry of Food Processing
- Agriculture & Processed Food Products Export Development Authority (APEDA)
- Directorate of Marketing & Inspection (DMI)
- 2014 – Government integrated various schemes under one umbrella
- Mission on Integrated Development of Horticulture (MIDH)
- States of Tamil Nadu, Maharashtra – significant investment plan to establish fruit processing sector and develop supporting infrastructure

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Sector Overview (continued)

- Top 5 commodity:
  Banana
  Mango
  Citrus
  Papaya
  Guava
- Mango cultivation covers an area of 2.52m ha (35% total fruit production)
- Production of 18.43 million tonnes (21% of total fruit production)
- 2010 Census - 85% of farms are operated by small & marginal farmers
- Farmers Cooperative Society – established 1991 - *Mahamango* with support from Maharashtra State Agriculture Marketing Board
- Other smaller groups – across the country

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Country Study: India

Assoc. Professor Robin E Roberts
Mango markets, trade and strategic research issues
Bangkok, Thailand
July 2016

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Overview

- Sector Overview
- Market Chains
- Production
- Price
- Export & Import Trade
- Summary Research Projects
- Opportunities and Constraints
- Conclusion

Opportunities and constraints

- Farm Technologies: technology dissemination and feasibility of off-season mango for smallholders
  - ask which dissemination channel is suitable for this technology?
  - What are the roles of public and private entities?
  - How to make it more feasible for smallholders farmers?
- Varieties
  - The market characteristic of gedong gincu and arumanis.
  - The intensity of each variety: at the moment there is no data of the intensity of gedong gincu (volume, locations etc)
  - The farm profitability and performance of Arumanis and Gedong Gincu.
  - to understand their responsiveness towards off season technology mango as well as post-harvest mango technology
- Export and premium market development
  - The true opportunities of export and premium market consumers need to be rigorously assessed
  - technology and feasibility for long distance logistics (by sea freight and/or air) will be very beneficial.

Take away messages

- Supply
  - Understand more about off season technology – feasibility for smallholders and dissemination tech
  - Effect to market
  - Varietal characteristics
- Demand
  - Focus to domestic vs premium and export market – to guide R&D investment
  - Varietal characteristics
- Role of public and private sector

Trade imports - volume and value

Countries/ tonnes	2010	2011	2012	2013	2014	% Growth (cum)	Annual Avg	% share of total imports
Thailand	622.6	488.6	545.4	119.1	156.4	-24.1	386.4	57.2
South Africa	136.9	166.3	274.0	-	77.1	-10.9	130.9	19.4
Others	344.5	279.9	166.5	-	-	-	158.2	23.4
Total	1,104.0	934.8	985.9	119.1	233.5	-26.7	675.5	100.0

Countries/ tonnes	2010	2011	2012	2013	2014	% Growth (cum)	Annual Avg	% share of total imports
Thailand	457,796	370,044	383,201	348,322	437,720	-0.9	399,417	58.8
South Africa	110,560	173,825	307,155	-	144,349	5.5	147,178	21.7
Others	228,426	224,779	207,772	-	-		132,195	19.5
Total	796,782	768,648	898,128	348,322	582,069		678,790	100

Summary Research Projects

Current and past

- ACIAR-DAFWA: Management of fruit quality and pest infestation on mango and mangosteen to meet technical market access requirements
- ACIAR-DFAT: Eastern Indonesia agribusiness development opportunities (EIADO)
- Australia-Indonesia Partnership for Promoting Rural Income through Support for Markets in Agriculture (AIP-PRISMA)
- Government sponsored project
  - Distribution of seedling, 6000/year for durian, mango, and mangosteen
  - Mango development program area
  - Promotion of GAP and SOP
  - Pest and disease management
  - Farm management
  - Research on post-harvest treatment (Heat Water Treatment (HWT) and off season mango in West Java, wooden flies trap.

Price

Quality Price Differentials Across Mango Grades

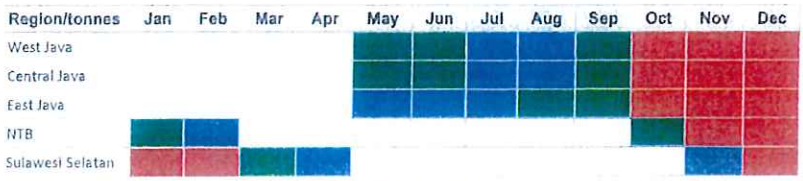
Grade	Gedong	Harumanis	Cengkir	Bapang	Gedong gincu
A	12000	7500	6500	2000	20000
B	8000	3500	3200	1000	10000
C	4000	2000	1750	600	7500
% of price grade B to price grade A	67%	47%	49%	50%	50%
% of price grade C to price grade A	33%	27%	27%	30%	38%

Trade exports – volume and value

Countries/ tonnes	2010	2011	2012	2013	2014	% Growth (cum)	Annual Avg	% share of total exports
Singapore	177.9	406.9	441.9	293.3	459.0	20.9	355.8	30.7
UAE	403.2	562.9	551.2	443.7	374.9	-1.4	471.2	40.6
Malaysia	19.5	74.0	99.6	64.1	74.0	30.6	66.3	5.7
Saudi Arabia	169.6	149.6	90.5	75.2	45.8	-24.7	110.1	9.5
Qatar	28.1	37.3	52.9	57.6	40.3	7.4	43.2	3.7
Oman	2.9	9.6	11.5	30.5	32.4	62.3	17.4	1.5
Kuwait	65.0	35.7	16.7	29.6	24.3	-17.9	34.2	3.0
Hong Kong	22.4	19.5	14.1	7.4	19.0	-3.3	16.5	1.4
Bahrain	15.7	20.0	10.3	33.4	17.6	2.3	19.4	1.7
Others	23.1	69.6	31.0	1.0	2.6	-35.3	25.5	2.2
Total	947.3	1,405.2	1,319.7	1,035.8	1,090.0	2.8	1,159.6	100.0

Countries/ US$	2010	2011	2012	2013	2014	% Growth (cum)	Annual Avg	% share of total exports
Singapore	293,371	744,257	739,971	485,950	935,540	26.1	639,818	39.2
UAE	296,698	686,680	648,424	401,800	297,053	0.0	466,131	28.6
Malaysia	37,470	115,860	240,682	142,422	170,732	35.4	141,433	8.7
Kuwait	108,367	61,263	42,799	104,395	82,857	-5.2	79,936	4.9
Oman	3,392	9,228	15,823	49,701	63,308	79.6	28,290	1.7
Hong Kong	36,530	45,172	33,282	21,353	54,627	8.4	38,193	2.3
Qatar	24,358	35,695	41,712	55,588	51,163	16.0	41,703	2.6
Saudi Arabia	125,992	92,670	47,548	62,083	23,540	-28.5	70,367	4.3
Bahrain	14,965	19,708	22,016	30,093	15,454	0.6	20,447	1.3
Others	125,920	169,872	94,031	54,098	75,126	-9.8	103,609	6.4
Total	1,067,063	1,980,405	1,926,288	1,407,463	1,769,400	10.6	1,630,128	100

Production - seasonality



Source: Wandschneider (2013), World Agroforestry (2015), Soemarno, (2012)

Legend: *High* *Medium* *Low*

Note: Only regions with >10% production included

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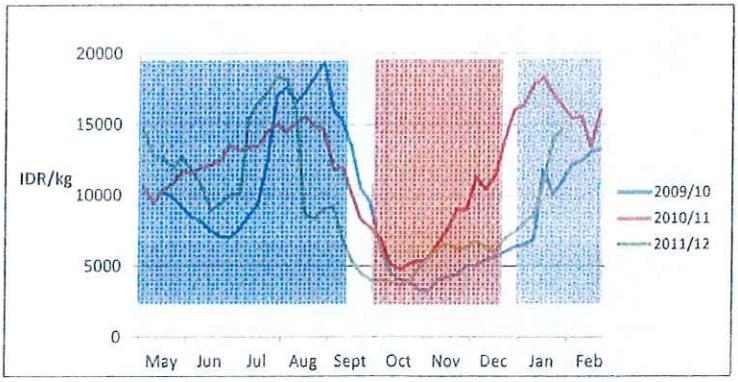
Price – seasonality

Average weekly prices for Arumanis (grade A) in Kramatjati market, Jakarta



Source: Management Board of Kramatjati Wholesale Market, 2012. Cited in Wandschneider 2013.

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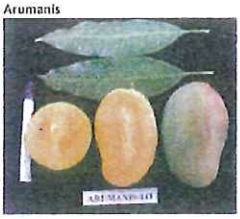
Production landscape

- East Java, West Java and Central Java have been consistently contributing 65-75 per cent of national mango supply.
- Nusa Tenggara Barat and Sulawesi Selatan contribute 10 per cent of mango total supply in the last 5 years.

Production – main varieties

Arumanis

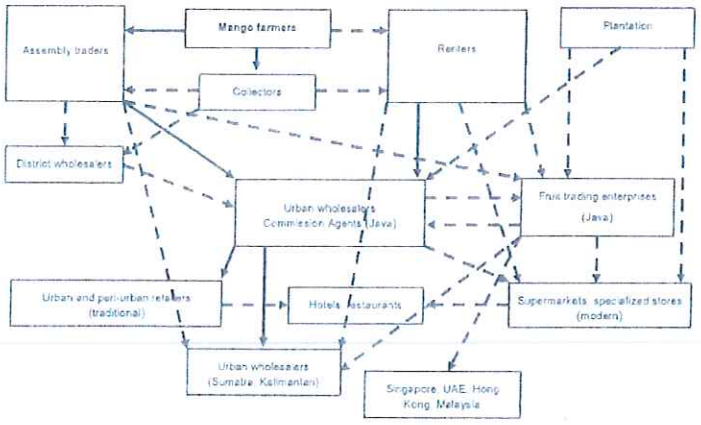


Gedong

Manalagi

Podang

Market Chains and Participants



Market Chains – Channels

- Traditional vs. Modern
- Domestic and export (<1%)
- Fresh and processed

Sector Overview

- the population of Indonesia is 237.6 million, with high population growth at 1.9%.(2010 national census)
- 58% of the population lives in Java

Mango

- Top 5 commodity: Mango, banana, orange, durian, and Mangosteen.
- a smallholder's commodity with an average of 7 trees per households.
- Total mango tree population is 18 million trees, in which 10 million are in mature age (production stage).
- Most of the growers cultivate only less than 1 hectare land.
- 2.3 million households mango production -- 1.5 m in java

Market Chains

- Chain Participants
  - Farmers
  - Collectors, Assembly traders and wholesalers
  - Agro inputs companies and retailers
  - Exporters
  - Processors
  - Supermarkets, specialty shops and wetmarkets retailers

Agribusiness

Country Study: Indonesia

Assoc. Professor Robin E Roberts
Mango markets, trade and strategic research issues
Bangkok, Thailand
July 2016

Griffith UNIVERSITY

Overview

1. Sector Overview
2. Market Chains
3. Production
4. Price
5. Trade - exports & imports
6. Summary Research Projects (current and past)
7. Opportunities and Constraints
8. Conclusion

Friday 8th July 2016

8.15am	*Coffee on arrival*	
8.30am	**Review Day 2**	Robin Roberts
	Day 3 - Aim & Purpose	
8.45am	**Session 8 – Group Activity**	Facilitator: Rodd Dyer
	Regional Outlook—Where to from here?	
	Group Activity (break out rooms available)	
10.30am	*Morning Break*	
10.45am	**Session 8 continued**	
	Feedback, inputs... from morning activity	
12.00pm	*Luncheon*	
1.00pm	**Session 9 Regional Mango Planning & prioritisation**	Facilitator: TBC
	Group Activity	
	(Coffee available – no fixed break)	
2.30pm	**Session 10 - Workshop and SRA Final Review**	
	Summary, finalisation and next steps.	
	Including additional information required for SRA final reporting	
	Agreement on timelines	
	Seminar survey, attendee feedback	
3.30pm	**Workshop Close – Day 3**	

Convenors:
Associate Professor Robin E Roberts
Mr Peter Johnson
Mr Rob Duthie
Professor Richard Beyer

Thursday 7th July 2016

8.15am	*Coffee on arrival*	
8.30am	**Review Day 1**	Robin Roberts
	Day 2 - Aim & Purpose	
8.45am	**Session 5 – Regional SRA Review** (30 - 40 mins / study)	Moderator / Discussant: Richard Markham
	Regional trade position	Hugh McIntosh & Robin Roberts
	Market entry & Bio security	Rob Duthie & Peter Johnson
	Session Discussion (30 mins) (opportunities & issues noted on flipchart for inclusion in later discussions & highlight additional information, if required for final reports)	
10.30am	*Morning Break*	
10.45am	**Session 6 – Regional SRA Review** (30 mins/study)	Moderator / Discussant: Rodd Dyer
	Indonesia & Philippines: Market observations	Ian Baker
	Fruit processing: Development, institutions & current landscape	Richard Beyer
	Fruit processing: Regional science & innovation in fruit processing	Kent Fanning
	Session Review & Discussion (30 mins) (opportunities & issues noted on flipchart for inclusion in later discussions & highlight additional information, if required for final reports)	
12.45pm	*Luncheon*	
2.00pm	**Session 7 – Mango Agribusiness – 3 Year SRA projects** (20 mins/SRA)	Moderator / Discussant: Robin Roberts
	A quality case study: Australian Avocado	Jenny Margetts
	Mango bio security	Rob Duthie & Peter Johnson
	Tropical fruit processing	Kent Fanning
3.00pm	*Afternoon Break*	
3.30pm	**Recommence Mango Agribusiness – 3 Year SRA projects**	
	Mango markets	Hugh McIntosh
	Market information Presentation & launch review—*Tropical Fruit Hub*	Robin Roberts
	Session Discussion (30 mins) (key points noted on side flip chart)	
5.00pm	**Regional SRA Review – Wrap Up**	
5.30pm	**Close – Day 2**	
Time TBC	*Meet in Foyer* *Additional guests joining from the Thai Department of Agriculture*	***Traditional Rice Barge - Dinner***

Wednesday 6th July 2016

8.15am	*Coffee on arrival*	
8.30am	**Welcome and introductions**	Robin Roberts
	ACIAR update	Rodd Dyer
8.45am	**Workshop aim & purpose**	Robin Roberts
	Activity – *Building our team*	
9.15am	**Session 1 – Country Studies** (30 mins / study)	Moderator / Discussant: Bob Williams
	Country study: Vietnam	Nguyen Duy Duc & Le Minh Hung
	Country study: Philippines	Presenter TBC
	Session Review & Discussion (15 mins /study) (opportunities & issues noted on flipchart for inclusion in later discussions & highlight additional information, if required for final reports)	
10.45am	*Morning Break*	
11.00am	**Session 2 – Country Studies** (30 mins / study)	Moderator / Discussant: Kent Fanning
	Country study: Indonesia	Teddy Kristedi
	Country study: Pakistan	Peter Johnson
	Session Review & Discussion (15 mins/study) (opportunities & issues noted on flipchart for inclusion in later discussions & highlight additional information, if required for final reports)	
12.30pm	*Luncheon*	
1.45pm	**Session 3 – Country Studies** (30 mins /study)	Moderator / Discussant: Peter Johnson
	Country study: India	Robin Roberts
	Country study: Australia	Trevor Dunmall
	Session Discussion (15 mins / each presentation) (opportunities & issues noted on flipchart for inclusion in later discussions & highlight additional information, if required for final reports)	
3.15pm	*Afternoon Break*	
3.45pm	**Session 4 – Country Study Review**	Moderator / Discussant: Rob Duthie
	Group Activity Focus: Review & clarify key issues and	
5.00pm	**Country Review – Wrap Up**	
5.30pm	**Close – Day 1**	
7.15pm	*Networking Dinner* *Guests joining from the Thai Department of Agriculture*	*Grand Sukhumvit Hotel Bangkok*

ATTACHMENT B

Griffith Agribusiness

ACIAR Regional Mango Workshop Program

6 - 8 July 2016

Venue: **Grand Sukhumvit Hotel** 99 Sukhumvit Road (Soi 6), Bangkok, Thailand

Phone: +66(0) 2207 9999 | Urgent messages: sm-corporate@grandsukhumvit.com

Overview

This workshop is a collaborative effort between Australian and partner country researchers, and industry working on Australian Centre for International Agricultural Research (ACIAR) supported mango projects throughout the Asia Pacific region and an output of project AGB/2015/015.

Aims

The focus of the workshop on Day 1 is to present and discuss the current mango production, market and trade dynamics across six country studies and the implications for smallholders, recognise information gaps in country data, and underscore the strategic imperatives for each country.

The Day 2 workshop will highlight and examine mango market and trade dynamics including information flows, market entry, bio security and fruit processing in the Asia Pacific and review the competitive and comparative position of mango trading nations in the region. The planned Mango Agribusiness 3 Year project outlines will be presented and discussed.

The aims of Day 3 are to discuss the issues constraining regional mango trade within and between ACIAR partner countries in the Asia Pacific region and explore business opportunities with private sector, NGOs and other agencies involved in mango value chain activities to develop longer term coordinated and collaborative business models and strategies to advance mango agribusiness and horticulture research programs.

Overall outcomes

The workshop will provide a longer term perspective to develop regional mango agribusiness networks, and to inform ACIAR funded mango research and development programs aiming to improve the profitability and livelihoods of regional smallholder tropical fruit farmers through better access to and competition in regional and local markets.

ATTACHMENT A

GRIFFITH ASIA INSTITUTE | Leadership in Asia research and engagement

Dear Mr Bob Williams

On behalf of Griffith University we would like to invite you to the following workshop:

Mango markets, trade and strategic research issues in the Asia-Pacific

(AGB/2015/015)

6 - 8 July 2016 in Bangkok, Thailand

This workshop is a collaborative effort between Australian and partner country researchers, and industry, working on Australian Centre for International Agricultural Research (ACIAR) supported mango projects throughout the region.

This event, funded by ACIAR, invites experts to discuss specific research areas including: regional country level mango production; market situation; trends; spatial flows; country-level areas of comparative and competitive advantage; and opportunities for mango production, industry and market development.

The workshop outcomes will provide a longer-term perspective to inform ACIAR-funded mango research programs aiming to improve the profitability and livelihoods of regional smallholder tropical fruit farmers through better access to and competition in regional and local markets.

More details about the project can be found on the ACIAR website.

Air and accommodation arrangements

We will cover air travel from Darwin to Bangkok, airport transfers and incidentals to a total value of AUS1,400. Please invoice Griffith University after the event and attach your boarding pass as evidence of travel.

Hotel accommodation in Bangkok will be organised for you and cover a maximum of four nights' accommodation (for the nights of 5, 6, 7 and 8 July, 2016) at a central Bangkok Hotel with meals included during the workshop activities. All other hotel and workshop expenses will be at your own cost.

Should you have any questions, please do not hesitate to contact me. Please RSVP to robin.roberts@griffith.edu.au by Friday 20 May 2016 to confirm your acceptance. I'm looking forward to seeing you in Bangkok.

With kind regards
Robin

OUTCOMES ACHIEVED

- Country representatives from the targeted export and import countries were present, these being; Thailand, the Philippines, Vietnam, Indonesia and China. The Pakistan representative was not available.
- An overview of key country mango agribusiness profiles was presented. Full details will be provided in the final meeting report. Examples of India, the Philippines, Vietnam and Indonesia are provided (Attachment C).
- Five short research Agreements were identified:
  1. Enhancing information access and research capacity for mango in the Asia-Pacific;
  2. Benefits of annual mango market and trade analysis in Asia-Pacific;
  3. Opportunities and strategies to improve biosecurity, market access and trade for selected mango markets;
  4. The economic potential and pilot options for enhancing mango customer quality in selected market chains; and
  5. Priority opportunities in tropical fruit processing in selected mango markets.
- These projects are to commence as soon as possible and be completed by June 2019.
- Present at the Workshop from ACIAR were the Program Manager for Agribusiness Development (Dr Rodd Dwyer) and the Program Manager for Horticulture (Dr Richard Markham). Both Program Managers agreed that a similar process needs to be developed for the production end of the supply-chain, as many of the impediments to the development of better agribusiness begin on the farm.

BENEFITS TO THE NORTHERN TERRITORY

- The reports from the five activities will provide a good background to additional export markets of NT mangoes;
- The decline in exports from the Philippines is a consideration that Northern Territory (NT) mango growers need to be cognisant of, in that in an endeavour to minimise the regular loss of market access in Japan, the Philippines Government implemented residue testing just prior to export, similar to the Australian requirement for the United States trade. However, because the majority of Philippine growers were using illegal/unregistered pesticides, they are not prepared to have their product tested for fear of being punished by the Philippine Authorities; and
- The NT Department of Primary Industry and Fisheries are to be involved in the review of production practices to support the development of the NT mango industry.

Action Officer:	Bob Williams	92215
Chief Executive	Alister Trier	92005

ALISTER TRIER **03/08/2016**

NOTED

GARY HIGGINS
5 AUG 2016

DEPARTMENT OF PRIMARY INDUSTRY AND FISHERIES

OVERSEAS TRAVEL REPORT

Dept Ref: 16-0476-SEC
Min Ref: 2016/1331-GJH
HPRM Ref:

Title:	ACIAR Regional Mango Workshop
Destination:	Bangkok, Thailand
Date/s:	5–9 July 2016
Travel approved:	15 June 2016 (Attachment A)
Officer/s travelling:	Mr Bob Williams

PURPOSE

To report on overseas travel to Bangkok, Thailand by Mr Bob Williams, Director Plant Industries Development, where he attended and participated in an Australian Centre for International Agricultural Research (ACIAR) Regional Mango Workshop on mango markets, trade and strategic research issues in the Asian-Pacific.

BACKGROUND

Over the past 20 years the ACIAR has funded research projects in most of the Asian and sub-continent countries. This research has covered the full supply from production through to trade development.

The majority of this work has been genetically similar, no matter which country is involved; the issues are basically the same. Poor genetic base, poor production practices (resulting in poor productivity), excessive pesticide usage, lack of infrastructure in regards to logistics and cool chain, no ownership of the product (from the grower to the consumer) and no respect for market access protocols. The stumbling block, however, for a few of these countries has been that once the research and development projects are finalised, agribusiness and governments have not built on the outputs of the project to build domestic and an export trade. For example, in the Philippines' considerable focus has been on reducing pesticide usage to reduce chemical residues in export fruit, however, regularly the Philippines lose market access into Japan due to chemical residues.

In 2015, ACIAR contracted Griffith University to review all past mango research projects and review the International trade of mangoes in Asian countries, both domestic and export. This report, solely based on the market and trade development part of the business, was presented to lead Australian agencies in mango research to prioritise issues for future activities. The next step in this process was to validate and commence to develop specific research areas.

PROPOSED OUTCOMES

To provide a longer-term perspective to develop regional mango agribusiness networks; to inform ACIAR funded mango research and development programs, aiming to improve the profitability and livelihoods of regional smallholder tropical fruit farmers, through better access to and competition in regional and local markets (Attachment B).

ATTACHMENT B

Mr Mark Hoult

Australian Centre for International Agriculture Research Project, Philippines

(HORT/2012/095)

9-16 July 2016

TRAVEL ITINERARY

Date	Location (country & city)	Daily Activity
9 July 2016	Darwin to Davao	Travel Darwin to Davao
10-12 July 2016	Davao, Philippines	Davao Meeting and project milestone activities with Project Partners. Training presentations & demonstration.
12 July 2016	Cebu to Ormoc, Baybay, Philippines	Inter and intra Island travel (Cebu to Leyte)
13-14 July 2016	Ormoc, Baybay, Philippines	Research trial activities with Visaya State University and Project Partners. Workshop Baybay, Philippines presentations and demonstrations
15 July 2016	Ormoc to Cebu, Philippines	Travel to Cebu to commence return trip
16 July 2016	Davao to Darwin (via Singapore)	Return travel to Darwin

ATTACHMENT B

PROPOSED TRAVEL ITINERARY

Mr Mark Hoult
Australia Centre for International Agricultural Research
Davao, Philippines
9-16 July 2016

Date	Location	Daily Activity
9 July 2016	Darwin to Davao	Travel Darwin to Davao
10-12 July 2016	Davao, Philippines	Davao Meeting and project milestone activities with Department of Agriculture Project Partners. Training presentations & demonstration.
12 July 2016	Cebu to Ormoc, Baybay, Philippines	Inter and intra island travel (Cebu to Leyte)
13-14 July 2016	Ormoc, Baybay, Philippines	Research trial activities with Visaya State University (VSU) and Department of Agriculture (DA) partners. Workshop Baybay, Philippines presentations and demonstrations
15 July 2016	Ormoc to Cebu, Philippines	Travel to Cebu to commence return trip
16 July 2016	Davao to Darwin via Singapore	Return travel to Darwin

Mr Daryl South, owner of Darwin Plant Wholesalers in Lambells Lagoon, explained the process of preparing coir-based growing media and nursery best practices.

Mr Han Shiong Siah (centre), agronomist and farm manager for Tropical Primary Products in Lambells Lagoon, discussed with the ACIAR project collaborators his family owned and operated business on tropical fruit production.

ATTACHMENT A

PID Staff host ACIAR Project Collaborators
Mr Constancio Asis, Senior Research Agronomist, Berrimah

Mr Mark Hoult, Senior Horticulturist and Mr Mark Traynor, Senior Technical Officer, Berrimah hosted research collaborators of the project on Tropical Tree Fruit Research and Development in the Philippines and Northern Australia (ACIAR /HORT/2012/095) on 20-22 April 2016. Filipino researchers, Dr Francisco Dayap and Dr Dario Lina observed the best practices for fruit production system from the nursery to the field in Berrimah Research Farm and Coastal Plains Research Station. They also visited several commercial orchards and interacted with fruit growers in the Northern Territory. They were accompanied by Mr Yan Diczbalis and Dr David Hall.

Dr Dayap is a researcher from the Department of Agriculture Region 8, Tacloban, Leyte. He leads the nursery and nutrient management component of the ACIAR Project. Dr Lina is an Associate Professor from the Visayas State University, Baybay, Leyte. He leads the nutrient management and flower regulation trial. Mr Yan Diczbalis, former DPIF staff and now the Principal Horticulturist, Department of Agriculture and Fisheries, Queensland, is the Leader of ACIAR-funded Project. Moreover, Dr David Hall is a consultant with the ACIAR funded research in Australia and Philippines.

The visit of the collaborators is funded by The Crawford Fund Queensland and Northern Territory Committee's International Training Award Program and ACIAR project. The objective of the training and extension visits are to develop an understanding of the application of disease management for seedling and orchard trees, nutrition budgeting, orchard fertiliser management and flower regulation techniques used in tropical tree fruit production in Australia. The visit was to assist the trainees to gain an understanding of the interrelation between the various components of production and the impact of mismanagement in one section on the next and the cascading effect this has in the production chain.

The ACIAR project aims to improve the livelihood of smallholder tropical fruit farmers in the southern Philippines and enhance new fruit industry development in tropical Australia. This includes developing and implementing integrated disease management in jackfruit and improving crop management to increase jackfruit productivity and quality in the Philippines and other tropical fruits in northern Australia. It also intends to develop improved processing options for jackfruit and lychee.

(From left) Dr Francisco Dayap, Dr Dario Lina, Mr Mark Hoult, Mr Yan Diczbalis and Mr Mark Traynor discussing jackfruit grafting at HortBlock, Berrimah Farm.

FOLLOW UP ACTION REQUIRED

Nil

Action Officer:	Mark Hoult	92338
Group Head:	Bob Williams	92215
Division:	Plant Industries	

ALISTER TRIER **11/08/2016**

NOTED

GARY HIGGINS
15 AUG 2016

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

This travel allowed Mr Hoult to implement milestone activities under the approved ACIAR HORT/2012/095 project. Contracted project services have been implemented and milestone targets met. Key project activities and outcomes gained included:

- In collaboration with Philippine project partners, DPIF developed new and improved growing media for containerised disease-free plant production whilst conducting nursery 'best practice' and local growing media workshops to ensure a coordinated propagation and research component between project partners in various regions;
- Artocarpus (jackfruit genus) germplasm sampling for (Deoxyribonucleic acid) DNA profiling and intra generic graft compatibility/adaptability studies. The Philippines is a major region of Artocarpus diversity with several endemic species potentially having a role in the development of commercial rootstocks to enhance productivity and disease tolerance;
- Complimentary graft compatibility studies with jackfruit on several related Artocarpus species is currently being undertaken by DPIF and this genome profiling of the genus will add valuable knowledge on affinities with the jackfruit and other Artocarpus species;
- Nursery 'best practice' guidelines are being implemented in 'model' nursery sites in Davao and Baybay, Leyte under milestone travel activities 1 and 2. These project nursery sites underwent a baseline sampling protocol for disease diagnostics encompassing core elements of disease and quality management in nursery systems ie: water source, potting media, germination sites and growing areas. The results have been used to identify where the main disease risk of Phytophthora is occurring and remedial actions established.
- At Visayas State University, Leyte, Dr Lucy Borines has finalised innovative work on Artocarpus tolerance to Phytophthora through a series of laboratory, greenhouse and field trials. This has identified some Artocarpus species with excellent tolerance to Phytophthora which may provide future resistant jackfruit rootstocks for this disease;
- The NT has supplied a larger gene pool of Artocarpus species from its field collections held at Berrimah Research Farm. In addition, several more Artocarpus species were collected and desiccated dry leaf tissue were introduced (via quarantine) for DNA/genotyping. These recent collections add to the 100 or more accessions that have previously been collected and analysed for the genotyping component of the project;
- For milestone activity three, interspecies graft compatibility trials continue and several combinations of Artocarpus species and jackfruit scions have been established in Davao and Leyte. This work represents a 'horticultural first' in grafting studies with the diverse genus of Artocarpus and offers great scope for enhancing jackfruit production and disease tolerance. This is a joint project initiative and is occurring concurrently in the Philippines and the Territory; and
- The NT component of this research, notably high density rambutan orchard systems, jackfruit cultivar development and passionfruit industry development will be presented to local industry at the planned field day at Coastal Plains Research Station in September 2016.

DEPARTMENT OF PRIMARY INDUSTRY AND FISHERIES

OVERSEAS TRAVEL REPORT

Dept Ref: 16-0455-SEC
Min Ref: 2016/1358 - 6TH
Trim Ref: P2012/0421

Title:	Implementation of ACIAR Tropical Fruits Project for the Philippines and Northern Territory.
Destination:	Philippines
Date/s:	9-16 July, 2016
Travel approved:	25 May 2016 (refer to Attachment A)
Officer/s travelling:	Mr Mark Hoult

PURPOSE

To report on travel to the Philippines for Mr Mark Hoult, Senior Horticulturist, Plant Industries, to implement the Australian Centre for International Agricultural Research (ACIAR) tropical fruits project objectives and activities with Philippine Partners.

PROPOSED OUTCOMES

Under the Northern Territory (NT) Government approved ACIAR funded project 'HORT/2012/095 Tropical tree fruit research and development in the Philippines and northern Australia to increase productivity, resilience and profitability', the Queensland Department of Agriculture and Fisheries has sub-contracted the Department of Primary Industry and Fisheries (DPIF) Plant Industries Development Group to provide services for several key activities.

Important project milestones that require this proposed travel to ensure completion of NT DPIF contracted services include:

Milestone	Description of Milestones
1	Construction of model nurseries at Bureau of Plant Industries (BPI) Davao and Philippines Department of Agriculture (PDA).
2	Develop and present workshops on Best Practice Nursery Management with distribution of extension materials and training in applicable nursery techniques such as growing media development for disease suppression and management.
3	Grafting trials to examine the influence of stock seedling age and scion preparation on graft take. Initiate field trials of scion-stock combinations. Commence growth and disease susceptibility measurements

ATTACHMENT B

Mr Pieter Conradie

The 10th International Rangelands Congress, Saskatoon

11-24 July 2016

Travel Itinerary

11-12 July 2016	Travel from Australia to Saskatoon (Canada)
13-16 July 2016	Pre-Conference Study Tour, Saskatchewan Mixed Grassland
16-22 July 2016	International Rangeland Conference
* 18 July 2016	Mid-Congress Tour, Forage and Livestock Research, Western Beef Development Centre
22-24 July 2016	Return to Australia

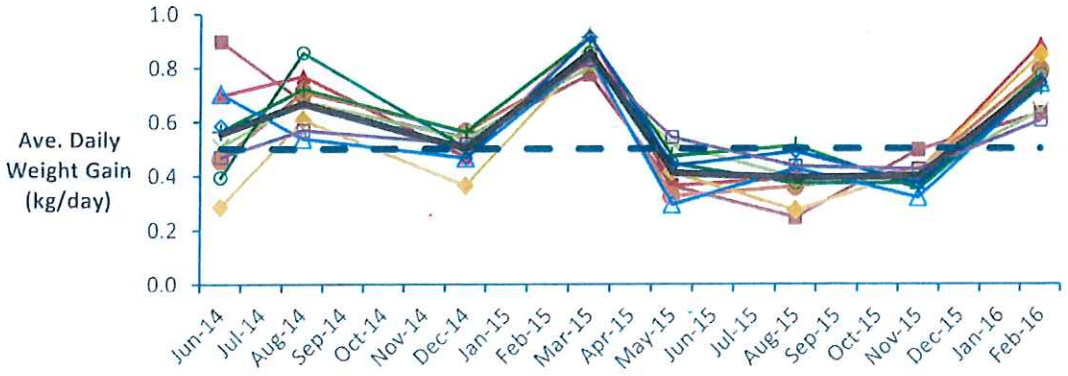


Fig. 1 Performance of 10 different steer breed groups showing daily growth rate targets of 0.5kg has been surpassed with the response to nutrition between breeds being similar.

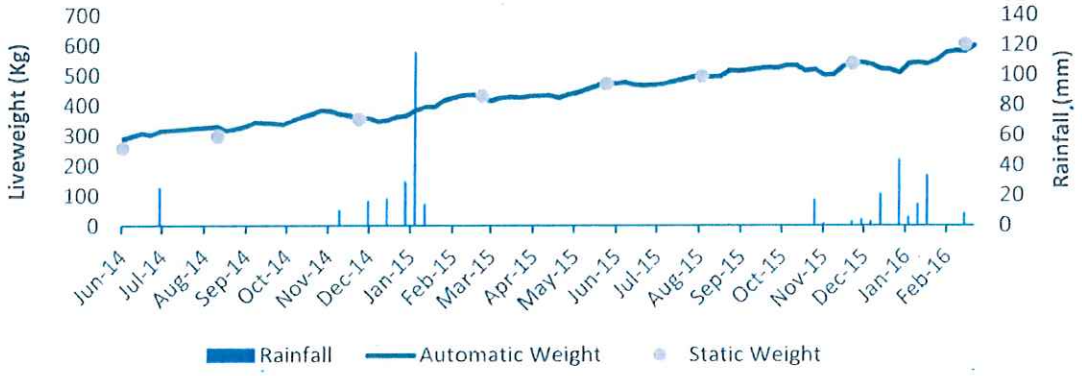


Fig. 2 Remotely monitored average steer automatic weight compared to quarterly static weight and rainfall distribution.

of grazing land management. In an extremely variable and unpredictable climate this project also demonstrates that steers can achieve a weight of 575kg (Fig.2) with a P8 fat depth of >6 mm by 30 months of age which enables them to achieve MSA grading. The development of a website to provide producers with updated information about the Challenge, as well as other relevant research findings, has the potential to improve communication and contribute significantly to uptake of research recommendations. Observations from two participants after a feedback session: Participant 1: *"But the interesting result so far is that regardless of the starting weights and the breed, they all ended up coming to reasonably consistent weight gain..... I certainly didn't expect that, but it does make sense."* Participant 2: *"I have learned that there are many unanswered questions related to animal performance, seasonal conditions and handling that we may have taken for granted without realising there could be perverse financial outcomes from the decisions that have been made..."*

Conclusions & Implications

The Challenge participants experienced how their steers can meet requirements to access premium markets through applying a grazing strategy and carrying capacity appropriate for the conditions. The Challenge has successfully engaged seven producers with approximately 25 percent of the Alice Springs region actively following the progress of the Challenge. This is a significant engagement outcome with potential to increase research uptake.

References

Materne, C. 2015. Quality Graze Trial: grazing strategies impact on land condition and premium beef production in central Australia. Proceedings Australian Rangeland Society 18th Biennial Conference, Alice Springs 2015.

ATTACHMENT B

Quality Graze Steer Challenge - Engaging Pastoralists in central Australia

Pieter Conradie[1*] and Chris Materne[2]

[1]Northern Territory Department Primary Industry & Fisheries, PO Box 8760, Alice Springs Northern Territory 0871 Australia

[2]Northern Territory Department Primary Industry & Fisheries, PO Box 8760, Alice Springs Northern Territory 0871 Australia

Corresponding author email: pieter.conradie@nt.gov.au

Key words: producer engagement, research adoption, grazing land management, premium beef

Introduction

The pastoral industry in the Arid Zone of central Australia has a number of strengths which include the ability to achieve significant weight gain on fully cured native pastures from predominantly *Bos taurus* cattle while having access to premium quality beef markets. The production of finished steers for slaughter and premium prices through the Meat Standards Australia (MSA) grading system is one option to take advantage of these strengths. To encourage adoption of research recommendations and to disprove a common perception amongst producers that steers can only be prepared for premium markets in exceptional seasons in the Arid Zone, a Producer Demonstration Steer Challenge (Challenge) was implemented at Old Man Plains Research Station (OMP) near Alice Springs in the Northern Territory of Australia.

This Challenge encompasses the extension component of a long-term grazing trial which tests different grazing strategies, based on a modelled carrying capacity, towards the consistent production of quality beef in central Australia while minimising the effect of a variable and unpredictable climate (Materne, 2015). The Challenge provides producers with a neutral venue to compare their steer performance under the latest land management recommendations and investigates the economic and ecological viability of producing quality beef consistently in central Australia. Focus areas of the study include the enhancement of communication and research adoption through participatory learning, monitoring and evaluation using the competitive nature of producers as impetus.

Materials & Methods

Seven central Australian producers representing popular cattle breeds and cross breeds supplied up to eight weaner steers (180-220kg) each for the Challenge. Following quarantine all steers entered a two-paddock 12 month rotation with a capped variable stocking strategy based on a long term carrying capacity of 2.2 Adult Equivalent per km^2. Web based, real-time performance updates on weights of individual animals as well as groups were made available to producers while steer performance data such as growth rate, condition score, P8 fat depth and skeletal growth are collected quarterly and results presented to the producers. A Remote Livestock Management System (RLMS) was used to collect automatic weights on a continuous basis during the trial. At approximately 2.5 years of age, and with a target weight of 575 kg, the steers were sent direct to slaughter and MSA grading with comparable steers from other grazing strategies on OMP. In consultation with the participants in the steer challenge criteria such as steer performance, meat quality and price per kg were used to determine the winner of the Challenge.

Qualitative data collected through a participant survey at the beginning and end of the project as well as discussions at field days and individual visits were used to indicate changes in perception on meat quality, grazing land management, MSA grading and steer performance and thereby the effectiveness of this Challenge as a communication and research adoption tool was assessed.

Results & Discussion

Data presented in Figure 1 provided evidence that environmental conditions exert a greater influence on steer growth rates than genetics. This is a most powerful message that emphasizes the importance

was conceived. Attending the IRC congress will hopefully be the impetus for a new pastoral production trial for the Alice Springs Region.

FLTR: Mr Roy Chisholm (Napperby Station, Alice Springs), Mr Pieter Conradie, Mr Tony Palmer (President Grassland Society of Southern Africa) and Mr David Phelps (President Australian Rangeland Society) at the end of Day two of the Conference.

CONCLUSION

- Active producer involvement, collaboration with universities and service providers, in planning and conducting research encourages ownership and subsequent adoption of technology.
- Dedicated research officers and agricultural economists are essential to provide effective support to the pastoral industry.
- Huge progress has been made in the technology space and this technology must be harnessed to remain relevant in a competitive research environment.
- Research facilities where long-term collaborative research can be undertaken are extremely valuable assets.

Action Officer:	Pieter Conradie	18101
Group Head	Scott Wauchope	92166
Chief Executive	Alister Trier	92005

ALISTER TRIER **08/08/2016**

NOTED

GARY HIGGINS

15 AUG 2016

combined), lease grazing blocks with a total of 323 000 hectares, which are managed through self-governing Pastoral Committees. This system assisted in developing the pastoral sector in Saskatoon by assisting smaller farmers to diversify, providing professional extension services in livestock and fodder management, applying appropriate stocking rates on sensitive land and enabling young and resource poor famers to enter the industry.

A fourth generation pastoral enterprise was visited, where a family prosper through farming with a cow/calf enterprise of 350 head, which, according to the state agricultural economist, is considered a viable unit for a cattle only enterprise. Even though weaning percentages of 90 to 95 are possible in this relatively intensive system, the over-wintering costs in an area that snows over for five months annually is considerable. This leads to an interesting comparison between efficiency of production systems and the role of subsidisation. A much larger cow/calf operation of approximately 1 500 is considered an economic unit in the Alice Springs Region.

At the Canada Saskatchewan Irrigation Diversification Centre, Research Development and Extension (RD&E) is done on irrigation systems with a more recent focus on testing feed and fodder crops adapted to the local environment. Unlimited irrigation water is available out of the South Saskatchewan River. Producers are assisted with the development of cost-effective methods to extract water from the river during summer. During winter the river freezes over, with no crop production.

We visited one of the most advanced Agricultural Research Centres in Western Canada's Arid Climate region and one of 20 Departmental Research Centres, the Swift Current Research and Development Centre. State-of-the-art equipment allows for innovative and applied research from cattle and fodder production to crop production. An example of how the different faculties collaborate is that an improved fodder legume, developed at the centre, is currently being tested for a potential increase in methane emissions by the cattle scientists. The effect of expected increases in soil temperature due to climate change is simulated to determine the effect on seed germination. Preliminary findings indicate that the effect on native grass seed is significant, while the 'tame' improved grass seeds are much less sensitive to increased soil temperatures.

As was found at a majority of the Research Centres visited, producers are well represented on the management structures and together with Universities and Government have a significant input into the research and funding allocation. A significant portion of research funding comes from a voluntary producer levy of $3 per livestock unit sold, with an additional mandatory Federal levy of $1 per unit sold. Producers are allowed to claim the industry levy back, but currently only two to three per cent of producers do claim the levy back. Although there are similarities with the Meat and Livestock Australia (MLA) funding model, it appears that this model is more simplistic and involvement by on-ground producers is higher with an increased sense of ownership, leading to higher adoption of research findings. Hopefully the new MLA funding model, once fully implemented, will have a similar outcome for Australia.

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

I am grateful to the NT Government for the opportunity to attend the 2016 IRC. Not only did I learn much about a wide range of topics related to pastoral production in Central Australia, I also had the opportunity to network with innovative thinkers from many countries and spent time with researchers, pastoralists and entrepreneurs from Australia in an environment conducive to creative thinking.

In 2014 I had the opportunity to attend a Grasslands Conference in South Africa with an Alice Springs-based pasture Scientist. At this Conference the recently completed Producers Steer Challenge Demonstration Trial (most valuable for Central Australia),

The session 'People of the Rangelands' started with two global perspectives on the uptake of technology in the developing world versus the developed world. A quantum leap has occurred with communication, especially with the introduction of mobile and smart phones. In Kenya, the host country for the 2020 IRC (and classified as 'developing'), approximately 78 per cent of the population with a large rural component are connected and receive information through this media. The Australian Outback is at a definite disadvantage at present with regards to connectivity.

The importance of involving all the people on the land is paramount to any successful management intervention and a big challenge is to integrate the scientific data with the traditional knowledge, experiences and belief systems of people that do not necessarily rely on modern education in decision making. In Saskatoon the extension service network is well developed with specialised extension officers for forage, animal science and agronomy in ten regional and district hubs. A research model is also being tested for Wyoming, USA, moving away from a country generalist to a regional specialist and making more use of web-based and social media interactions with producers. Research and development initiatives normally have a strong social economic base provided by experienced agricultural scientists in the system. Producer organisations provide input through bodies similar to our Industry Advisory Committees, but in Saskatoon specifically, these bodies have a much higher level of involvement.

Powerful presentations on global climate change patterns using soil core data from Western Rangelands Lakes going back 9 000 years and correlated with tree ring patterns, confirms climate variability over 30-year cycles. Innovative research is being conducted to look at the effect of climate change on grasses and crop species and adapted species are being bred, with cases studies on how graziers in different parts of the world are already being affected by climate change. With new technology such as drones and collars for livestock; and GPS and other data collection features becoming more readily available, new opportunities arise to prepare for the eventual changes in temperature and precipitation. To cope with the expected intensification of the natural variation that will affect continents and agro-ecological regions in different ways, we need to manage the rangelands in a manner that ensures that they remain healthy and robust.

Studies on fire behaviour and management, soil carbon sequestration, satellite imagery, grazing systems in commercial and communal areas, inclusion of forage legumes in grazing systems, NRM, invasive plant and animal species and numerous related topics were presented. The proceedings of the IRC (with all presentations) will be shared with relevant people through the Arid Zone Research Institute Library.

REPORT ON CONGRESS TOURS

I attended the Mixed Grassland Tour to the south of Saskatoon as well as a tour to the Western Beef Research and Development Centre.

A visit to two Conservation areas showcased pristine prairies as well as pasture reclamation efforts such as reseeding and use of fire in disturbed areas. At the Grassland National Park, bison have been re-introduced for cultural reasons, but also to determine the effect of large herbivores on the ecosystem. Cattle handling facilities have been adapted to allow working with these wild animals in a low-stress manner and with consideration to Workplace Health and Safety. Surrounding cattle producers have been involved in the development of this recently established park as there is an increased biosecurity risk.

Land tenure and grazing systems were discussed at the Valjean Community Pasture, administrated under the Canadian Government's Prairie Farm Rehabilitation Scheme. A total of 2 500 producers (owning more than 125 000 cattle and 6 000 sheep

DEPARTMENT OF PRIMARY INDUSTRY AND FISHERIES

OVERSEAS TRAVEL REPORT

MIN.LIAISON

Dept Ref: 16-0454-SEC
Min Ref: 2016/1354 - GJH
HPRM Ref:

Title:	Attendance at the 10th International Rangelands Congress
Destination:	Saskatoon, Canada
Date/s:	11-24 July 2016
Travel approved:	2 June 2016 (refer to Attachment A)
Officer/s travelling:	Mr Pieter Conradie

PURPOSE

To report on attendance at the 10th International Rangeland Congress (IRC) in Saskatoon, Canada from 17-23 July 2016 by Mr Pieter Conradie, Regional Manager, Market and Enterprise Development, Alice Springs. To present a poster paper entitled "Quality Graze Steer Challenge - Engaging Pastoralists in Central Australia" at the Conference.

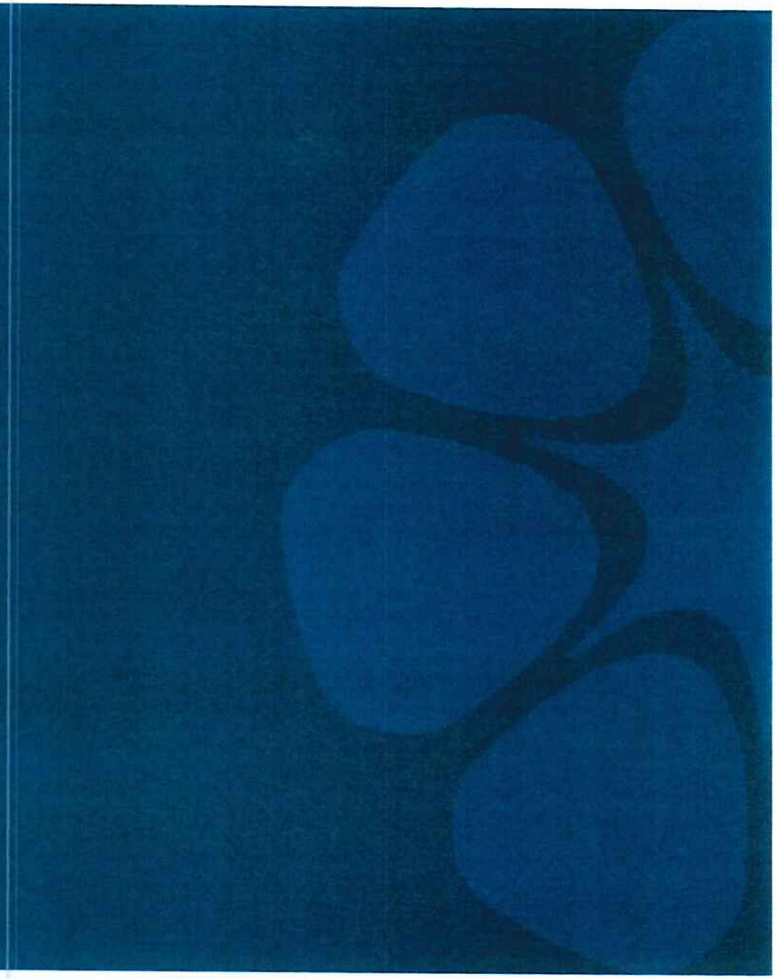
REPORT ON CONGRESS PROCEEDINGS

The IRC was attended by 500 delegates from 48 countries and more than 400 papers were delivered as platforms, posters and in workshops. The Australian Delegation was the second largest outside of Canada with approximately 35 representatives from the Commonwealth Scientific and Industrial Research Organisation, Universities, Government Departments, Consultants, Natural Resource Management (NRM) groups, Non-Government Organisations and Producers. With the main theme of the conference being 'The Future Management of Grazing and Wild Lands in a High-tech World' there was much focus on new technology.

In a plenary session dealing with grazing land assessment and management Mr Ed Charmley, James Cook University, presented a global overview with reference to the impact of communication technologies on pastoral societies. He also made reference to the Digital Homestead Project in Queensland and the Precision Pastoral Management Tools Project based in Alice Springs, one of the stand-out innovations presented at the Conference.

The state of rangeland resources and their use and competitiveness in the global market place was discussed; with the impact of Mining (not only on the resources but also on the labour force), a major point of interest. Case studies from China, Australia, and Mongolia were presented, but a stand-out presentation came from the United States on improving cattle grazing distribution through genetic selection. With Deoxyribonucleic acid (DNA) testing and gene marking becoming more affordable ($30 a sample), this technology opens new application for some of the genetics work in which the Northern Territory (NT) is involved with Australian Universities. New empirical data was also provided on the relationship between cow size and the overall efficiency in different production systems. This is of particular relevance to Central Australia with its climatic challenges, extreme temperatures, low carrying capacity and relatively small margins-for-profit.

Thank you



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Conclusion

- Nutrient balance approach is a novel model that integrates statistical computation of balances and evaluation of nutrient concentrations into a coherent diagnosis that avoids conflicting interpretation of nutrient contents and ratios.
- The results demonstrate the power of nutrient balance analysis in studying the mineral composition of plant and changes in this composition in response to physiological, environmental stimuli and plant plant's development state.
- The potential of this process to provide a means to manage orchard nutrition and understand the impact of soil chemistry on tree nutritional status will be explored.

Fig. 4. Dendrogram of mango fruit ionome shoing significant imbalances of Ca, Cu and Fe ratios among other nutrients

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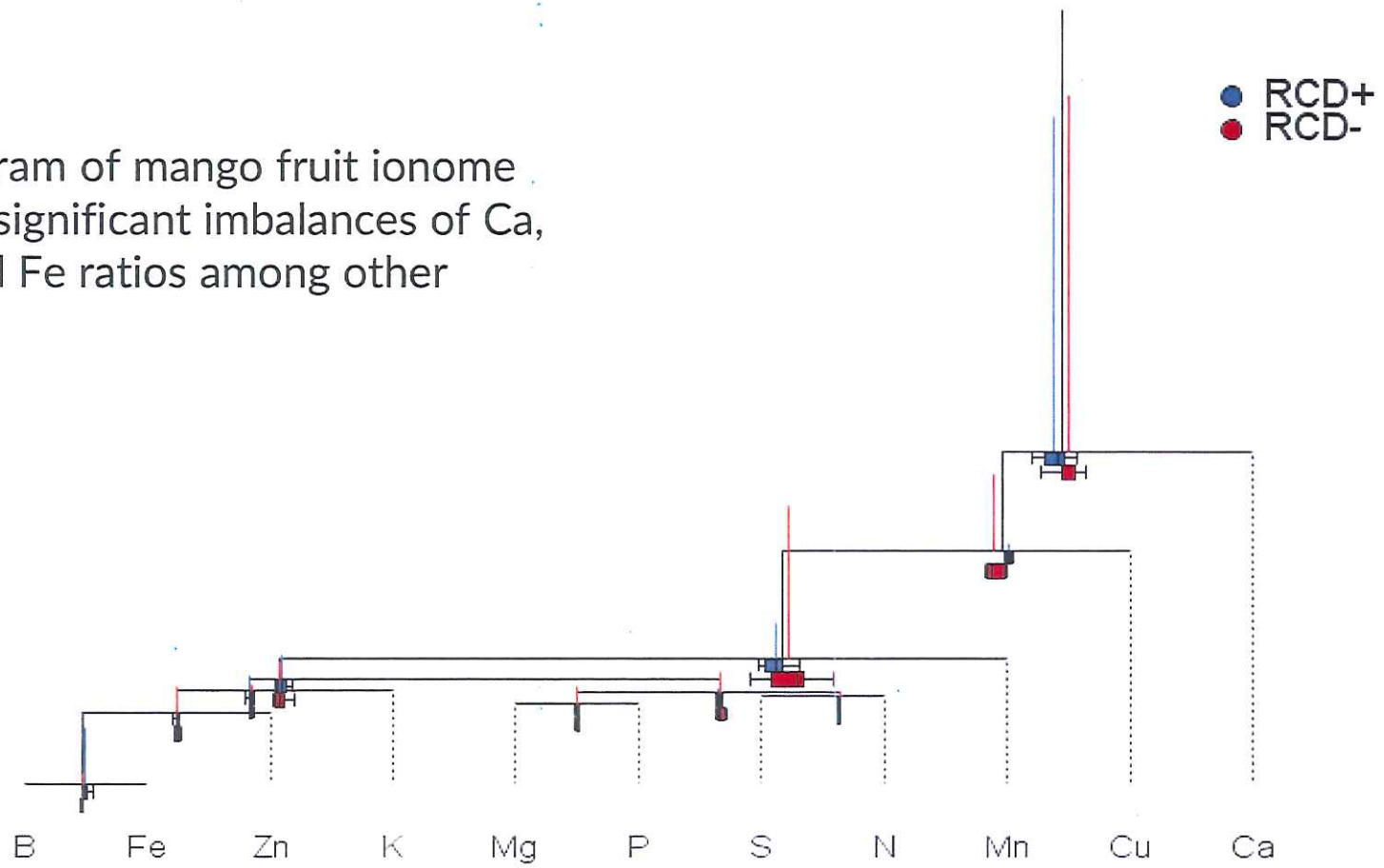
Fig. 3. Dendrogram of mango fruit ionome showing significant imbalances of Ca, Cu, B and Fe ratios among other nutrients



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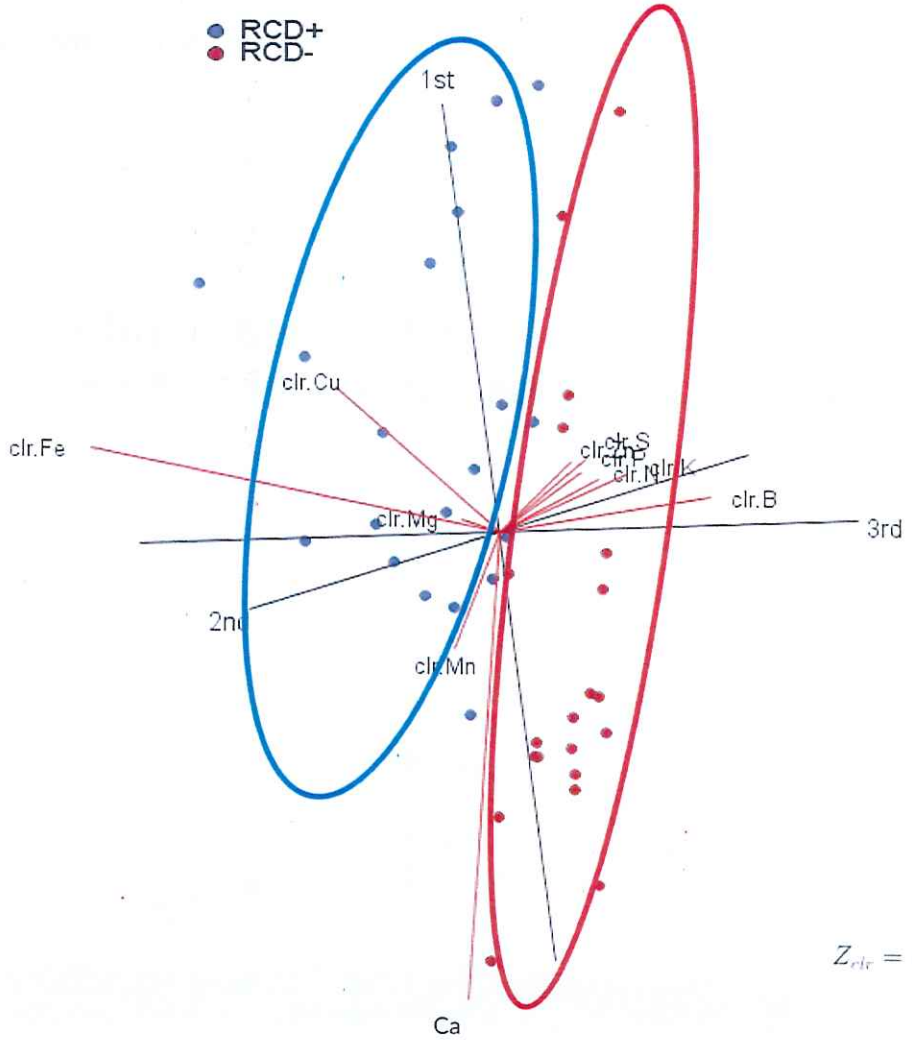

$$Z_{clr} = (UT)V^T$$

Principal Components:

	clr.S	clr.N	clr.P	clr.K	clr.Ca	clr.Mg	clr.Cu	clr.Zn	clr.Mn	clr.Fe	clr.B	Cum.Prop.Exp.
PC1	0.1247	0.0989	0.0990	0.0610	-0.8211	0.0322	0.3779	0.1258	-0.2861	0.2118	-0.0240	0.7110
PC2	-0.0707	0.0357	-0.0574	-0.2519	0.4287	0.0497	0.5715	-0.0141	-0.3960	0.1788	-0.4744	0.8206
PC3	0.1723	0.2712	0.1652	0.1266	0.0962	-0.0448	0.0869	0.1759	-0.4230	-0.7761	0.1498	0.9218
PC4	-0.1476	-0.0288	0.1081	-0.0016	-0.1772	0.2604	0.3763	-0.1979	0.6030	-0.4541	-0.3405	0.9539
PC5	0.1449	0.5637	-0.2448	-0.2601	-0.0565	-0.4735	-0.0773	0.3599	0.3103	0.0061	-0.2728	0.9700
PC6	-0.2022	-0.2665	-0.6864	0.1048	-0.0042	0.1734	0.2228	0.5109	0.0475	-0.1202	0.2202	0.9829
PC7	0.2426	0.3207	-0.4656	-0.1557	-0.0020	0.0529	0.2208	-0.6203	0.0135	-0.0078	0.4008	0.9899
PC8	-0.1442	-0.2524	0.1369	0.2330	0.0775	-0.7559	0.4181	-0.0980	0.1296	0.0029	0.2526	0.9958
PC9	0.4477	-0.4197	0.1784	-0.6951	-0.0113	-0.0079	0.0934	0.1764	0.1103	-0.0911	0.2189	0.9982
PC10	-0.7036	0.3035	0.2420	-0.4308	-0.0330	0.0852	0.0510	0.0832	-0.0132	0.0286	0.3870	1.0000

Fig. 2. Principal component analysis showing separation of nutrients in mango fruit between RCD+ and RCD- orchard.

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Variation array: RCD+ orchard

Variance ln(Xi/Xj)

Xi\Xj	N	P	K	S	Ca	Mg	Cu	Zn	Mn	Fe	B	clr variances
N		0.0094	0.0168	0.0069	0.3691	0.0061	0.0141	0.0104	0.0424	0.1201	0.0148	0.0074
P	-1.6277		0.0073	0.0066	0.3987	0.0087	0.0106	0.0117	0.0585	0.1364	0.0083	0.0116
K	0.6081	2.2357		0.0077	0.4467	0.0143	0.0123	0.0104	0.0688	0.1253	0.0049	0.0169
S	-2.2268	-0.5991	-2.8348		0.4329	0.0088	0.0073	0.0096	0.0499	0.1079	0.0073	0.0106
Ca	-2.6999	-1.0723	-3.3080	-0.4732		0.3427	0.4375	0.3704	0.2844	0.5476	0.4308	0.3211
Mg	-1.5802	0.0474	-2.1883	0.6466	1.1197		0.0104	0.0076	0.0409	0.1259	0.0129	0.0045
Cu	2.6642	4.2919	2.0561	4.8910	5.3641	4.2444		0.0169	0.0565	0.1095	0.0115	0.0144
Zn	2.8989	4.5266	2.2909	5.1257	5.5989	4.4791	0.2347		0.0465	0.1044	0.0098	0.0063
Mn	2.7790	4.4067	2.1709	5.0058	5.4789	4.3592	0.1148	-0.1199		0.0981	0.0583	0.0251
Fe	2.8799	4.5076	2.2719	5.1067	5.5799	4.4602	0.2157	-0.0190	0.1009		0.1192	0.0969
B	2.9081	4.5357	2.3000	5.1349	5.6080	4.4883	0.2439	0.0092	0.1291	0.0281		0.0136
Mean ln(Xi/Xj)												0.5285 Total Variance

Variation array: RCD- orchard

Variance ln(Xi/Xj)

Xi\Xj	N	P	K	S	Ca	Mg	Cu	Zn	Mn	Fe	B	clr variances
N		0.0246	0.0315		0.5112	0.0527	0.0318	0.0200	0.2576	0.0508	0.0620	0.0301
P	-1.6956		0.0164	0.0153	0.4511	0.0356	0.0819	0.0359	0.1949	0.0333	0.0368	0.0186
K	0.6429	2.3385		0.0188	0.4139	0.0166	0.0917	0.0268	0.1465	0.0235	0.0105	0.0068
S	-2.2402	-0.5445	-2.8831		0.4994	0.0372	0.0421	0.0143	0.2415	0.0236	0.0371	0.0198
Ca	-2.0941	-0.3985	-2.7371	0.1460		0.3288	0.6698	0.5527	0.1912	0.4325	0.4157	0.3405
Mg	-1.6857	0.0099	-2.3287	0.5544	0.4084		0.1176	0.0516	0.1205	0.0219	0.0259	0.0079
Cu	2.1407	3.8363	1.4978	4.3809	4.2348	3.8264		0.0390	0.4232	0.1040	0.1340	0.0922
Zn	2.8667	4.5623	2.2238	5.1068	4.9608	4.5524	0.7260		0.2584	0.0403	0.0507	0.0335
Mn	2.9964	4.6920	2.3535	5.2365	5.0905	4.6821	0.8557	0.1297		0.1918	0.1415	0.1315
Fe	2.5439	4.2395	1.9009	4.7840	4.6380	4.2296	0.4032	-0.3228	-0.4525		0.0235	0.0204
B	3.1336	4.8292	2.4906	5.3737	5.2277	4.8193	0.9928	0.2669	0.1372	0.5897		0.0197
Mean ln(Xi/Xj)												0.7210 Total Variance

Fig. 1. Variation array of mango fruit ionome showing stable ratios of nutrient (dark blue to light blue) and nutrient contributing significant variation (red) in the ionome balance.

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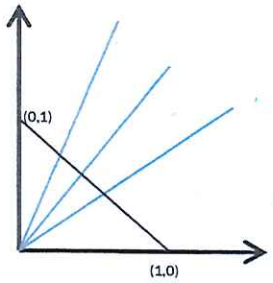
Balance as isometric log ratio (*ilr*) coordinates

- Orthogonal coefficient × log ratio contrast

$$ilrj = \sqrt{\frac{rs}{r+s}}\{\ln[g(c_+)] - \ln[gc_-]\} = \sqrt{\frac{rs}{r+s}}\, ln\ g(c_+)/g(c_-)$$



Compositional data in R^2

Order	N	P	K	Ca	Balance
1	+	+	-	-	N, P/K,Ca
2	+	-	0	0	N/P
3	0	0	+	-	K/Ca

Sequential Binary Partitioning

- Variation array
- Principal component analysis
- Dendrogram balance
- Discriminant analysis

Free software: CoDaPack 2.02.04 (http://ima.udg.edu/codapack/)

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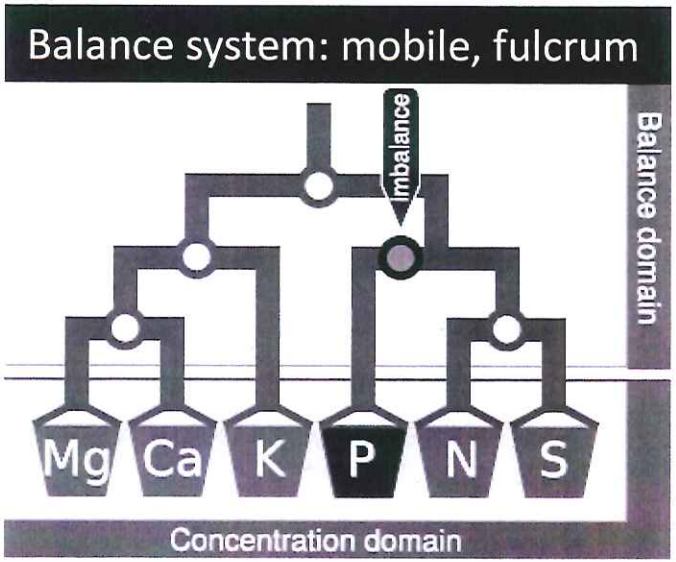
Approaches of nutrient diagnosis

3. Compositional nutrient balance diagnosis

   - Connects nutrient balances and concentration within a physiologically sound, coherent, and statistically unbiased model performed on isometric log ratios (ilr).



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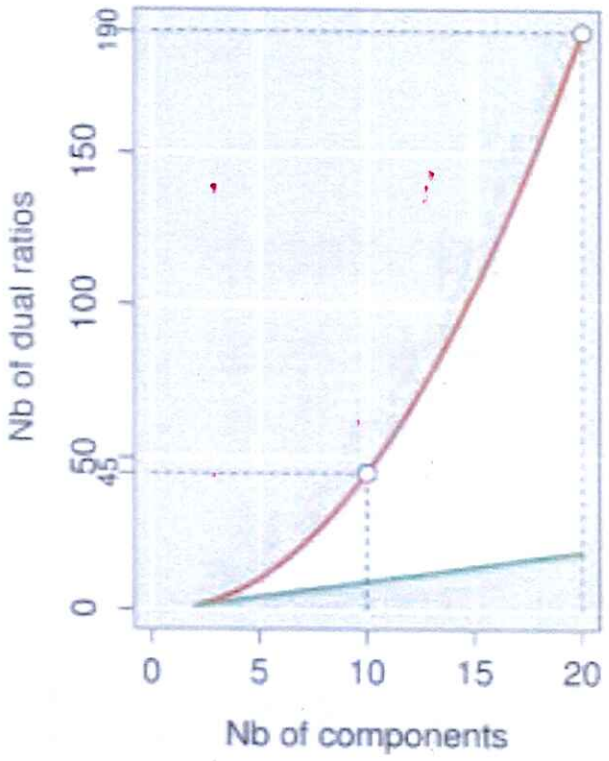
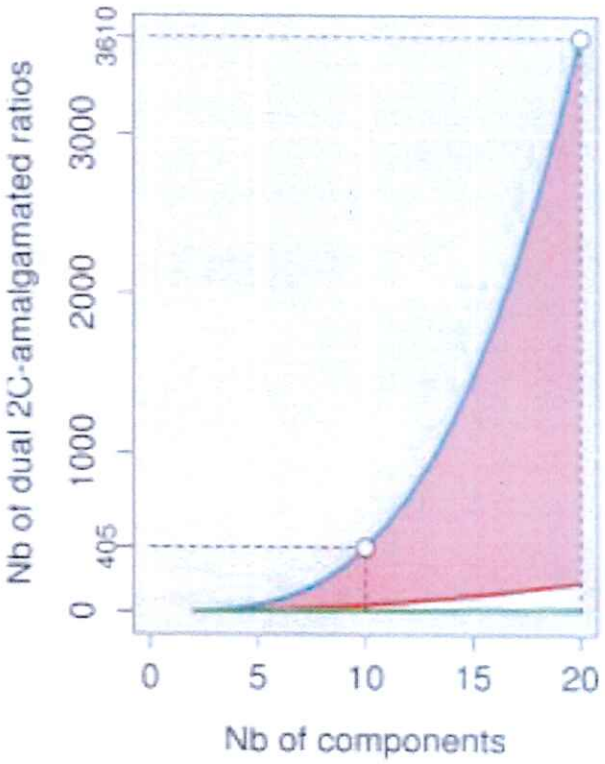
Redundancy bubbles of dual and amalgamated ratios





- Ratios generate spurious correlations in multivariate analysis (Pearson, 1897)

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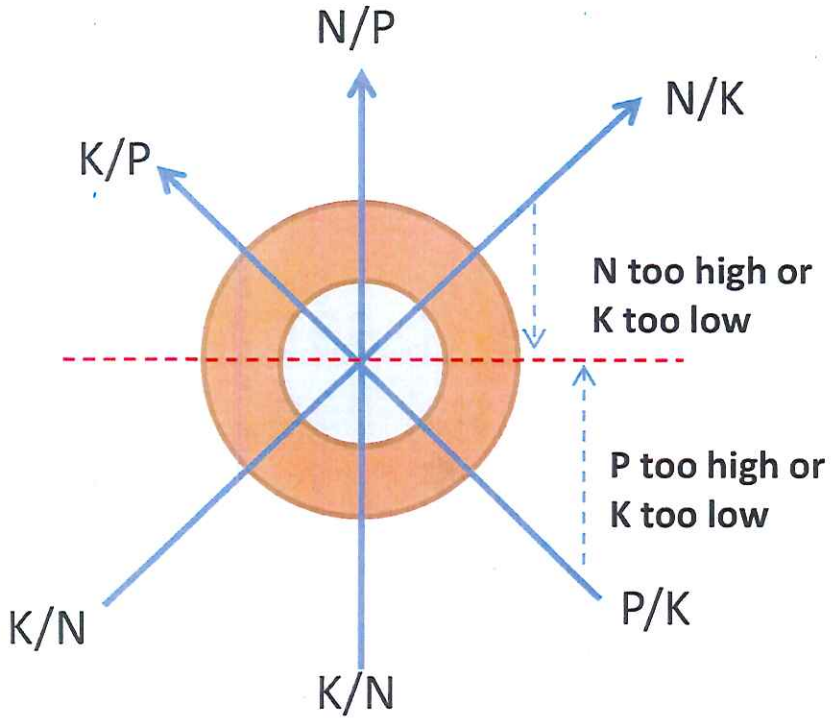
Approaches of nutrient diagnosis

2. Dual or amalgamated ratios
   - Accounts for interactions of two nutrients
   - e.g. Diagnosis and Recommendation Integrated System (DRIS)



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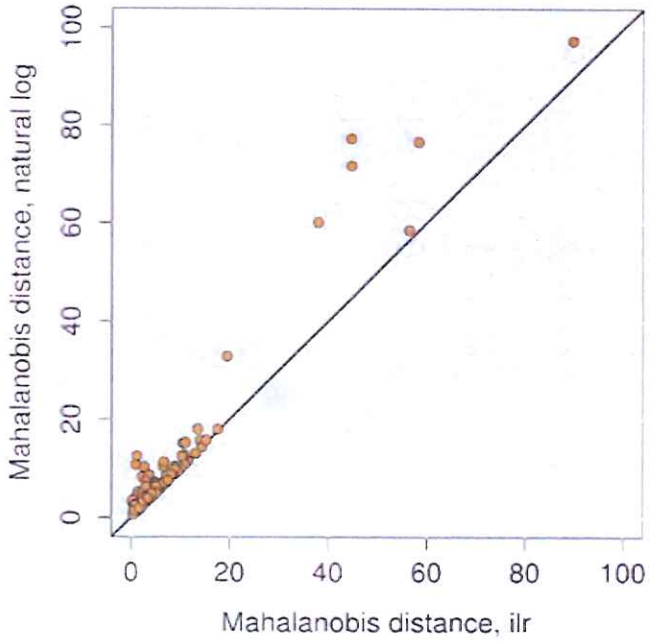
Critical level/range of nutrient content in mango leaves

Nutrient Element	Robinson et al. (1997)	Catchpoole & Bally (1995)	Stassen et al. (1999)	Bhargava and Chadha (1988)	Young & Koo (1971), Young & Sauls (1981)
N (%)	1.00-1.50	0.80-1.90	1.25	1.23	1.00-1.50
P (%)	0.08-0.18	0.12-1.30	1.45	0.06	0.09-0.18
K (%)	0.30-1.20	0.40-2.50	0.10	0.54	0.50-1.00
Ca (%)	2.00-3.50	1.50-2.80	0.80-1.05	1.70	3.00-5.00
Mg (%)	0.15-0.40	0.20-0.40	2.08	0.91	0.15-0.47
S (%)	0.50-0.60	0.10-0.23	0.30	0.12	-
Cu (mg/kg)	10-20	10-150	20	12	28-35
Zn (mg/kg)	20-150	20-63	40	25	10-119
Mn (mg/kg)	60-500	160-980	80	66	92-182
Fe (mg/kg)	70-200	30-120	80	1.71	38-120
B (mg/kg)	50-80	20-140	50	-	24-84

Approaches of nutrient diagnosis

1. Critical value approach
   - Based on the critical value of deficiency or toxicity of the nutrient
   - Nutrient interactions assumed negligible



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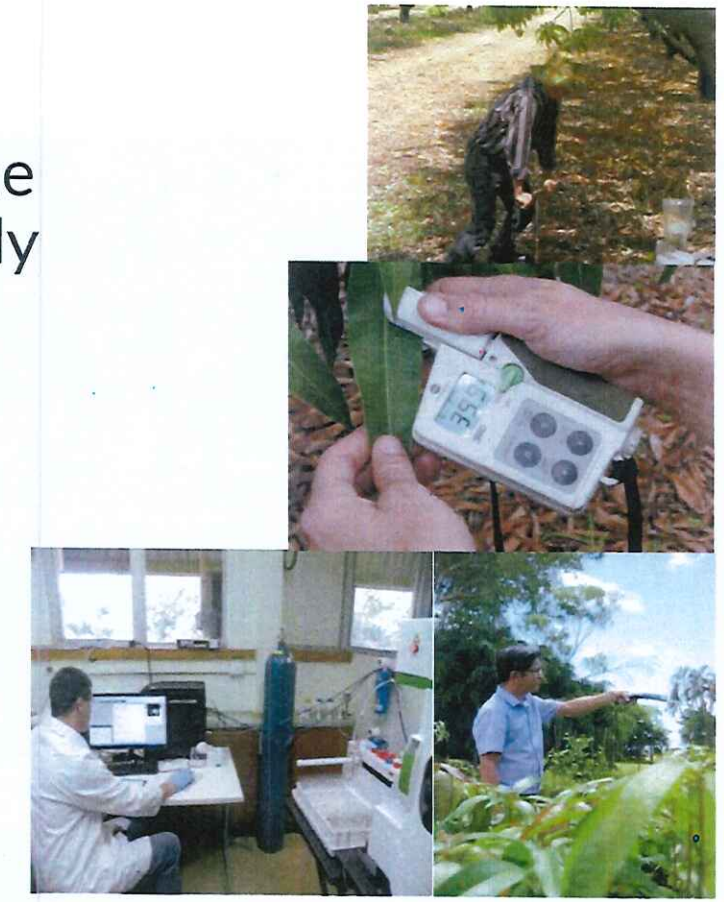
Importance of nutrient analysis

- Determine the nutrient status of the ecosystem and its capacity to supply nutrient
- Assist in making fertilizer recommendations



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Diagnosis of Mango Ionome Using Nutrient Balance Concept

Constancio Asis

7 July 2016

DEPARTMENT OF **PRIMARY INDUSTRY AND FISHERIES**

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ATTACHMENT D

Universitat de Girona
Departament d'Informàtica, Matemàtica Aplicada i Estadística

Campus Montilivi,
Escola Politècnica Superior
Edifici P4
E-17003 Girona
41°57'46.5"N 2°49'53"

On behalf of the CoDaCourse Organizing Committee,

Dra. Glòria Mateu-Figueras

hereby certifies that

Constancio Asis

has attended the 25 hours

week-CoDaCourse

a 5-day course on Compositional Data Analysis

organized by the Research Group on Compositional Data,
that took place in Girona July 4 – 8, 2016

Girona, July 8, 2016

This course is officially accredited by the International Association for Mathematical Geosciences

Universitat de Girona

Day 5 – Friday 7July 2016

The knowledge gained during the training was measured by allowing the participants to present their respective case study. Dr Asis presented on 'Diagnosis of mango ionome using nutrient balance concept'. The ionome of agricultural crops is typically diagnosed using critical nutrient value and nutrient ratios but these diagnoses are biased. Nutrient concentrations are made of compositional data; thus, former diagnostic tools developed according to the "Law of minimum" should be replaced a by physiologically sound and statistically unbiased numerical tools such as nutrient balance concept. Nutrient balance approach is a novel model that integrates statistical computation of balances and evaluation of nutrient concentrations into a coherent diagnosis that avoids conflicting interpretation of nutrient contents and ratios. We used nutrient balance technique to explore the possible role of ionomics in the development of resin canal discolouration of mango fruit as well as characterise soil and plant ionome in several orchards in the NT. Nutrient balance is a useful tool in studying the mineral composition of plant and changes in this composition in response to physiological, environmental stimuli and plant's development state.

All participants received a certificate of attendance and the training culminated after a photo session (Fig 4).

Fig 4. Our group photo, taken before the end of the training (Dr Asis - second from left)

Prepared by:

Constancio Asis
Plant Industries Division
DPIF, Berrimah Farm

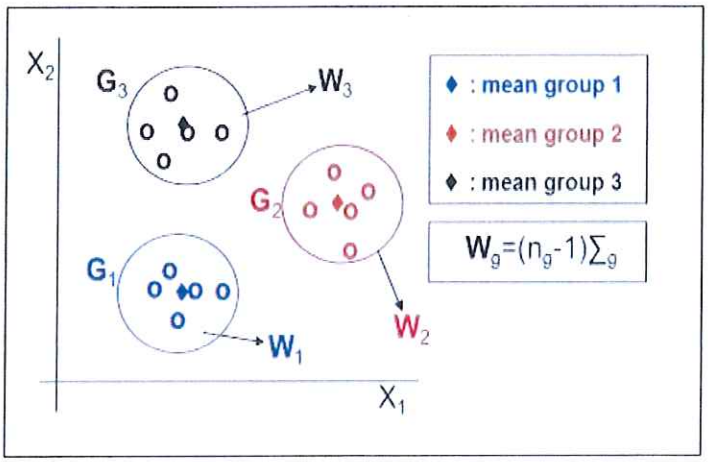

Fig. 3 Illustration of cluster analysis of compositional data

Day 4 – Thursday 6 July 2016

Dr K Hron, an invited speaker from the Department of Mathematical Analysis and Applications of Mathematics, Palacky University of Olomouc, Czech Republic discussed Robust Compositional Data Analysis. Some data sets contain outliers or other forms of data inhomogeneity. Robust statistics offers concepts on how to deal with these situations, where the data does not follow strict model assumptions. These concepts are designed for the usual Euclidean space and they can be easily applied to compositional data, if they are represented in this space as well. It turns out that the isometric logratio coordinates are best suitable in the context of robust estimation. Depending on the method applied, an interpretation of result is usually done in a back-transformed space.

The lecture was followed by a laboratory exercise on log ratio analysis focusing on distribution, linear regression and discriminant analyses. The Euclidean structure of the simplex also implies a natural measure of reference on it. This measure, called Aitchison measure, can be used to better visualize and understand probability distributions on the simplex. The main distribution on the simplex is the logistic-normal one. When the coordinates of a random composition are distributed as a multivariate normal, then the distribution is logistic-normal, or simply normal on the simplex.

Linear regression of a compositional response on external covariates can be used to identify and estimate linear evolution of CoDa. This kind of regression is easily carried out using some coordinate representation of the compositional response and conventional statistical packages. Residual analysis is also carried out in the simplex, preferably using some coordinate systems. Regression techniques are easily extended to comparisons of the centres (means) of different populations (ANOVA) in a similar way as it is done in standard multivariate analysis.

Discriminant techniques are useful when the response data are some pre-defined categories, considered a function of some continuous variables. In the case that such data form in fact a composition, then CoDa-discriminant analysis should be employed. This is formally equivalent to applying standard discriminant techniques (Fisher, linear or quadratic discrimination) to the log-ratio coordinates of the observed components. However, this subject deserves further attention, as the obtained results can be interpreted as objects on the simplex (directions of maximal separation between groups, boundary planes, ellipses, parabolas, etc.) and represented as such.

Table 1. An example sequential binary partition to obtain the coordinates in the corresponding orthonormal basis

order	x_1	x_2	x_3	x_4	x_5	coordinate
1	+1	−1	+1	+1	−1	$y_1 = \sqrt{\frac{3\cdot 2}{3+2}} \ln \frac{(x_1 \cdot x_3 \cdot x_4)^{1/3}}{(x_2 \cdot x_5)^{1/2}}$
2	0	+1	0	0	−1	$y_2 = \sqrt{\frac{1\cdot 1}{1+1}} \ln \frac{x_2}{x_5}$
3	+1	0	−1	−1	0	$y_3 = \sqrt{\frac{1\cdot 2}{1+2}} \ln \frac{x_1}{(x_3 \cdot x_4)^{1/2}}$
4	0	0	+1	−1	0	$y_4 = \sqrt{\frac{1\cdot 1}{1+1}} \ln \frac{x_3}{x_4}$

Day 3 – Wednesday 6 July 2016

The morning session started with the laboratory exercise on basic multivariate analysis of compositional data using CoDaPack and R packages such as robCompositions, zCompositions, MASS and mvoultier. The laboratory exercises were followed by a lecture on logratio analysis, basic multivariate methods (irregular data and cluster analysis). Because the mentioned techniques are based on log-ratios, the CoDa should be free of zeros. The treatment of zeros is a difficult issue and requires either imputation techniques or changes in the sample space. This treatment is part of the pre-processing tasks. Other tasks to do in advance are the treatment of missing data and the detection of potential outliers. In short, specific techniques for this *irregular* data are needed.

The application of hierarchic methods of classification and the method of k-means needs to establish in advance some or all of the following measures: difference, central tendency and dispersion, in accordance with the nature of the data. When the data set to classify is a compositional, there are four requirements for these measures; scale invariance, permutation invariance, sub compositional dominance and perturbation invariance. Therefore, from this point of view, it is wrong to use the Euclidean distance between two compositions to calculate the matrix of distances associated with hierarchic methods, like single linkage, complete linkage and average linkage. Similar trouble appears in the k-means method (Fig. 3) when we compute the distance between a composition and the "centre" of the i^{th} group. It was suggested to adapt the usual non-parametric clustering methods using the definitions of distance, centre and variability from log-ratio methodology, which are compatible with the compositional nature of the data. This is equivalent to applying standard methods to the centred log-ratio transformed data set or to the ilr-coordinates.

The afternoon session was devoted to applying our knowledge on compositional data analysis using our own data sets. We also prepared a PowerPoint presentation of our case studies.

Day 2 – Tuesday 5 July 2016

The morning session was devoted to the use of CoDaPack 2.02.04, a free software package used for analysis of compositional data. It implements the most elementary of mentioned statistical methods. This software is oriented to users coming from the applied sciences, with no extensive background in using various computer packages.

CoDaPack is based on menus. Numerical results appear on the output part of the window, while graphs appear in new graphical windows. Data could be imported from Excel files or recovered from previous sessions. The observations are organized in rows and the variables in columns. The new CoDaPack has three different areas: the variables area; the data area; and the results area, which has a textual output window and independent graphical output. Activities for the hands-on exercise using the datasets provided by University of Girona were the following:

1) Downloading of CoDaPack software from the website http://ima.udg.edu/codapack;
2) Importing data – routine to import data from different sources and formats;
3) Transformation – routine that transforms the data from the simplex to the real space or vice versa;
4) Operations – routine that performs some operations on the data inside the simplex;
5) Descriptive statistics – routine that returns descriptive statistics for data set;
6) Exploratory analysis – routine to check data errors by graphical and numerical method;
7) Numerical analysis – routine that produces variation array, centred log-ratio variance, centre, min and max quartiles, and estimate of the variability of each part; and
8) Graphical representation of the data through biplots, ternary diagram, principal component analysis and balance dendrogram.

To augment the hands-on experience in the laboratory session, a lecture on exploratory analysis of CoDa was discussed in the afternoon session. Elementary statistics should agree with the principles of CoDa analysis. A consequence is that statistics defined for single compositional components are meaningless. The analysis of simple log-ratios should be used instead. Means and variances of the simple log-ratios, organized in a variation array, are a standard tool in a first exploration of CoDa. CoDa-biplot is a simultaneous bi-dimensional projection of the clr-components and the data, and it is based on CoDa-principal component analysis. The interpretation of the CoDa-biplot has some characteristics that deserve particular attention. If data are represented in balance-coordinates, the CoDa-dendrogram is a simultaneous visualization of the sequential binary partition (Table 1) that generates the balances, together with some descriptions of their marginal distributions, like; the mean, quantiles and variances of the balances. It also allows the visual comparison of different populations. Both representations (principal components and balance-coordinates) are closely related to dimension-reduction techniques which are needed when dealing with a large number of compositional components.

Topic 2 - The Euclidean space structure of the simplex (the Aitchison geometry)

From the realization that compositional data carry only relative information, Professor Aitchison deduced that the fundamental operation of change for compositions had to be also of relative nature: the perturbation operation of two components is the closed component-wise product. The inverse perturbation is maybe easier to interpret, as it describes the change between an initial state $\mathbf{z}(0)$ and a final one $\mathbf{z}$, as the closed division: $C[z_1/z_1(0), ..., z_D/z_D(0)]$, where the operation $C[\cdot]$ just ensures that its argument vector is re-closed to sum up to 100% (or the total sum we are working with).

This operation, complemented with the closed component-wise powering of a composition by a scalar, builds a vector space structure on the simplex. Finally, by adding a log-ratio scalar product, this space is given a Euclidean structure, where we can measure distances and angles, and define concepts like orthogonality, projections, lines, hyperplanes and ellipses.

Euclidean spaces permit the definition of reference systems and the corresponding coordinates. Orthonormal basis are of primary interest because they allow us to translate all operations and metrics of the simplex into standard operations and metrics of the real vector spaces. In order to build up orthonormal coordinate systems, two useful procedures are available. The first one is to carry out a CoDa-principal component analysis which results after representing the raw percentages or proportions as centred-log-ratio scores (clr) and then using a Singular Value Decomposition (SVD). The second one is to define groups of compositional components (sequential binary partition) that generate an orthonormal system of coordinates called balances. The first technique is clearly adequate when the user has no preference on the interpretation of the coordinates. The second technique can be adapted to the user's preferences, thus enhancing the interpretation of the coordinates. Balance-coordinates are useful to understand the meaning of orthogonal projections in the simplex. For instance, the extraction of a sub-composition, or the grouping of some components, can be interpreted as orthogonal projections.

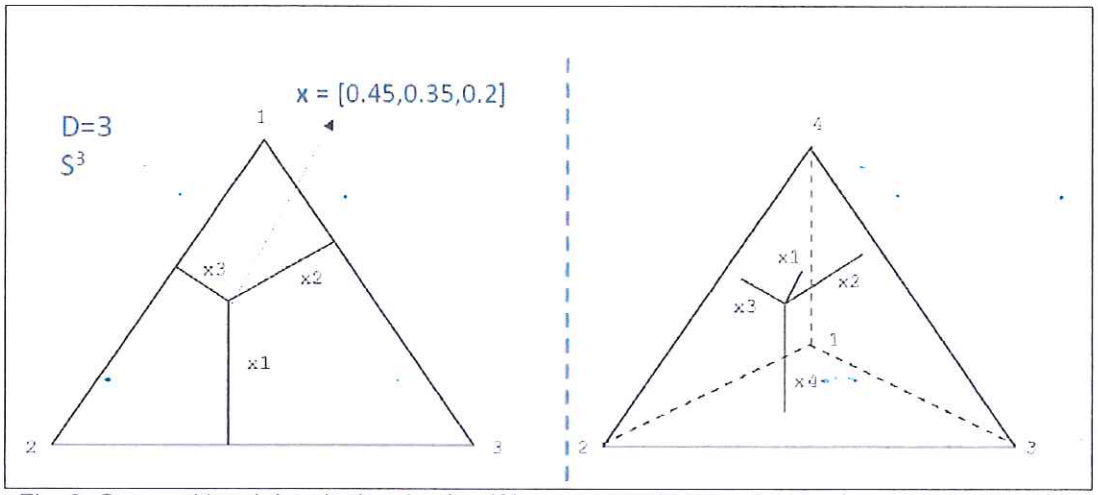

Fig. 2 Compositional data in the simplex (S) represented in ternary (D=3) and quarternary (D=4) diagram.

The afternoon session, I met Dr Juan Jose Egozcue, Professor of the Polytechnic University of Cataluña, Barcelona, Spain. I discussed with him the analysis of two data sets: 1) nutrient analysis of fruit from orchard with and without incidence of resin canal discolouration and 2) soil and plant nutrient content of six orchards in Northern Territory.

TRAINING ACTIVITIES

Compositional Data Analysis Course, University of Girona, Spain

Day 1 – Monday 4 July 2016

Day one of the training started with a lecture in the morning session and meeting with individual mentor in the afternoon session. The topics discussed during the lecture were:

Topic 1 - Nature of compositional data

Compositional data (CoDa) are typically defined as vectors of positive components and constant sum, usually 100% or 1. These conditions render the classical statistical techniques useless on compositions, as they were devised for unbounded real vectors. However, there are many more types of data having the same limitations: as soon as the variables of a data set show the relative importance of some parts of a whole, data must be considered compositional, and classical statistics should be then avoided. Typical examples of these disguised compositions are data presented in ppm, ppb, molarities, or any other concentration units.

Professor John Aitchison introduced the log-ratio approach to analyse CoDa back in the eighties. His solution was based on transforming the vector with some standard log-ratio transformations (called *alr* and *clr*, respectively, for additive and centred log-ratio transformation) and applying the classical techniques to the scores so obtained. This became the foundation of modern CoDa nowadays which is based on the geometric structure of the simplex (Fig. 1), the sample space of CoDa. In this geometry, classical translation is replaced by a multiplication-based perturbation while classical scaling is replaced by a powering. Since then, progress has been done in understanding the geometry peculiar to their sample space, the *D*-part simplex. Moreover, in this geometry of the simplex, some log-ratios play the role of coordinates, and most familiar vector procedures (sum, orthogonal projections, and distances) are available using coordinates.

Pearson (1896) was the first one to detect what was called 'spurious correlation in CoDa'. People started realizing that CoDa needed a special treatment as far back as the sixties, when Chayes first started wondering on the effects of spurious correlation (induced by the forced sum to 100%, and not due to any natural process) on all sorts of multivariate statistical techniques. The key idea to get out of the problem was to realize that the information conveyed by a composition is purely relative: from a compositional data set alone, we can only make statements about evolution or change on (log-ratios) of components. Any statement about absolute increase or decrease of any variable is utterly spurious, as we will never be able to distinguish between them.

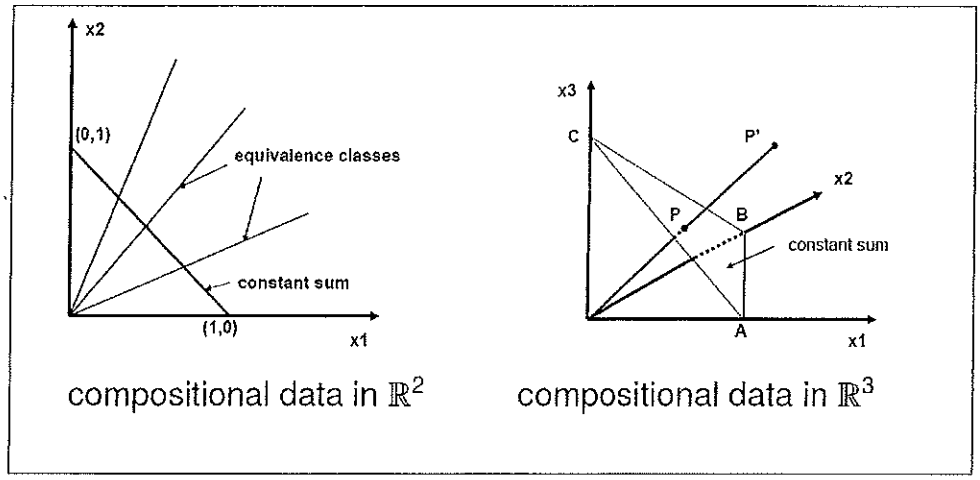

Fig. 1 Projection of composition data in the simplex

Compositional Data Analysis, CoDaCourse, 2016

ATTACHMENT A

Officially accredited by the IAMG

University of Girona

4-8 July 2016

Organized by the Research group on Compositional Data

At the University of Girona
Campus Montilivi, P4
E-17071 Girona (Spain)
41°57'46.5"N 2°49'53"E

Objectives and contents

Compositional data are vectors which components show the relative importance of some parts of a whole. Typical examples are data presented in percentages, ppm, ppb, or the like. Aitchison introduced the **logratio** approach to analyse compositional data back in the eighties. Since then, progress has been done in understanding the geometry peculiar to their sample space, the D-part simplex.

This **CoDaCourse** provides an introduction to theoretical and practical aspects of the statistical analysis of compositional data. The following **topics** will be covered:

- The sample space, principles of CoDa.
- The Aitchison geometry of the simplex.
- Coordinate representation: distributions on the simplex.
- Exploratory analysis (centering, variation array, biplot, balance-dendrogram).
- Irregular data: zero values, outliers and missing data.
- Introduction to multivariate analysis: regression, manova, cluster and discriminant.

Duration and language

One week 4-8 July 2016, 5 days, 25h class room
Language: English

Teaching staff

The teaching staff is composed by members of the research group on Compositional Data Analysis that includes professors from the University of Girona (UdG) and form the Technical University of Catalonia (UPC). Professors J.J. Egozcue and V. Pawlowsky-Glahn received the John Cedric Griffiths Teaching Award from the IAMG in 2016 and 2008, respectively.

Teaching methods

The course will consist of theoretical and practical sessions, a hands-on session, as well as case-study presentations followed by an open discussion session. An **invited session** about **robust** compositional data analysis will be imparted by Dr. K. Hron from Palacky University of Olomouc (Czech Republic).

In the **theoretical sessions**, the current state of the art in this field is presented. In the **practical sessions**, coda techniques are applied using the freeware software CoDaPack and some R packages like zCompositions for the imputation of zeros. CoDaPack is freeware developed for the statistical analysis of compositional data (http://imae.udg.edu/codapack/).

The **open discussion session** is a case-based discussion session. Some compositional data sets and their particular problems will be presented, discussed and analysed interactively. Assistants to the course are encouraged to bring their own data sets and state those questions they would like to be answered during the course. Some of these proposals will be selected for a detailed open discussion.

For this edition we have a new proposal, a **hands-on session**. With some outputs and specific questions related to a real data set, the participants will be invited to discuss, choose and build a reasoning applying Compositional Data methodology.

Preliminary Schedule

	9:00-13:00	14:30-17:00
July, 4	Sample space, principles, log-ratios, geometry	
July, 5	Exploratory (centering, variation array, biplots)	Coordinates, balance-dendrogram, distributions
July, 6	Irregular data (zeros, missing data, outliers)	
July, 7	Invited session: Robust compositional data (Dr. K. Hron)	Multivariate methods (manova, cluster), linear processes
July, 8	Open discussion, hands-on session	

Target group

Statisticians and applied scientists of any field, in particular engineers, geologists, environmental scientists, business statisticians, sociologists, economists or biologists, working for academic or industrial institutions. It is strongly recommended that attendants have undergone some first semester courses on statistics, algebra and calculus. Basic knowledge about multivariate statistics may also be handy.

How to apply

Register on the website www.compositionaldata.com and fill in the form at the CoDaCourses menu.
Registration now OPEN!!

Visit our recently updated website

Course fees

Regular fee: 250€
Student fee: 150€ (proof of student condition is required)
Late fee (after June 1, 2016): 350€
The fee includes course material, coffee breaks and two lunches (Tuesday, Thursday).

Supported by:

Universitat de Girona

Agència de Gestió d'Ajuts Universitaris i de Recerca

BENEFITS TO THE NORTHERN TERRITORY

- Contribute to the development of improved nutrient use efficiency in mango and other horticultural crops produced in the NT;
- Provide insight into the role of nutrient balances in mango fruit quality and fruit defects such as RCD;
- The method is an essential tool for the interpretation of data collected in the successful 'Rural Research and Development for Profit' project that was negotiated with the Department of Agriculture and Water Resources; and
- Build capacity for re-analysing mango grower leaf and soil analyses that when combined with a geographic information system will contribute to the development of a decision support system for nutrient management of horticultural crops in the NT.

Action Officer:	Constancio Asis	92041
Group Head:	Bob Williams	92215
Division:	Plant Industries Development	

ALISTER TRIER **27/07/2016**

NOTED

GARY HIGGINS
5 AUG 2016

DEPARTMENT OF PRIMARY INDUSTRY AND FISHERIES

OVERSEAS TRAVEL REPORT

Dept Ref: 16-0453-SEC
Min Ref: 2016/1264-GJH
HPRM Ref:

Title:	Travel to Girona, Spain to attend the Compositional Data Analysis Course at the University of Girona, Spain
Destination:	Spain
Date/s:	1-12 July 2016
Travel approved:	2 June 2016 (Attachment A)
Officer/s travelling:	Dr Constancio A. Asis

PURPOSE

To report on a trip to Spain by Dr Constancio Asis, Senior Research Agronomist, to attend the Compositional Data Analysis Course at the University of Girona, Spain held on 4-8 July 2016.

TRAVEL PERIOD

The travel period was changed from 2-10 July 2016 to 1-12 July 2016 as the Airline carrier offering the lowest fare based on the quote by QBT does not operate daily.

TRAINING ACTIVITIES

The training consisted of lectures, laboratory sessions and case study presentations. There were 11 participants involved, coming from Australia, Canada, China, Colombia, Denmark, Italy and Spain.

TRAINING OUTCOME

The training provided Dr Asis the theoretical and practical aspects of the statistical analysis for compositional data (CoDa). Using CoDa approach, Dr Asis explored the possible role of nutrients imbalance in the fruit of mango from trees in an orchard with Resin Canal Disorder (RCD+) and without (RCD-) incidence. He found that fruit from the RCD+ orchard had higher variations in Calcium Potassium (Ca/K) and Calcium/Iron (Ca/Fe) ratios, while RCD- fruit had higher variations in Calcium (Ca), Copper (Cu) and Zinc (Zn) ie Ca/Cu and Ca/Zn ratios. Variations in nutrient ratios indicate the possible role of nutrient imbalances on RCD. Dr Asis also analysed soil and plant tissue data from past research activities on the comparison of farming practices of six orchards in the Northern Territory (NT) from 1998-2001. In mining these past data sets he identified the variable and stable ratios of nutrients two data sets. Dr Asis proposed the use of nutrient balance approach to diagnose orchard nutrition status in the Territory.

Dr Asis presented the topic 'Diagnosis of mango ionome using nutrient balance concept' (refer Attachment B). An informative Itinerary was compiled by Dr Asis (refer Attachment C). All participants in the course received a Certificate of Attendance (refer Attachment D).

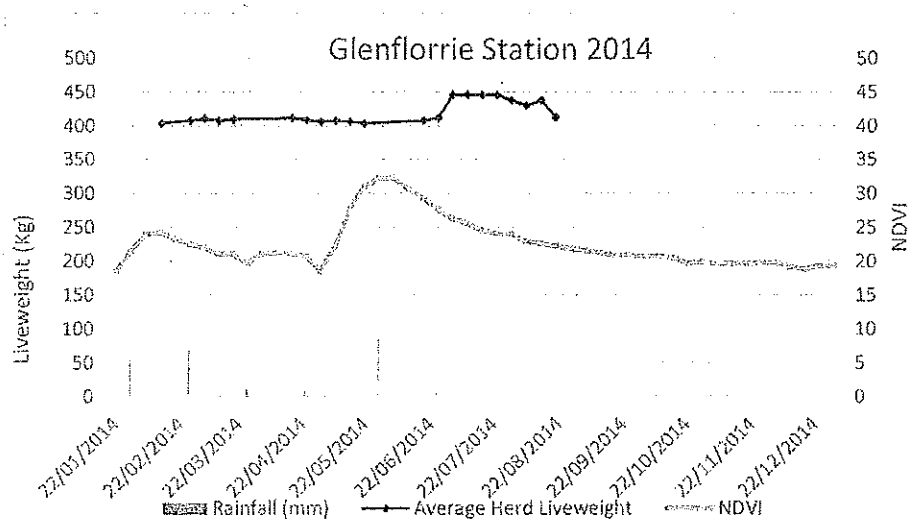

Fig. 1 Data output from the PPMS at Glenflorrie Station in 2014, including average herd liveweight, NDVI and rainfall

The use of the PPMS at Glenflorrie Station has provided significant learnings for the Grey family. In 2014, the PPMS identified pasture quality declining from the 11 June and cattle losing weight from the 30 July (see Fig. 1). The pasture quality decline was 3 months earlier than Murray Grey expected and the cattle weight decline was five weeks earlier. Mr Grey described the experience: "*The PPMS was indicating that the paddock was done in July, but I thought that the paddock would hold the cattle until September. Looking at the feed from the road it seemed that paddock would be right. Once I rode through the paddock on the motorbike, I found that the PPMS was right: the feed was certainly in decline. I was overly optimistic about the paddock's capacity and I was wrong. You can't argue with the liveweight data when it starts declining; it was a fact. Had we acted when the PPMS data was indicating we would have saved ourselves liveweight, pasture and money.*" Mr Grey stated that preventing an average herd weight loss of 10 kg/animal would save $30/animal; across even a small herd of 400 head, this is an annual saving of $12,000. He indicated that this technology gave him more confidence to enact management decisions relating to looking after the cattle and grazing land. The use of the PPMS technology, as demonstrated at Glenflorrie Station, can offer beef producers financial benefit and can improve grazing land management and animal welfare outcomes.

After twelve months of using the PPMS prototype, all five station managers were able to identify a number of improvements needed for the system, including changes to timeliness of data and presentation of the data. These suggestions have been incorporated into the 2015 version.

Conclusions & Implications

The PPMS is a new software system that can remotely monitor and analyse rangeland pasture and cattle production for beef producers. It enables producers to make better-timed and more profitable decisions on marketing of cattle, stocking rates, supplementation and land management. The PPMS provides beef producers with data that have not required additional rounds of mustering, labour, time or skill.

References

Hamilton, J., Banney, S., 2011. Preliminary investigation into the development of an electronic forage budget and land condition application, for use on existing hand-held devices, for the northern grazing industry. North Sydney: Meat and Livestock Australia.

MLA (Meat and Livestock Australia), 2015. Improving the performance of northern beef enterprises. Key findings for producers from the Northern Beef Report. North Sydney: Meat and Livestock Australia.

ATTACHMENT B

Precision Pastoral Management System: automated 'big data' analysis for pastoral properties

Sally Leigo, CRC for Remote Economic Participation and NT Dept. Primary Industry & Fisheries, PO Box 8760, Alice Springs NT 0871 Australia, sally.leigo@nt.gov.au
David Phelps, Qld Dept. of Agriculture and Fisheries, PO Box 519, Longreach Qld 4730
Tim Driver, Precision Pastoral Pty Ltd, PO Box 3880, Alice Springs NT 0871 Australia.

Key Words: Technology, decision support systems, precision agriculture

Introduction

The beef industry of Australia continues to search for technology that can increase production and reduce operating costs. Beef producers in Australia's rangelands manage an average of 7000 head of cattle over 2000 km^2 with 6.6 labour units (MLA 2015). To date, collecting and analysing objective data on pasture and cattle performance is done by few beef producers. Hamilton and Bamey (2011) reported that 76% of northern Australian beef producers complete no written forage budget. Undertaking regular monitoring of cattle and rangeland pasture is currently expensive, time consuming and requires skills and knowledge that are not readily available in the remote parts of the country. A tool is needed that can provide accurate, objective data on rangeland cattle and pasture production. The Precision Pastoral Management Tools (PPMT) project has spent the past five years developing a cloud-based software system, the Precision Pastoral Management System (PPMS), to address these needs. The PPMS can remotely monitor and analyse cattle and pasture production without any labour or skill inputs from beef producers.

Materials & Methods

A review was undertaken of 60 mapping and modelling technology products, with 34 shortlisted and four selected for inclusion in the PPMS. The four technology products selected were the Google Earth mapping platform, the Queensland Government's pasture modelling program GRASP, Landgate's NDVI program Pastures from Space and Precision Pastoral's RLMS (automated weighing and drafting unit). The PPMS prototype was built to receive automatic and manual data from third party providers. This prototype was reviewed by beef producers, and their feedback was incorporated into the 2013 version of the PPMS. The PPMS 2013 version was applied to five commercial cattle stations in 2013 and 2014 for research and development.

The project has undertaken quantitative and qualitative research methods, driven by an action learning process. The quantitative research concentrated on validating the pasture data products used in the PPMS. The qualitative research focused on reviewing if and how the data have been used by the beef producers and documenting improvements that could be made. The qualitative research has involved semi-structured interviews held with each of the station managers at the start, middle and end of the research phase. The research is ongoing; therefore preliminary data are reported in this paper from Glenflorrie Station, run by the Grey family.

Results & Discussion

Quantitative research has focused on validating the NDVI values and correlating them with observations from cattle station paddocks. The correlation between observed green cover in the paddock against measured NDVI found that r^2=0.7909. This regression provides beef producers with the confidence that the NDVI trends accurately reflect the condition of the pasture.

Five existing stations have been using the PPMS since 2013. Based on the interviews conducted in the first year of using the PPMS, all beef producers were hesitant to use the data to make decisions as they were still evaluating the accuracy of the system. Glenflorrie Station in Western Australia is the only station to have completed its research phase.

CONCLUSION

The opportunity for Ms Leigo and Mr Conradie, to travel to the 10th International Rangelands Congress has demonstrated that DPIF's innovative research and extension projects are international leaders in their field. There are real opportunities for Ms Leigo to collaborate with partners in Canada and the USA in the future. The NT Government should not underestimate its ability to provide solutions for the world.

Action Officer:	Sally Leigo	18144
Group Head	Neil MacDonald	15885
Chief Executive	Alister Trier	92005

ALISTER TRIER **12/08/2016**

NOTED

GARY HIGGINS

FURTHER OUTCOMES

During the IRC Ms Leigo and her team members were able to identify potential partners for international collaboration. Two researchers from the USA Department of Agriculture expressed a strong interest in utilising the technology in their research. Furthermore, a private Canadian Consultant is also interested in utilising the PPMS in a smart ranch demonstration in southern Alberta.

Figure 2. PPMT Project team members visit Dugdale Ag Co's feedlot cattle, via Vulcan, Alberta, Canada. (L-R) Mr Tim Driver (Precision Pastoral), Ms Sally Leigo (DPIF), Mr Ryan Dugdale (Dugdale Ag Co) and Mr Roy Chisholm (Napperby Station)

A week of visits to beef producers through the Canadian beef supply chain allowed Ms Leigo and her team to further understand its unique aspects. The visits highlighted the challenges that long winters and short growing seasons place on beef production in Canada and the heavy reliance on feedlots to finish cattle. By understanding the challenging points of the beef production system, the PPMT project team can start to assess how the PPMS can be adapted to the North American beef production system.

FOLLOW UP ACTION REQUIRED

As a result of Ms Leigo's travel to the IRC, she will be having ongoing discussions with research staff from the USA Department of Agriculture, around the potential to deliver the PPMS in the USA. Ms Leigo has been invited by the Saskatchewan Province Government to give a Webinar to local beef producers. Ms Leigo will also be having ongoing discussions with a private consultant, Mr James Van Leeuwen, about the potential of demonstrating the technology in the Alberta province.

It was demonstrated by Ms Leigo, that DPIF is an international leader in developing technology for rangeland beef producers. Through presentations, discussions and meetings with international researchers Ms Leigo clearly demonstrated how far ahead the PPMT project is compared to other similar research projects, with clear benefits delivered to beef producers. Further, during the summary of all the technology presentations, reviewer Dr Don Burnside singled out Ms Leigo's research as a clear example of technology delivering direct benefits to beef producers.

DPIF's research and extension findings were shared to a large international audience through the presentations given by Ms Leigo and Mr Conradie. There were close to 500 delegates present at the IRC from 48 different countries. Ms Leigo was able to share the research and extension principles applied to the PPMT project research and how they had contributed to the success of the project. In particular the need to involve beef producers in every stage of the research process and to develop the technology on commercial cattle stations.

DPIF's international networks were also enhanced, as Ms Leigo was able to reconnect with previous contacts including United States of America (USA) researchers from the New Mexico State University and University of Colorado, as well as make new contacts from Canada, South Africa and the USA. These networks will continue to be important as potential international collaborations are explored.

The IRC provided some new sources and updates to Rangeland productivity, profitability and sustainability issues. Issues of interest included; what is an appropriate cow size for rangeland production systems? How people in the rangelands are using technology and the increasing competition of other users in the rangeland environment. There was a great deal of discussion regarding ecosystem services, as such, what services do healthy ecosystems provide to the world and how should these be valued? This concept challenges rangeland users to consider the biological, economical and spiritual benefits of the rangeland ecosystems.

Through attendance at the IRC, Ms Leigo and Mr Conradie were able to demonstrate the innovative way that DPIF is addressing issues of productivity, profitability and sustainability for the beef industry of northern Australia.

Figure 1. PPMT Project team members at the IRC
(L-R) Mr Roy Chisholm (Napperby Station), Mr Ian Houston (Qld DAF), Ms Sally Leigo (DPIF), Mr Pieter Conradie (DPIF), Mr David Phelps (Qld DAF), Mr Tim Driver (Precision Pastoral Pty Ltd) and Ms Amy McArdle (Precision Pastoral Pty Ltd)

DEPARTMENT OF PRIMARY INDUSTRY AND FISHERIES

OVERSEAS TRAVEL REPORT

Dept Ref: 16-0420-SEC
Min Ref: 2016/1354-GTH
Trim Ref: AS2011/0308

Title:	10th International Rangelands Congress
Destination:	Saskatoon, Saskatchewan, Canada
Date/s:	8-31 July 2016
Travel approved:	24 May 2016 (refer Attachment A)
Officer/s travelling:	Ms Sally Leigo

PURPOSE

To report on travel by Ms Sally Leigo, Principal Research Leader, Department of Primary Industry and Fisheries (DPIF) Alice Springs seconded to the Cooperative Research Centre for Remote Economic Participation (CRC-REP) to Canada to attend the 10th International Rangelands Congress (IRC) on 17-23 July 2016.

PROPOSED OUTCOMES

Proposed benefits to the Northern Territory (NT) Government included:

- An increased profile of the DPIF's research projects to the international rangeland research community;
- Demonstration that DPIF is an international leader in rangeland research;
- Sharing DPIF's extension and research findings with an international audience;
- Enhancing the professional networks of DPIF; and
- Sourcing the most up-to-date information and findings relating to productivity, profitability and sustainability of beef production from the rangelands.

Furthermore, through this international travel Ms Leigo also intended to:

- Identify opportunities for international collaboration;
- Identify opportunities for international commercial investment in the Precision Pastoral Management System (PPMS); and
- Observe and learn more about the Canadian beef production, to identify possible areas of applicability for the PPMS.

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

Ms Leigo, through her international travel achieved outcomes for the NT Government and her research project, the Precision Pastoral Management Tools (PPMT) project.

The profile of DPIF was increased to the international rangeland research community at the IRC due to the innovative research presented by Ms Leigo and Mr Pieter Conradie, Regional Manager, Market and Enterprise Development, Alice Springs. Comments received from North American Delegates included "Australian research is always so ahead of ours" and "I would love to work in Australia".

ATTACHMENT C

Summary of Investment Meetings

Organisation	Investment interests	Actions
China		
China CAMC Engineering Co Ltd	Zinc, gold and copper	3
Sinosteel	Base metals	1
Sinoma	Various	-
China Zenith Capital	Gold	1
China Coal International Investment Co (subsidiary of China National Administration of Coal Geology (CNACG))	Uranium	1
Au Venture	Gold	1
China CAMC Engineering Co (SINOMACH)	Zinc, gold and copper	3
Wanbao Mining (subsidiary of Norinco)	Lead, zinc, copper, gold	4
China Corporation of Coal Geology Engineering (CCEGC) (subsidiary of China National Administration of Coal Geology (CNACG))	Copper, gold	-
Shandong Provincial Bureau of Geology and Minerals Resources (SDGB or SDGM)	Rare earth elements	1
Chongqing Bureau of Geology and Minerals Exploration (CBGSME)	Lithium, zinc	2
NERIN (subsidiary of China Nonferrous Metal Mining Company (CNMC)	Copper	1
Sheng Kang Ning (Shanghai) Mining Investment Co (SKN) (subsidiary of Shenghe Resources)	Uranium	1
Sichuan Xinye Investment Corporation of Mining & Exploration (subsidiary of Sichuan Bureau of Metallurgical Geology and Exploration (SBMGE)	Copper, lead, zinc, nickel, gold	1
Guangzhou Aoaizhi Mining Technology Co	Gold	1
Shantou Suntec Mining	Lithium	1
Shandong Riufu Lithium (SRL)	Lithium	1
Sichuan Development Holding (SDH) (an investment arm of the Sichuan Provincial Government)	Gold, silver	1
Japan		
JOGMEC	Copper, zinc, lead, cobalt, indium	1
Itochu	Copper, uranium, manganese, tungsten, molybdenum	3
Sojitz	Non-ferrous metals	1
Sumitomo Metal Mining Co	Gold	1

11:00am	Case study of successful Chinese investment in Australia	
	Speaker	Dr Jianjiao (Joe) Xie, Chief Geologist, Deputy General Manager, Yunnan Tin Australia Investment Holding Co. Pty. Ltd.
11:15am	Precious metals	
	Moderator	Dr Rick Rogerson, Executive Director, Geological Survey of Western Australia
	Panellists	Dr Kevin Ruming, Director Strategic Resource Assessment and Advice, Geological Survey of New South Wales
		Dr Andrew McNeill, Chief Government Geologist, Mineral Resources Tasmania
		Mr Tony Knight, Chief Government Geologist, Geological Survey of Queensland
11:45am	Case study of successful Chinese investment in Australia	
	Speaker	Mr Fei (Eddy) Wu, Director, Murray Zircon
12:00pm	Emerging and strategic minerals	
	Moderator	Mr Tony Knight, Chief Government Geologist, Geological Survey of Queensland
	Panellists	Dr Steve Hill, Director, Geological Survey of South Australia
		Dr Rick Rogerson, Executive Director, Geological Survey of Western Australia
		Mr Corrie Germin, Key Account Manager – Coal, Industry Investment and Export Support, New South Wales
12:30pm	Closing remarks	
	Mr Ian Macintosh, Trade Commissioner (Investment), Australian Trade and Investment Commission	
12:35pm	Lunch and exhibition	
2:00pm	Close	

Australian Government
Australian Trade and Investment Commission

Australia Unlimited
澳大利亚 机遇无限

Australian Government
Department of Industry, Innovation and Science

Ministry of Land and Resources
of the People's Republic of China
中华人民共和国国土资源部

MURRAY ZIRCON
KNOWLEDGE · INNOVATION · EXCELLENCE

CIDA
商务部投资促进事务局
Investment Promotion Agency of
Ministry of Commerce, P.R. China

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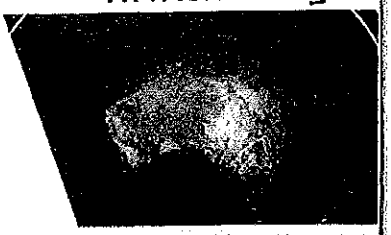

AUSTRALIA MINERALS
REALISE THE OPPORTUNITY

2016 China–Australia Resources Investment Forum

WESTIN BEIJING CHAOYANG HOTEL, WEDNESDAY 21 SEPTEMBER 2016

Chair	Mr Ian Macintosh, Trade Commissioner (Investment), Australian Trade and Investment Commission	
8:00am	Registration	
9:00am	Welcome speeches	
	Speaker	H.E. Jan Adams AO, Australian Ambassador to China
		Vice Minister, Chinese Ministry of Land and Resources
9:20am	Australia's policy, regulatory and investment landscape	
	Moderator	Mr Dan Tebbutt, Senior Trade Commissioner, Australian Trade and Investment Commission, Beijing
	Panellists	Mr William Lin, Senior Investment Manager, Australian Trade and Investment Commission, Beijing
		Mr Ben Jarvis, Resources and Energy Counsellor, Australian Embassy
		Mr Jeremy Clark, Manager – Hong Kong, RungePincockMinarco
		Ms Fiona Park, Director, Investment Attraction, Northern Territory Department of Mines and Energy
9:50am	Commodity overview	
	Speaker	Dr Anthony Budd, Section Leader, Resources Advice, Assessment and Minerals Promotion, Resources Division, Geoscience Australia
10:05am	Base metals	
	Moderator	Dr Steve Hill, Director, Geological Survey of South Australia
	Panellists	Mr Corrie Germin, Key Account Manager – Coal, Industry Investment and Export Support, New South Wales Department of Industry
		Dr Andrew McNeill, Chief Government Geologist, Mineral Resources Tasmania
		Mr Tony Knight, Chief Government Geologist, Geological Survey of Queensland
10:35am	Coffee break	

FOLLOW UP ACTION REQUIRED

Detailed notes were taken of all investor enquiries and meetings held in both China and Japan, including actions arising.

DPIR liaises closely with the Office of Asian Engagement, Investment and Trade (OAETI) in the Department of Trade, Business and Innovation, to ensure that all of DPIR's investment attraction activities align with NTG policy settings and strategies. OAETI is currently developing updated NTG country engagement plans for China and Japan. DPIR has provided significant input into those plans, and all of the intelligence gathered during this visit will be shared with OAETI.

The information gathered during this visit will also be used in the updating of DPIR's own China and Japan Minerals and Energy Investment Attraction Strategies (due for completion December 2016).

Unlike in previous years, the timing of the NT election in August 2016 precluded the participation of either the Minister for Primary Industry and Resources, or of NT exploration companies, on this visit. DPIR will liaise with both industry and with strategic partner organisations in China, to identify another suitable opportunity in 2016/17 for you to lead an industry delegation to promote minerals investment opportunities in China.

CONCLUSION

The departmental visit to China and Japan in September 2016 achieved four out of five of its original objectives. DPIR will track the investment that arises from the introductions arranged on the trip.

Thirty follow-up actions have been identified (refer to Attachment C) and will be undertaken by DPIR.

Dr Scrimgeour will provide a verbal briefing to the Minister on the Department's International Investment attraction strategy.

Action Officer:	Fiona Park	91385
Group Head:	Ian Scrimgeour	95377
Deputy Chief Executive- Mines and Energy	Rod Applegate	95332

Date: 10/11/2016

NOTED

KEN VOWLES

Outcome 5 - achieved

Provide a platform in which NT exploration companies can identify and directly access potential investors

Investment interest in both China and Japan appears to have strengthened in 2016, with a number of proven investors describing now as a good time to buy into quality projects while prices are low.

The main commodities that Chinese companies were seeking in September 2016 were gold, zinc and lithium. There was also some interest in uranium, rare earths and copper. There is a sense of urgency to get any lithium projects developed as quickly as possible before the market gets flooded by new mines and expansions.

In Japan, there is currently a very strong focus on securing coal resources, but gold, copper and zinc (strengths for the NT) remain strong targets. Japan appears to have secured sufficient lithium supplies from South America, so lithium interest was lower than in China.

A large proportion of the enquiries and discussions at the China Mining Congress seemed to be with companies based in either Shandong or Sichuan provinces, supporting DPIR's researched view that these are priority provinces to focus on for future investment attraction activities.

DPIR trialed a new approach to investment meetings at the 2016 China Mining Congress. For the first time, a mining specialist was engaged to arrange meetings and interpret at the NT booth. As well as cold-calling a list of investment targets identified beforehand by DPIR, the specialist was able to suggest other potential meeting targets from among his considerable contact base in China. The results represented a step-change in efficiency, relevance and effectiveness of our investment meetings in China. A large number of relevant meetings were secured, and with the specialist's knowledge of the NT, Australian business environment and deep knowledge of the minerals sector, the meetings were non-superficial and a significant amount of information was communicated in both directions. Based on this experience in 2016, it is recommended that a similar approach be taken for similar events in future. The NT was the only Australian jurisdiction to use this approach at the China Mining Congress this year. Subsequently, other jurisdictions have announced their plans to do the same in 2017.

From the China Mining Congress daily newspaper. The caption reads "Good communication"

The Australia Minerals delegation at the China Mining Congress in Tianjin

- Dr Scrimgeour gave an in-depth presentation about investment opportunities in the NT, to 70 attendees at the *Australia Minerals* Investment Seminar in Tokyo on 27 September. In Tokyo he also joined other *Australia Minerals* delegates in meetings with JOGMEC and the trading house, Itochu.

Australia Minerals Investment Seminar in Tokyo

<u>Outcome 4 – not achieved</u>

Raise the NT's profile as an exciting jurisdiction for onshore oil and gas exploration

While this was one of the trip objectives included in the April 2016 Ministerial approval for this overseas visit, Dr Scrimgeour and Ms Park did not actively promote onshore oil and gas exploration during this visit. This was due to the nature of the activities that made up DPIR's September 2016 itinerary in China and Japan, which were fully aligned with the *Australia Minerals* initiative, and thus targeted minerals instead of petroleum investors.

Depending upon NT Government policy decisions following the 2016 Scientific Inquiry into Hydraulic Fracturing of Unconventional Reservoirs Onshore within the Northern Territory, future international investment attraction activities could be designed to reincorporate promotion of the NT as an onshore oil and gas exploration destination.

Outcome 3 – achieved

Participate in Australia Minerals activities in China and Japan

To leverage the efforts of DPIR's own International Investment Attraction Program, this department participates with other states and the Commonwealth in the international promotion of Australia as an exploration investment destination, under the '*Australia Minerals*' banner.

Australia Minerals is an initiative of all Australian Geological Surveys with the support of Commonwealth, State and Territory Ministers through the Council of Australian Governments (COAG) Energy Council. Participation in these events is a low-cost, high-impact means of raising the NT's profile in international markets and directly reaching potential investors.

During the visit, Dr Scrimgeour and Ms Park participated as follows:

- Ms Park staffed the NT booth at the China Australia Resources Investment Forum (CARIF) in Beijing on 21 September (refer to Attachment B). CARIF was jointly organised by the *Australia Minerals* initiative and Austrade. During CARIF, Ms Park was part of a panel presentation about the Australian investment environment. Approximately 150 people attended CARIF. There was good investment interest throughout the day. Notable visits to the NT booth included China MinMetals, whose subsidiary MMG Ltd is an active explorer in the NT, and the Chairman of Meijin Energy Group, which recently invested in both an iron-titanium exploration project, and an onshore gas exploration project in the NT.
- Dr Scrimgeour and Ms Park provided a full-time presence in the NT area of the *Australia Minerals* booth at the China Mining Congress in Tianjin. Dr Scrimgeour also promoted the NT's mineral prospectivity during an investment panel session at the Congress. Dr Scrimgeour and Ms Park held more than a dozen meetings with potential investors at the booth. Aside from those investment meetings, a highlight was a visit by Her Excellency Jan Adams, the new Australian Ambassador to China, who was keen to discuss the Northern Australia Development agenda, and who stated that Northern Australia "presented some of Australia's greatest opportunities in minerals and energy".

Dr Ian Scrimgeour, HE Jan Adams, Fiona Park at the China Mining Congress in Tianjin

Chinese investors sought reassurances that the recent NT elections had not altered the NT Government's welcoming stance towards foreign investment and trade. Dr Scrimgeour explained the new NT Government's priorities, including a renewed focus on Chinese investment and mentioned the forthcoming NT delegation to Rizhao.

Dr Scrimgeour presented at an *Australia Minerals* investment seminar in Tokyo. During his presentation he communicated the NTG's understanding of Japan's wish for consistent, long-term, trusted trading and investment relationships.

During a meeting with Japan Oil and Gas Metals National Corporation (JOGMEC) on 26 September 2016, that organisation referred to concerns that it had raised during DPIR's visit to Tokyo in June 2016, regarding the leasing of the Port of Darwin to a Chinese company. JOGMEC confirmed that DPIR had provided reassurances in June 2016 about the NT's commitment to maintaining its investment and trading relationship with Japan. However, at this latest meeting, JOGMEC sought additional assurances from the Australian Embassy representative present, regarding the importance of the Japan-Australia trading relationship.

Outcome 2 – achieved

Maintain and strengthen relationships with strategic partner organisations in China and Japan, which in turn will maintain the NT's profile and credibility as an exploration investment destination

The key investment events attended by Dr Scrimgeour and Ms Park were supported or organised by long-term strategic partners of DPIR. These organisations are either investors themselves (in the case of JOGMEC), or they play an influential role in foreign investment decision-making in the case of China's Ministry of Land and Resources, and the China Mining Association.

The roles of these organisations during the attended events were:

- China's Ministry of Land and Resources (MoLaR) – Vice Minister Mr Cao Weixing gave an opening address to the China Australia Resources Investment Forum in Beijing on 21 September. MoLaR is responsible for the regulation and management of mines in China, and plays a role in approving outbound mining investments by Chinese State-owned enterprises.

- China Mining Association (CMA) – organised the China Mining Congress in Tianjin from 22-25 September. DPIR has maintained a formal cooperation relationship with CMA since 2007. CMA plays an important policy-advisory role regarding foreign investment by Chinese companies, and has a membership comprising the major players in China's mining sector, including many potential investors. CMA operates under the auspices of MoLaR.

- JOGMEC supported the *Australia Minerals* Investment Seminar in Tokyo on 28 September, encouraging companies from Japan's minerals sector to attend. While in Tokyo, Dr Scrimgeour also attended a roundtable meeting at JOGMEC with the rest of the *Australia Minerals* delegation. In its role to secure supplies of strategic metals for Japan, JOGMEC both invests itself in early stage exploration projects, and provides financial and other support for private Japanese companies undertaking exploration and development projects.

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

OVERSEAS TRAVEL REPORT

Dept Ref: 16-0337-SEC
Min Ref: 2016/0197-KEV
Trim Ref: 2014/0579

Title:	*Australia Minerals* activities, including the 18th China Mining Congress in Tianjin, China
Destination:	Beijing and Tianjin (China), Tokyo (Japan)
Date/s:	19 – 30 September 2016
Travel approved:	21 April 2016 (refer to Attachment A)
Officer/s travelling:	Dr Ian Scrimgeour, Ms Fiona Park

RECEIVED
10 NOV 2016
MINISTER VOWLES OFFICE

PURPOSE

Dr Scrimgeour and Ms Park represented the Northern Territory Government (NTG) at a number of *Australia Minerals* events in both China and Japan, planned to coincide with the 18th China Mining Congress.

PROPOSED OUTCOMES

The objectives of the visit (as defined prior to the trip) were to:

1. communicate the NT's ongoing willingness to be a trusted, long-term and stable supplier of resources to China and Japan
2. maintain and strengthen relationships with strategic partner organisations in China and Japan, which in turn will maintain the NT's profile and credibility as an exploration investment destination
3. participate in *Australia Minerals* activities in China and Japan
4. raise the NT's profile as an exciting jurisdiction for onshore oil and gas exploration
5. provide a platform in which NT exploration companies can identify and directly access potential investors.

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

Outcome 1 - achieved:

Communicate the NT's ongoing willingness to be a trusted, long-term and stable supplier of resources to China and Japan

Dr Scrimgeour and Ms Park held a series of meetings with potential minerals investors during the 18th China Mining Congress in Tianjin, China. In these meetings, organisations were reassured that the NT welcomes foreign investment into its minerals sectors, and that the NT is determined to provide a responsible, yet investment-friendly regulatory regime for mining companies.

ATTACHMENT C

Mr David Mckey

International Institute of Fisheries Economics and Trade Conference 2016

10-15 July 2016

The field excursion to Peterhead Fish Market.

International Institute of Fisheries Economics and Trade Delegates networking.

IIFET 2016 Scotland *Challenging new frontiers in the global seafood sector – a Northern Enlightenment*
Industry and Policy Day – Discard-free fishing and market opportunities for responsibly caught fish.

Providing opportunities for economists and market researchers to network with business owners and policy makers and discuss how well designed research can help inform policy and business decisions.

0845 to 0915	Fleming Auditorium *Plenary session:* **The EU Landing Obligation – policy intentions and practical reality.** Session chair: **Hazel Curtis**, Seafish Key Note speaker: **Ernesto Penas Lado**, DG MARE *Questions from the audience*	
	Gordon A Suite – Marketing, Ethics, Responsibility	Gordon B Suite – Landing Obligation
0925	*Session A1:* **Market challenges: ethics and social responsibility.**	*Session B1:* **Experiences from further afield.**
1030	**Coffee Break**	
1110	*Session A2* – **Market implications and possible solutions: certification, ethics and social responsibility**	*Session B2:* **Implementing the Landing Obligation in the reformed CFP – practical challenges** and **effects on fishing businesses – 2016 story so far.**
1230	**LUNCH** - with Poster presentations – Boyd Orr Suite	
1320 to 1435	*Session A3:* **Reformed CFP – implications for routes to market**	*Session B3:* **Adapt, Improvise and Overcome – fishermen's responses to the LO.**
1440	*Session A4:* **Global Market: connections and prospective opportunities** – *horizons, risks*	*Session B4:* **LO – Government solutions.**
1540	**Tea Break**	
1610 to 1730	Fleming Auditorium - *Plenary Session* **Key take home thoughts from today**	
1900	**Conference Gala Dinner and Ceilidh - Beach Ballroom, Aberdeen with Danse McCabre live band**	

PROGRAMME

Monday 11th July 2016

12.30 – 19.30	Upload presentations in Room 17
13.30 – 17.30	Getting Published Workshop (break at 15.30)
15.00	Conference check-in open
17.30-19.30	Welcome Reception

Tuesday 12th July 2016

08.00	Conference check-in open
09.00 – 10.30	Opening Ceremony and Plenary Session
10.30 – 11.00	Refreshment Break
11.00 – 12.30	Special and Concurrent Sessions 1
12.30 – 13.30	Lunch
13.30 – 15.30	Special and Concurrent Sessions 2
15.30 – 16.00	Refreshment Break
16.00 – 17.30	Special and Concurrent Sessions 3
17.30 – 19.00	Poster Session and Reception

Wednesday 13th July 2016 – Industry and Policy Day

08.45 – 09.15	Plenary Session	09.00 – 10.30	Special and Concurrent Sessions 4
09.25 – 10.30	Session A1/Session B1		
10.30 – 11.00	Refreshment Break		
11.10 – 12.30	Session A2/Session B2	11.00 – 12.30	Special and Concurrent Sessions 5
12.30 – 13.20	Lunch with poster presentations		
13.20 – 14.35	Session A3/Session B3	13.30 – 15.30	Special and Concurrent Sessions 6
14.40 – 15.40	Session A4/Session B4		
15.30 – 16.00	Refreshment Break		
16.10 – 17.30	Plenary Session	16.00 – 17.30	Special and Concurrent Sessions 7
19.30 - midnight	Conference Banquet		

Thursday 14th July 2016

09.00 – 10.30	Plenary Session
10.30 – 11.00	Refreshment Break
11.00 – 12.30	Special and Concurrent Sessions 8
12.30 – 13.30	Lunch
13.30 – 15.30	Special and Concurrent Sessions 9
15.30 – 16.00	Refreshment Break
16.00 – 17.30	Special and Concurrent Sessions 10

Friday 15th July 2016

09.00 – 10.30	Special and Concurrent Sessions 11
10.30 – 11.00	Refreshment Break
11.00 – 12.30	Special and Concurrent Sessions 12
12.30 – 13.30	Closing Ceremony Plenary Session

Supporters

The organisers gratefully acknowledge the participation of all event supporters, including:

Aberdeenshire Council

Environmental Defense Fund

The European Association of Fisheries Economists

Scottish Fishermen's Federation

Seafish

Sea Grant Oregon

SWFPA

University of Stirling

UNU-FTP

Visit Aberdeenshire

Visit Scotland

World Bank

Front cover image courtesy of McGarvaPhotography www.pbase.com/mcgarva

IIFET 2016 Scotland

International Institute for Fisheries Economics and Trade

11-15 July 2016

Aberdeen Exhibition and Conference Centre, Scotland, UK

	▪ Recognising and Assessing Social and Economic Values in Fisheries ▪ Gender Research as a New Frontier in Fisheries and Aquaculture Economics: In the Footsteps of Rosemary Firth ▪ The Ghosts of Adam Smith: The Past, Present, and Future of Fishery Subsidies ▪ Measuring and managing risk-taking and safety in commercial fishing
Special Sessions (Closed)	▪ Analyzing behavioral responses to regulation – what can be learned for management? ▪ Improving Food Security and Reducing Poverty through Intra-regional Fish Trade in Sub-Saharan Africa ▪ Creating shared value through stakeholders' involvement to strengthen the seafood competitiveness ▪ Economics of Bycatch ▪ Gender Research as a New Frontier in Fisheries and Aquaculture Economics: In the Footsteps of Rosemary Firth
Please note that some sessions are still be to confirmed and the final list may be different.	

INTERNATIONAL INSTITUTE OF FISHERIES ECONOMICS AND TRADE 2016

CPD Services, Research and Innovation
University of Aberdeen
University Office
King's College
ABERDEEN
AB24 3FX

Tel: +44 1224 272523
Fax: +44 1224 272319

Email: cpdservices@abdn.ac.uk

	▪ Promoting integration – policy lessons from theory and practice
Special Feature: **Industry & Policy Day**	▪ Fishing business owners and policy makers from across northern Europe take part in a day of policy-relevant discussion panels, workshops and presentations ▪ Can economics help resolve policy challenges? ▪ Discussion of the key emergent outcomes from previous sessions regarding the future co-operation and integration of seafood stakeholders: Wild capture fisheries Aquaculture Processing Seafood logistics Markets Consumption The business of fishing - a film made by Seafish
Special Sessions (Open)	▪ Economics of Protected Resources ▪ Fisheries, Aquaculture and Global Food Security ▪ The economics of a discard ban policy ▪ Payments for Ecosystem Services in fisheries and aquaculture – A rose by any other name? ▪ Transdisciplinary research in fishery science – are we making progress influencing policy making? ▪ Present and Emerging Arctic Fisheries ▪ Unlocking the sustainable wealth potential of aquatic resources and ecosystems: Beyond traditional commercial fisheries management ▪ 'SUCCESS: Reinforcing the competitiveness of the seafood sector' ▪ Game theory and fisheries ▪ Innovations in governance of highly migratory and transboundary fisheries ▪ Fishing Cost Data Collection and Implications in Fisheries Management ▪ Sustainability of fisheries and aquaculture: the multidisciplinary approach as a key for success ▪ Economics of Bycatch

ATTACHMENT 1

Skip to content

Themes & Special Sessions

Home › Programme › Themes & Special Sessions

Wild Capture Fisheries	▪ Adaptations to evolving governance ▪ International fisheries management & models of co-operation ▪ Hierarchies of fishing rights allocations – country, producers organisations & individuals ▪ Bio-economic modelling – estimating the present value of different harvesting strategies ▪ Adoption & adaptation of technical measures to improve resilience & profitability ▪ Ecosystems based management, MPAs
Aquaculture	▪ New species – salmon and more? ▪ New processes – onshore and seawards? ▪ Capture based acquaculture ▪ New products – farming not only for food? ▪ New markets – emerging alternatives
Processing	▪ Integration of captured & farmed raw material supplies ▪ The reformed CFP and its emergent supply chain of discards ▪ Delivering sustainability through alternative processes and products
Seafood Logistics	▪ Fish welfare and the addition of value ▪ Landing live ▪ Flying fresh ▪ Net-based logistics – challenging traditional supply chain models
Markets	▪ Improving understanding through innovative use of available, but ignored, market data ▪ Seafood segmentation and positioning strategies ▪ Envisioning, shaping and communicating future markets ▪ Shifting global power – implications for trade
Consumption	▪ The emergent importance of sustainability labels & other attributes in seafood purchase and consumption decisions ▪ Consumption of Authentic and Adulterated products ▪ Improving health though fish consumption – limits to gains?
The BIGGER PICTURE	▪ Fish versus competing animal proteins – swimming against agricultural tide ▪ Economics of recreational fisheries ▪ Implications of fish stock responses to climate change for the seafood sector – new global value chains? ▪ Sea level change and the emerging submergence of seafood infrastructure

position to learn from both the successes and failures of Fisheries around the world with a long history of fishing.

In addition, the Conference provided the opportunity to discuss and evaluate policy directions taken by countries which share resources such as the European Union's (EU) controversial 'no-discards' policy. The cooperative arrangements that were established may influence future policy directions in the management of fish stocks shared with other jurisdictions.

There continues to be widespread agreement amongst participants with cooperative research and industry investment in science being a common theme. Notably, the Territory's cost-sharing approach taken in the management of Offshore Snapper Fishery is in general accord with international policy direction.

During a field excursion to the Peterhead Fish Market (the United Kingdom's largest 'whitefish' wholesale markets), Mr McKey had an opportunity to discuss the EU's quota management, reporting and reconciliation mechanisms with several active north-sea fishers. These fishers have collectively been working in quota fisheries for decades and were a wealth of knowledge as to what they see as working well for their businesses, and what doesn't. The insights gained will contribute to focussing the quota reconciliation and reporting review currently being undertaken by the Offshore Snapper Fishery Advisory Committee, aimed at reducing unnecessary red-tape and legislative burden to industry.

FOLLOW UP ACTION REQUIRED

No follow up action required.

CONCLUSION

The proposed outcomes from this travel were achieved, in addition to meeting new contacts (Attachment C) for potential sharing of information assisting future Fishery policy development.

Action Officer:	David McKey	92268
Group Head	Glenn Schipp	92213
Chief Executive	Alister Trier	92005

ALISTER TRIER **11/08/2016**

NOTED

GARY HIGGINS

15 AUG 2016

DEPARTMENT OF PRIMARY INDUSTRY AND FISHERIES

RECEIVED

17 AUG 2016

MIN.LIAISON

OVERSEAS TRAVEL REPORT

Dept. Ref: 16-0303-SEC
Min Ref: 2016/1360 - GJH
HPRM Ref:

Title:	International Institute of Fisheries Economics and Trade 2016
Destination:	Aberdeen, Scotland
Date/s:	10-15 July 2016
Travel approved:	6 April 2016 (refer Attachment A)
Officer/s travelling:	Mr David McKey
Note:	Mr McKey took personal leave directly after the Conference; hence the report due date was extended.

RECEIVED
15 AUG 2016
MINISTER HIGGINS

PURPOSE

To report on overseas travel by Mr David McKey, Manager, Aquatic Resource Management to Aberdeen, Scotland to attend the International Institute of Fisheries Economics and Trade (IIFET 2016) Conference. This was a professional development opportunity for Mr McKey, using prize money from the Chief Minister's Award: Delivering a Balanced Environment.

PROPOSED OUTCOMES

The IIFET 2016 Conference is a large, internationally renowned gathering of scientists, policy-makers, stakeholders and industry representatives to engage in discussions on fisheries economics and trade (refer Attachment B - extract of program - 316 pages). It has members from over 75 countries and is held biennially. This Conference was expected to provide an excellent professional development opportunity for Mr McKey. Relevant themes included; exploration of quota fisheries, fishing rights, social and economic values in contemporary management arrangements.

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

The IIFET is an international group of economists, government managers, private industry members and others interested in the exchange of research and information on the economics of marine resource issues. The next Conference is planned to be held in Seattle in 2018.

Some 500 Delegates attended the IIFET Conference from 35 countries, many from regions with centuries of marine resource use. This provided an excellent opportunity to understand how countries with Fisheries that are much more developed than ours have dealt with issues that Fisheries in the Northern Territory (NT) may face as they move to optimise their resource potential. As most of our Fisheries are in early stages of development, the Territory is placed in a fortunate

Photo 3. Expatriated Australian high-grade Brahman Steers.

ATTACHMENT B

Photographs

Overseas Travel - Mr Kieren McCosker – Jakarta

3-7 October 2016

Photo 1. NIAPP Alumni participants presenting breeder herd management plans during the workshop.

Photo 2. Locally purchased females for breeders in a feedlot

RESULTS

1. A workshop on breeder management to maximise calf production was completed on the 5 October 2016 and was attended by 60 NTCA Indonesia-Australia Pastoral Program Alumni Members; and
2. The TUM feedlot, which has a strong history for importing Territory cattle, was visited on 4 October 2016. The company expressed considerable concern about the Indonesian Government's requirement for the feedlot operators to import and manage one breeding heifer per five feeder cattle. Because of this policy they had not yet secured an import Permit and as a result, the feedlot was operating at 30% of its capacity. It was explained that having breeding females in a feedlot situation gives rise to health and welfare issues and the cost and space requirements of breeders within feedlot systems is impractical. The company also had significant concerns about alternative systems of managing those breeders, such as lease-share arrangements between feedlots and farmers, because of possible under-performance, uncontrolled sale of livestock and theft.

FOLLOW UP ACTION REQUIRED

- No follow up action is required.

CONCLUSION

The aims of this trip were all successfully accomplished to the mutual benefit of the NT Government, the NTCA and the Indonesian Government.

Action Officer:	Kieren McCosker	39771
Group Head	Neil MacDonald	39746
Chief Executive	Alister Trier	92005

ALISTER TRIER **19/10/2016**

NOTED 24/10/16

KEN VOWLES

DEPARTMENT OF PRIMARY INDUSTRIES AND RESOURCES

RECEIVED

25 OCT 2016

MIN.LIAISON

OVERSEAS TRAVEL REPORT

Dept Ref: 16-0662-SEC
Min Ref: 2016/0149 - KEV
HPRM Ref: P2010/380

Title:	Travel to Jakarta to present at a Workshop organised by the Northern Territory Cattlemen's Association.
Destination:	Indonesia, Jakarta
Date/s:	3-7 October 2016
Travel approved:	12 September 2016 (Refer Attachment A)
Officer/s travelling:	Mr Kieren McCosker

RECEIVED
19 OCT 2016
MINISTER VOWLES' OFFICE

PURPOSE

The Northern Territory Cattlemen's Association (NTCA) facilitated a workshop for the Alumni of the NTCA Indonesia-Australia Pastoral Program to reinforce key principles on correct breeder management, designed to reduce risk of animal welfare issues and poor reproductive performance in Australian cattle imported into Indonesia. Mr Kieren McCosker, Beef Production Scientist at the Katherine Research Station was invited by the NTCA to deliver key sessions of the workshop on 'Improving breeder management to maximise calf contribution'.

BACKGROUND

Mr McCosker, has recently completed the 'Cash Cow Project' in collaboration with the University of Queensland and the Queensland Department of Agriculture and Fisheries which provided insights into the productivity and performance of beef breeding herds across northern Australia. Mr McCosker has also recently collaborated with the University of Queensland conducting the 'Straw Cow Project', which monitored the reproductive performance of cows and fattening of cattle in low input systems within villages of Indonesia. The involvement in both of these projects provides Mr McCosker with the knowledge and experience to deliver his presentation at such sessions.

Also provided for your information are photographs from the travel (Attachment B) and Itinerary (Attachment C).

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

- Relationship-building between the Department of Primary Industries and Resources, the NTCA and Indonesian Government Science Officers;
- Technical knowledge transfer to Indonesia, to improve industry practices; and
- This activity is part of our efforts to demonstrate to Indonesia our willingness to assist in their beef production development.

ATTACHMENT C

Itinerary

Dr Jocelyn Coventry
International AITVM-STVM Conference, Berlin
2-15 September 2016

2-3 September 2016
Travelled from Alice Springs, Northern Territory (NT) to Berlin, Germany

4 September 2016
Registration and welcome reception 'First Joint International AITVM-STVM Conference' at Humboldt Freie Universität zu, Berlin, Germany.

5 September 2016
Day 1 - satellite workshop meeting 'The Path to the Greener Pastures: Pastoralism, the backbone of the world's dry lands'
http://www.aitvm-stvm2016.com/workshops/VSF-Satellite-Event-on-Pastoralism/index.html

6 September 2016
Day 2 'First Joint International AITVM-STVM Conference'.

7 September 2016
Day 3, including visit to the Museum für Naturkunde, Invalidenstr. 43, 10115 Berlin
https://www.naturkundemuseum.berlin/en

8 September 2016
Day 4 - first day of post-Conference workshop 'Socio-Economic Impact Assessment of Animal Health Interventions'.
http://www.aitvm-stvm2016.com/workshops/Socio-economic-assessment/index.html

9 September 2016
Day 5 - attended second day of post-Conference workshop 'Socio-Economic Impact Assessment of Animal Health Interventions'
http://www.aitvm-stvm2016.com/workshops/Socio-economic-assessment/index.html)

10-12 September 2016
Personal Leave

13-15 September 2016
Travelled from Berlin, Germany to Alice Springs NT

Muscle glycogen at slaughter is higher with higher growth rates in extensively-managed cattle

Jocelyn Coventry[1], Peter McGilchrist[2], Cameron Jose[2], Mark Hearnden[3]

[1] Department of Primary Industry and Resources, Alice Springs NT 0870, Australia; [2] School of Veterinary and Life Sciences, Murdoch University, Murdoch WA 6150, Australia; [3] Department of Primary Industry and Resources, Darwin NT 0800, Australia

Low pre-slaughter liveweight gain in beef cattle has been associated with low muscle glycogen at slaughter, insufficient drop in meat pH and unacceptably dark meat ('dark cutting'). This study demonstrated the impact of liveweight gain on muscle glycogen concentration, with 97 extensively-managed (rangelands) steers (27 to 30 months old) from three genotype groupings (Droughtmaster (100%Dm), Droughtmaster-cross (50%Dm), Droughtmaster-infused (25%Dm)). Before long distance transport to abattoirs, these cattle co-grazed for 50 days in a 26 sq.km paddock in central Australia. Paddock vegetation was mixed arid rangelands, mineral supplementation was available *ad libitum*, and trough water was reticulated to a permanent water-yard. Walk-over-weighing (WOW) technology incorporated into a commercial remote livestock management system (RLMS, Precision Pastoral Pty Ltd) was installed in the water-yard exit. Time, liveweight and the unique radio frequency identity device were recorded for each steer when it walked over the RLMS to leave the water-yard. Regression modelling with individual WOW datasets determined average daily liveweight gain (ADG) for each steer in the 50 days before transportation to abattoirs (1,590 km in 20 hours). Muscle samples from the *longissimus thoracis* of each steer carcass were collected 40 minutes post-mortem and stored at -80°C until analysed for glycogen and lactate concentration. The general linear statistical model that was used to analyse the relationship between pre-slaughter liveweight gain and post-mortem muscle glycogen included genotype as a fixed effect and carcass traits as continuous variables.

There was a significant, positive relationship between ADG and muscle glycogen ($P<0.05$). As ADG increased from 0.25 to 1.5 kg/day, muscle glycogen increased 16.5% from 1.34 to 1.62 g/100g. Rib fat depth was positively correlated with muscle glycogen ($P<0.05$), indicating that fatter animals had greater glycogen storage. However, carcass weight tended towards being negatively correlated with muscle glycogen ($P=0.051$), suggesting more fatigue or higher maintenance requirements for heavier animals during long distance transport. Muscle glycogen was also significantly different between genotype groups ($P<0.05$). The 25%Dm group (1.34 g/100g) had less muscle glycogen than the 50%Dm (1.54 g/100g) and 100%Dm (1.49 g/100g) groups.

Overall, these results demonstrate a link between improved nutrition, growth and muscle glycogen. The faster-grown rangelands cattle in the study had higher post-slaughter muscle glycogen and were less at-risk of 'dark cutting'. These results also demonstrate that WOW technology and modelling can be used as tools to identify individuals with low liveweight gain and to manage the risk of 'dark cutting' in rangeland cattle.

Muscle glycogen at slaughter is higher with higher growth rates in extensively-managed cattle

Jocelyn Coventry[1], Peter McGilchrist[2], Cameron Jose[2], Mark Hearnden[3]

[1] Department of Primary Industry and Resources, Alice Springs NT 0870, Australia; [2] School of Veterinary and Life Sciences, Murdoch University, Murdoch WA 6150, Australia; [3] Department of Primary Industry and Resources, Darwin NT 0800, Australia

Low pre-slaughter liveweight gain in beef cattle has been associated with low muscle glycogen at slaughter, insufficient drop in meat pH and unacceptably dark meat ('dark cutting'). This study demonstrated the impact of liveweight gain on muscle glycogen concentration, with 97 extensively-managed (rangelands) steers (27 to 30 months old) from three genotype groupings (Droughtmaster (100%Dm), Droughtmaster-cross (50%Dm), Droughtmaster-infused (25%Dm)). Before long distance transport to abattoirs, these cattle co-grazed for 50 days in a 26 sq.km paddock in central Australia. Paddock vegetation was mixed arid rangelands, mineral supplementation was available *ad libitum*, and trough water was reticulated to a permanent water-yard. Walk-over-weighing (WOW) technology incorporated into a commercial remote livestock management system (RLMS, Precision Pastoral Pty Ltd) was installed in the water-yard exit. Time, liveweight and the unique radio frequency identity device were recorded for each steer when it walked over the RLMS to leave the water-yard. Regression modelling with individual WOW datasets determined average daily liveweight gain (ADG) for each steer in the 50 days before transportation to abattoirs (1,590 km in 20 hours). Muscle samples from the *longissimus thoracis* of each steer carcass were collected 40 minutes post-mortem and stored at -80°C until analysed for glycogen and lactate concentration. The general linear statistical model that was used to analyse the relationship between pre-slaughter liveweight gain and post-mortem muscle glycogen included genotype as a fixed effect and carcass traits as continuous variables.

There was a significant, positive relationship between ADG and muscle glycogen ($P<0.05$). As ADG increased from 0.25 to 1.5 kg/day, muscle glycogen increased 16.5% from 1.34 to 1.62 g/100g. Rib fat depth was positively correlated with muscle glycogen ($P<0.05$), indicating that fatter animals had greater glycogen storage. However, carcass weight tended towards being negatively correlated with muscle glycogen ($P=0.051$), suggesting more fatigue or higher maintenance requirements for heavier animals during long distance transport. Muscle glycogen was also significantly different between genotype groups ($P<0.05$). The 25%Dm group (1.34 g/100g) had less muscle glycogen than the 50%Dm (1.54 g/100g) and 100%Dm (1.49 g/100g) groups.

Overall, these results demonstrate a link between improved nutrition, growth and muscle glycogen. The faster-grown rangelands cattle in the study had higher post-slaughter muscle glycogen and were less at-risk of 'dark cutting'. These results also demonstrate that WOW technology and modelling can be used as tools to identify individuals with low liveweight gain and to manage the risk of 'dark cutting' in rangeland cattle.

ATTACHMENT A

Dear Jocelyn Coventry,

Your AITVM-STVM abstract.msg

We would like to inform you that your abstract entitled 'Muscle glycogen at slaughter is higher with higher growth rates in extensively-managed cattle' has been accepted as a POSTER presentation for the first joint AITVM-STVM conference. Date, time and location of the poster sessions will be included in the final program, which will be sent to you in due course.

The preferred poster format is A0 (84.1 cm x 118.9 cm) and you will be responsible to bring your own poster to the event. There will not be a local printing service available on site.

Please note that all submitting/lead authors need to have registered and paid the conference fee before Friday 1 July 2016 (i.e. qualifying for EARLY registration) (http://www.aitvm-stvm2016.com/registration/index.html). Failure to do so may result in the withdrawal of the abstract from the conference program and abstract band.

We also strongly advise you to book your accommodation and transport to Berlin as soon as possible to avoid disappointment since September is still peak tourist season and various other events take place simultaneously. Should you need a visa, please apply as early as possible at the German Embassy in your country.

CIRAD-, DAAD,- MSD-, and STVM-Award applicants will be notified in a separate e-mail about the outcome of their application before 1 June 2016.
Please feel free to contact us, should you need further information.
Yours sincerely,
Ard Nijhof

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Figure 1. Photograph outside the Humboldt Freie Universität zu Berlin.

Figure 2. Photograph at the University with Conference attendees during a lunch break.

** These photographs are courtesy of representatives of the Conference Organising Committee (Humboldt Freie Universität zu Berlin - Maximilian P.O. Baumann (Chair), Peter-Henning Clausen and Ard M. Nijhof

The itinerary for the Conference and associated workshops is provided (refer Attachment C).

OUTCOMES ACHIEVED/GAINED FOR NORTHERN TERRITORY GOVERNMENT

Specific outcomes achieved for the NT Government were:

- The international profile of DPIR was increased, both though discussions with international Conference attendees and organisers, as well as through presentation and publication of some DPIR co-operative research outcomes.
- Professional research, development and extension networks of the DPIR were enhanced, by networking with Conference attendees who had domestic or international expertise relating to DPIR project areas, or represented countries with similar environmental challenges and shared livestock market access considerations, especially in marginal sub-tropical areas and in South East Asian tropical areas respectively.
- The formal Conference presentations provided information on Rangeland beef production and health and welfare of livestock in pastoral and remote regions. This included the latest information on the role of research, extension and service organisations in facilitation of positive outcomes in these regions. Field-based presentations were provided on key 'One Health' world issues such as antibiotic resistance, rational (animal) drug use, socio-economic assessment of livestock projects. The keynote presentation was made by Dr Bassirou Bonfoh, West Africa Regional Coordinator of the National Centres of Competence in Research North-South and Director of the One Health Initiative (Centre Suisse de Recherches Scientifiques en CI, Côte d'Ivoire).

FOLLOW UP ACTION REQUIRED

Post-Conference action that has been, or is to be, undertaken with Conference colleagues and department colleagues includes:

- A copy of the Conference proceedings and related research publications has been delivered to research co-operators at Murdoch University. Contact will also be made with them in relation to Dr Coventry's networking with an academic at the Humboldt Freie Universität zu Berlin.
- Four presenters from the Conference, workshops and poster session have been contacted for additional reference publications, and a Conference colleague from the Commonwealth Scientific and Industrial Research Organisation in Geelong, Victoria has been provided with contact details for group facilitation.
- Compiled information from the Conference will be made available to department colleagues on reference publications, the business model of international commercial veterinary laboratory, ClinVet, South Africa and the workshop on socio-economic assessment of project outcomes.
- Other information will be made available to department colleagues though abstracts from key presentations, workshop topics and contacts made through networking at the poster session including:
  - One Health;
  - Rational drug use;
  - Antibiotic resistance;
  - Challenges for pastoral communities;
  - Socio-economic assessment of projects;
  - Field laboratory logistics; and
  - Genomic effects on meat quality.

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

OVERSEAS TRAVEL REPORT

Dept Ref: 16-0514-SEC
Min Ref: 2016/ 0051 - KEV
HPRM Ref:

Title:	Travel to attend the first joint International AITVM-STVM Conference in Germany
Destination:	Berlin, Germany
Date/s:	2-15 September 2016
Travel approved:	3 July 2016 (refer Attachment A)
Officer/s travelling:	Dr Jocelyn Coventry

PURPOSE

To report on travel by Dr Jocelyn Coventry, Pastoral Production Officer, Livestock Industries Development, Alice Springs to Berlin, Germany to attend the first joint International Conference of the Association of Institutions for Tropical Veterinary Medicine (AITVM) and the Society of Tropical Veterinary Medicine (STVM) herein 'the Conference' from 2-15 September 2016 . The theme for this Conference was 'Tropical Animal Diseases and Veterinary Public Health: Joining Forces to Meet Future Global Challenges'.

PROPOSED OUTCOMES

It was proposed that attendance at the Conference would provide unique opportunities to:

1. Share and update knowledge relevant to livestock health and production in the global regions between the Tropics of Cancer and Capricorn.
    - The Conference had a scientific program and workshops, featuring broad-based issues for both the livestock resource (genetic resources / biodiversity / animal production / welfare) and the human resource (pastoralism on arid lands / socio-economic assessment of animal health interventions / training / capacity building); and
    - In her current role as a Pastoral Production Officer and a registered Veterinarian with the Northern Territory (NT) Department of Primary Industry and Resources (DPIR), Dr Coventry undertakes research and extension in extensive cattle production, including applied cattle research into herd dynamics, herd health and performance recording on the Department's Old Man Plains Research Station. Much of the conference program and workshops were relevant to Dr Coventry's current and future work.
2. Present a poster titled: 'Muscle glycogen at slaughter is higher with higher growth rates in extensively-managed cattle' (refer Attachment B).
    - This poster is an output from research that has been undertaken in conjunction with the Murdoch University, School of Veterinary and Life Sciences. This showcased co-operative DPIR research to an International audience, and also provided a professional development opportunity for Dr Coventry.

MINISTER VOWLES

Estimates Review Committee

Director Mining Remediation	470.64	2/07/2016	11/07/2016	Vienna, Austria	Invited to assist the International Atomic Energy Agency (IAEA) to prepare a Strategic Master Plan for the remediation of uranium legacy sites in Central Asia. Travel in July 2016. [Externally funded arranged flights and per diem allowance for 5 days provided by the European Commission. Travel allowance funded by NTG. Accommodation funded by Traveller]
Principal Research Leader, Livestock Industry Development	1,725.00	8/07/2016	31/07/2016	Saskatoon, Canada	Attend the 10th International Rangelands Congress (IRC) held in Saskatoon, Canada 17-23 July 2016. Invited to present "Precision Pastoral Management System: automated 'big data' analysis for pastoral properties". [Travel fares, accommodation, registration fees, and car hire externally funded by Cooperative Research Centre for Remote Economic Participation (CRC-REP). Travel allowance funded by NTG]
	2,195.64				

Action Officer: Karen Simpson Phone: 8999 7879 Date: 20/06/2017

Department of Primary Industry and Resources

MINISTER VOWLES

Estimates Review Committee

Position	*Travel Cost $	Travel Date From	Travel Date To	Destination	Reason for Travel
Principal Livestock Research Officer	1,175.26	20/03/2017	1/04/2017	Texas, United States of America	As recipient of the Department's Star Award and Chief Minister's Medal for his work on "Senepol Cross Breeding" project regarding cattle production the Officer requested to utilise funds from the award for a study tour to Texas A&M University. The Texas A&M University is an internationally recognised research team working to improve the fertility of Brahman cattle. This travel was partially funded by the NTG and external funding provider - Commonwealth Scientific And Industrial Research Organisation (CSIRO)
Principal Molecular Scientist Principal Entomologist	4,659.83	25/03/2017	3/04/2017	Phnom Penh, Cambodia	As part of the Australian Centre for International Agricultural Research (ACIAR) project "Building a resilient mango industry in Cambodia and Australia through improved production and supply chain practices" attend the project review workshop. (Externally funded by ACIAR).
	66,597.66				

EXTERNAL ENTITY FUNDED and ARRANGED TRAVEL with the exception of some Travel Allowance

Position	Travel Cost $	Travel Date From	Travel Date To	Destination	Reason for Travel

Action Officer: Karen Simpson Phone: 8999 7879 Date: 20/06/2017

Department of Primary Industry and Resources

MINISTER VOWLES

Estimates Review Committee

Position	*Travel Cost $	Travel Date From	Travel Date To	Destination	Reason for Travel
Director - Livestock Industry Development Pastoral Research Officer	5,277.56	21/11/2016	1/12/2016	Lampung, Bandung, Medan, Surabaya - Indonesia	Request by Meat and Livestock Australia (MLA) to present at four workshops (Lampung, Bandung, Medan and Surabaya) on breeder managements based on findings of the East Kalimantan Breeder Project. Externally funded by MLA and the Australian Government on behalf of the Indonesia-Australia Partnership for Food Security in the Cattle and Red Meat Sector (the "Red Meat Partnership") to manage the East Kalimantan project.
Market Development Officer	7,948.43	29/11/2016	11/12/2016	Los Angeles, United States of America	To support the Australian Mango Industry Association's (AMIA) United States market access and development effort. Horticulture Innovation Australia (HIA) requested officer to travel to US to monitor the progress of Australian mango shipments in the third year of access to the US market. (Externally funded by HIA)
Director - Livestock Industry Development	2,891.00	4/12/2016	10/12/2016	Jakarta, Indonesia	Accompany the Minister for Primary Industry and Resources to develop relationship between the NTG, Australian Embassy and Indonesian Governments. (externally funded by Department of Agriculture and Water Resources- DWAR)
Market Development Officer	5,088.71	5/02/2017	13/02/2017	Los Angeles, United States of America	To support the Australian Mango Industry Association's (AMIA) United States market access and development effort. Horticulture Innovation Australia (HIA) requested officer to travel to US to monitor the progress of Australian mango shipments in the third year of access to the US market. (Externally funded by HIA)
Senior Technical Officer	2,109.85	5/02/2017	11/02/2017	Dili, Timor-Leste	To conduct final cold chain audit for the Timor-Lest Village Poultry Health and Biosecurity project. The Berrimah Veterinary Laboratory (BVL) has been involved in training veterinary laboratory staff in Dili under an Australian Aid funded Public Sector Linkage Project (PSLP) to improve capabilities in animal disease diagnosis. This program is jointly managed by the Australian Department of Agriculture and Water Resources (DAWR) and the Timor-Leste Ministry of Agriculture and Fisheries (MAF). Funding provided by DAWR.

Action Officer: Karen Simpson Phone: 8999 7879 Date: 20/06/2017

Department of Primary Industry and Resources

MINISTER VOWLES

Estimates Review Committee

Position	*Travel Cost $	Travel Date From	Travel Date To	Destination	Reason for Travel
Research Officer, Livestock Industry Development	2,426.90	3/10/2016	8/10/2016	Jakarta, Indonesia	To present lecture to the Alumni at NT Cattlemen's Association (NTCA) workshop "Indonesia-Australia Pastoral Program". This is part of the NT Government's commitment to the Live Export Trade. Externally funded by the Australian Government on behalf of the Indonesia-Australian Red Meat Partnership
Aquaculture Research Officer	-	6/11/2016	13/11/2016	Penang, Malaysia	Attend the Crawford Funds Master Class in Agricultural Research Leadership and Management at the WorldFish Centre Penang Malaysia. This Officer was sponsored by the Australian Centre for International Agriculture Research (ACIAR).
Veterinary Officer	2,632.13	12/11/2016	21/11/2016	Kathmandu, Nepal	To participate in the Australian Government Department of Agriculture and Water Resources (DAWR) "Foot and Mouth Disease (FMD)" real time training course and improve Australia's FMD preparedness. The training is undertaken in collaboration with the European Commission for the Control of FMD (EuFMD) of the United Nations Food and Agriculture Organisation. Officer was one of ten merit based selections funded by DAWR, who covered training, travel and accommodation within Nepal. Flights funded by NTG.
Principal Entomologist Principal Molecular Scientist Plant Industries Development Science Leader Director - Plant Industry Development	15,917.16	14/11/2016	1/12/2016	Phnom Penh, Cambodia	As part of the Australian Centre for International Agricultural Research (ACIAR) project "Building a resilient mango industry in Cambodia and Australia through improved production and supply chain practices" attend the project review workshop. (Externally funded by ACIAR)
Primary Industry Livestock Management Officer	6,706.72	21/11/2016	2/12/2016	Cartagena Columbia	To attend 11th International Buffalo Congress in Cartagena, Colombia. The Officer is an internationally recognised expert on water buffalo. A BreedPLAN for Australian buffalo is currently under development as a joint project between DPIR and the Animal Breeding Research Institute funded by Rural Industry Research and Development Corporation (RIRDC). As the Officer was recipient of the Department's Star Awards, this trip has been partially funded by the NT and external funding provider RIRDC.

Action Officer: Karen Simpson Phone: 8999 7879 Date: 20/06/2017

Department of Primary Industry and Resources

MINISTER VOWLES

Estimates Review Committee

Position	*Travel Cost $	Travel Date From	Travel Date To	Destination	Reason for Travel
Chief Information Officer	1,338.15	15/03/2017	17/03/2017	Kuala Lumpur, Malaysia	To attend the Open Government Leadership Forum. Invited as Guest Presenter to discuss challenges government face with ever adopting technology.
	115,845.44				

EXTERNAL FUNDING

Position	*Travel Cost $	Travel Date From	Travel Date To	Destination	Reason for Travel
Senior Research Agronomist	3,219.02	1/07/2016	12/07/2016	Girona, Spain	Attend Compositional Data Analysis Course at the University of Girona, Spain 4-8 July 2016. 5 day course to provide training on analysing nutrient balance of ionomic data facilitating greater collaboration with the international mango research community. (Externally funded by Horticulture Australia Limited)
Director - Plant Industry Development	1,172.35	5/07/2016	10/07/2016	Bangkok, Thailand	Attend Australian Centre for International Agriculture Research (ACIAR) Regional Mango Workshop for Mango markets, trade and strategic research issues in the Asian Pacific. (Externally funded by ACIAR).
Senior Horticulturist, Plant Industries Development	2,097.63	9/07/2016	16/07/2016	Cebu, Davao, Philippine	Required to complete project milestones as part of the Australian Centre for International Agriculture Research (ACIAR) Tropical Tree Fruit Research project. (Externally funded by ACIAR).
Senior Technical Officer	3,275.11	2/10/2016	12/10/2016	Dili, Timor-Leste	To conduct a cold chain audit for the Timor-Lest Village Poultry Health and Biosecurity project. The Berrimah Veterinary Laboratory (BVL) has been involved in training veterinary laboratory staff in Dili under an Australian Aid funded Public Sector Linkage Project (PSLP) to improve capabilities in animal disease diagnosis. This program is jointly managed by the Australian Department of Agriculture and Water Resources (DAWR) and the Timor-Leste Ministry of Agriculture and Fisheries (MAF). Funding provided by DAWR.

Action Officer: Karen Simpson Phone: 8999 7879 Date: 20/06/2017

Department of Primary Industry and Resources

MINISTER VOWLES

Estimates Review Committee

Position	*Travel Cost $	Travel Date From	Travel Date To	Destination	Reason for Travel
Executive Director Geoscience	6,539.10	21/09/2016	30/09/2016	Tianjin China and Tokyo Japan	Delivery of industry delegation to promote opportunities for international investment in the NT's resource sector. Delegation timed to coincide with the China Mining Congress held annually in Tianjin. Represent the NT at the Australian Minerals Investment Seminar in Tokyo Japan.
Primary Industry Livestock Management Officer	2,570.28	8/10/2016	17/10/2016	Haiphong and M'Drak, Vietnam	Request from exporting company South East Asian Livestock Services for officer to provide technical assistance and monitoring to 500 Northern Territory buffalo to Animex in Hai Phong, Vietnam and provide advice on setting up a Beef Breeder Management Plan for the Red Star farm in M'Drak.
Director Investment Attraction Chief Executive Senior Director - Major Project Development Executive Director NT Geological Survey	23,686.15	1/11/2016	8/11/2016	Rizhao, China	To accompany Chief Minister on a major trade and investment delegation including Industry representatives visit to China. Attend Northern Territory - Rizhao City Joint Economic Cooperation Forum in Rizhao City.
Executive Director NT Geological Survey Director Investment Attraction	9,470.52	13/11/2016	21/11/2016	Kolkata (Calcutta) India	To participate and present in the Australian Minerals (an initiative of all Australian Geological Surveys) investment promotion events in India.
Chief Executive	6,780.97	4/12/2016	8/12/2016	Jakarta, Indonesia	To accompany Minister on introductory visit and meetings in Jakarta. Return via Sydney to attend critical Mines and Energy meeting.
Deputy Chief Executive Executive Director NT Geological Survey	27,779.43	1/03/2017	11/03/2017	Toronto, Canada and St. Louis, United States of America.	To attend the Prospectors and Developers Association of Canada (PDAC) 2017 convention in Toronto Canada, visit uranium mine site operated by McArthur River in Canada's Saskatchewan province and visit St. Louis, USA Doe Run mine.
Chief Executive Manager, Food Industry Investment	10,320.54	11/03/2017	15/03/2017	Tokyo Japan	To attend Japan-Australia Public and Private Sector Forum on Northern Australia Agricultural Development

Action Officer: Karen Simpson Phone: 8999 7879 Date: 20/06/2017

Department of Primary Industry and Resources

MINISTER VOWLES

Estimates Review Committee

NOTE:

Data is per the Travel Request Information Processing System (TRIPS) and includes all acquitted travel that occurred during the period 01 July 2016 and 31 March 2017.

*TRIPS Travel Cost will not match the Government Accounting System (GAS) due to timing of expenses paid in GAS.

INTERNAL FUNDING

Position	*Travel Cost $	Travel Date From	Travel Date To	Destination	Reason for Travel
Senior Aquatic Resource Manager, Fisheries	6,340.38	29/06/2016	20/07/2016	Aberdeen, Scotland	Attend the International Institute of Fisheries Economics and Trade (IIFET 2016) Conference 10-15 July 2016. Funded by Chief Minister's 2014 Award: Delivering a Balanced Environment
Regional Manager, Market & Enterprise Development	4,284.10	11/07/2016	25/07/2016	Saskatoon, Canada	Attend the 10th International Rangelands Congress (IRC) held in Saskatoon, Canada 17-23 July 2016. Invited to present "Quality Graze Steer Challenge - Engaging Pastoralists in Central Australia". [Traveller Self-Funded Airfare]
Senior Petroleum Engineer	5,644.02	14/08/2016	20/08/2016	Kuala Lumpur, Malaysia	Attend the Society of Petroleum Engineers (SPE) "Reserves, Resources and Definition Workshop" in Kuala Lumpur, Malaysia 15-18 August 2016.
Pastoral Production Officer	2,317.03	2/09/2016	15/09/2016	Berlin, Germany	To attend the International Conference of the Association of Institutions for Tropical Veterinary Medicine (AITVM) and the Society of Tropical Veterinary Medicine (STVM). Opportunity to also promote officer's Abstract Poster "Muscle glycogen at slaughter is higher with higher growth rates in extensively managed cattle."
Director - Livestock Industry Development	2,677.76	16/09/2016	23/09/2016	East Kalimantan, Indonesia	Provide technical assistance to East Kalimantan Indonesia Provincial Government breeder importation program as part of the NTG's commitment to the Live Export Trade and Indonesia's livestock industry development.
Director Investment Attraction	6,097.01	19/09/2016	27/09/2016	Tianjin China	Delivery of industry delegation to promote opportunities for international investment in the NT's resource sector. Delegation timed to coincide with the China Mining Congress held annually in Tianjin.

Action Officer: Karen Simpson Phone: 8999 7879 Date: 20/06/2017

Department of Primary Industry and Resources