



Australian Government

Australian Centre for  
International Agricultural Research

# Annual report

*project*

## **Domestic and international market development for high value cattle and beef in SE Cambodia**

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## 1 Progress summary

During the second year the project successfully established areas of forage and moved towards the marketing of a premium branded beef product in both supermarket and wet markets in Phnom Penh. Research into consumer knowledge and preferences in the major markets and the value chain have characterised the beef markets and recent changes taking place. The key achievements in the major areas of the project were:

The first year of forage establishment and production resulted in 45 households in 3 villages in Kampong Cham partnering with the project. These households own a total of 203 head with approximately 43 being fattened for market and 29 sold during 2013. Within Pursat there are 232 head of cattle owned by households partnered with the project, with 38 being fattened and 28 sold during 2013. There were significant losses of forage due to flooding during the wet season resulting in loss of 30% of forage plots in Kampong Cham and 40% in Pursat. These will be replanted in the coming wet season and new farmers will be enrolled. An additional 58 farmers have expressed interest in participating in the project, this will result in an extra 6.7 ha of land allocated to growing forage. An excessively long dry season during the past 12 months led to several forage crop failures as farmers ran out of water. Solutions to this feed gap being considered are reconditioning of dams or wells and silage production (which has been developed in NW project). Forage seed is purchased through a commercial company in Thailand.

University based experiments began after the construction of research facilities including cattle houses and in-vitro laboratory facilities. Mr Theng Kouch planned and began PhD studies on various aspects of cattle markets and nutrition. The economics of forage production was analysed in Toch Sokunthea's RUA Master of Economics thesis. More detailed economics of project farmers growing forage will be completed once cattle are sold and as project farmers collect detailed information.

Planning, production of training materials and execution of the farmer training program were completed during the year. The training included production, biosecurity and marketing modules for both farmer and train the trainer. Each module had poster materials produced for presentation in villages without electricity. A total of 171 farmers and village health workers and 9 DAHP trainers attended the program.

A biosecurity education booklet specifically for farmers was created and adds to the existing series featuring biosecurity booklets for Village Animal Health Workers (VAHWs) and livestock traders. Additionally, biosecurity protocols were developed for project staff to apply themselves. These protocols were recommended to DAHP for general application by their staff, and we further recommend them to ACIAR for application by their project teams working on farms in countries where transmissible livestock diseases are endemic.

Socheat Sieng's first year of his PhD achieved a planned program of study, completion of various data collection exercises including a survey on attitudes to, and knowledge of biosecurity issues, an opportunistic survey during an FMD outbreak and vaccine cold chain data collection. The surveys interviewed 300 farmers, 199 Village animal health workers and 19 vaccine retailers.

RUA organised and hosted a policy roundtable including stakeholders from across the value chain, including emerging large scale producers Soma farm and recently established NZ dairy enterprise. This was followed up with a policy session at the mid-project review where presentations were made on; 1. a summary of the outcomes of the policy roundtable, and 2. existing policy documents, projects and policy areas where the B4M project could contribute. This provided a framework for the ensuing discussion on interventions. Policy areas such as the establishment of disease free zones could benefit

from premium product marketing and knowledge of farmer attitudes to, and uptake of, biosecurity measures. An important area that emerged was, given the impending ASEAN free trade agreement, the relationship between small-holder producers and large scale industry will be important, both in policy and market terms.

Several reports and papers were published and distributed via the project website and presented at meetings (see communications and dissemination section for full detail):

- Baseline farmer household survey summary statistics report.
- Beef value chain analysis report. This report details existing structure of the market chain and its relationship to traditional and emerging domestic and export markets.
- Changing cattle market over 5 years. A survey of changing cattle markets since a previous project showed changes in the age and gender of cattle being brought to market.
- Consumer willingness to pay survey in Phnom Penh and Ho Chi Minh City undertaken and reported.
- Demand and supply report in HCM City. The market conditions are highly dynamic with increasing imports of Australian cattle to Vietnam throughout the year. The markets will be monitored as to the effects on demand, and price of premium beef products.
- Further quantitative analysis is been undertaken of the household survey data identifying the farm and farmer factors that influence the cattle condition score.
- An SES framework paper has been submitted for publication. This develops a framework or checklist to ensure appropriate data is collected when analysing the efficiency and equity of beef value chains.
- Five travel reports were produced for trips undertaken. Project staff spent a total of 103 days in country.
- Five papers from the in-vitro work.

## 2 Achievements against project activities and outputs/milestones

### Objective 1: To ...

No.	Activity	Outputs/ milestones	Completion date	Comments
1.1	Manage partner and market chain stakeholder relationships	Opening workshop	Feb 2012	2013 report
		Establish Project Liaison Group. 6 monthly meetings held, reports prepared	Feb 2012	See 2013 report. This Group has still not been established. Preliminary meetings have taken place with farmers, traders, processors to develop the market chain for a branded beef product, including meeting in Feb 2014 with 31 attendees. As stakeholders agree to participate the group will be formally organised as Market Chain Working Group.
		Final workshop	Dec 2015	
1.2	Construct framework for diagnosing/ analysing the cattle market chain, identify the knowledge gaps and stakeholder partners	Literature review undertaken. Development of a draft diagnostic framework and identification of knowledge gaps to be researched. Report presented	May 2012	2013 report
		Series of activities (e.g. workshops, focus groups, interviews) with stakeholders to validate (and revise where necessary) (a) the draft diagnostic framework, (b) existing understandings of factors affecting performance of the cattle market chain,, and (c) knowledge gaps to be researched.	July 2012	2013 report
		Identification of specific project areas within Pursat and Kampong Cham Provinces.	July 2012	2013 report
1.3	Design and implement base level survey.	Design of survey, with input from all stakeholders. Survey form	Sept 2012	2013 report

No.	Activity	Outputs/ milestones	Completion date	Comments
	Provinces Kampong Cham, Pursat	Train enumerators, supervisors, and data entry staff, who will implement the survey or data entry activities	Oct 2012	2013 report
		Pre-test the questionnaire in one location close to Phnom Penh. Revise and adapt the questionnaire based on the received feedback	Jan 2013	2013 report
		Select survey participants and conduct survey	Feb 2013	2013 report
		Enter the data collected with the interviews into a database by trained data entry persons.	April 2013	2013 report
		Dataset available to partners	June 2013	Data set available. Working Paper 2: "Household Survey Summary Results Kampong Cham and Pursat, 2013"
1.4	Describe market/value chain for transit and Cambodian bred cattle	Focus groups/key informant interviews to develop understanding of stakeholder relationships	Aug 2013	Stakeholder interviews conducted: Trader workshop conducted in Phnom Penh Feb 2014. All parties agreed to cooperate in tracking and collection of price and condition information of project cattle.
		Description of market/value chain of transit and Cambodian bred cattle	Dec 2013	Results presented at Policy roundtable meeting at RUA and mid project review. Report drafted "The changing cattle trade in transition over 5 years in Cambodia". Working paper of a combined SE NW report drafted "Cattle Market Chains in North-West & South-East of Cambodia"
1.5	Design and implement demand and consumer analysis. PP, HCMC	Consumer survey designed and completed, report presented at workshop	Dec 2013	Report with statistics published and presented at mid-project review. "Consumer Survey Report: Phnom Penh and Ho Chi Minh City (January to March, 2013)"
		Market demand data collection and modelling; present and future demand for Cambodian beef	Sept 2013 May 2013	Demand data presented mid-project review, "Ho Chi Minh City Beef Market Demand and Supply Report" completed
1.6	Design and implement risk assessment	Scope and design of risk assessment complete. Will include details on target sites (e.g. farms, villages, trader holdings, export depots, quarantine stations) and stakeholders (e.g. smallholders, traders, transporters, trading companies, officials.)	Jan 2013	See 2013 report

No.	Activity	Outputs/ milestones	Completion date	Comments
		Further assessment of the risk pathway and identification of the 'critical points' where risk reduction interventions will be most effective	Oct 2013	Results: <ul style="list-style-type: none"> <li>• Biosecurity education for various market chain participants remains an important intervention.</li> <li>• Biosecurity risks posed by traditional behaviour / practices will take time to change, even with education.</li> <li>• Point 2 (above) necessitates reliance on vaccination against FMD etc.</li> <li>• Point 3 (above) prompted investigation of risks to vaccination effectiveness.</li> <li>• Cold chain failures and improper vaccination practices in Cambodia have been identified by B4M project as serious risks to effective vaccination on local and national scale.</li> <li>• PhD student Socheat Sieng is gathering data on cold chain and vaccination risks in order to make recommendations to Cambodian DAHP and regional OIE vaccine bank.</li> </ul>
		Recommendations for practical biosecurity measures	Dec 2013	<ul style="list-style-type: none"> <li>• Biosecurity education booklets created specifically for farmers</li> <li>• Biosecurity training materials created for farmers and delivered to study farmers at B4M training schools</li> <li>• Proposals costed for FMD vaccination, HS vaccination, and parasite treatments to be provided in study villages by B4M project as exemplary biosecurity interventions.</li> </ul>
		Recommendations for practical biosecurity interventions post farm-gate (including village-level measures for VAHWs and traders, recommendations for transporters, depot operators, high-level traders, and officials in Cambodia & Vietnam).	Dec 2013	<ul style="list-style-type: none"> <li>• Data gathered from VAHWs by questionnaire re biosecurity practices</li> <li>• Biosecurity education booklets created for VAHWs.</li> <li>• Biosecurity education booklet created by previous ACIAR Project AH/2006/025 available to traders in study villages.</li> <li>• Ongoing research into FMD vaccine cold chain compliance and FMD vaccination practices will generate recommendations to policy makers in Cambodia and OIE for more effective use of donated FMD vaccine.</li> </ul>
		Facilitation of biosecurity policy formulation	Oct 2014	<ul style="list-style-type: none"> <li>• Policy session featured in B4M Annual Meeting April 2014.</li> <li>• Result: implementation of changed biosecurity policy unlikely during life of B4M project.</li> <li>• Cold chain and vaccination research may prompt Cambodian authorities to implement improved practices.</li> </ul>
		Workshop with policy makers re. future expectations	July 2013	RUA Policy roundtable and policy sessions undertaken with project partners at mid-project review. (see above)

No.	Activity	Outputs/ milestones	Completion date	Comments
1.7	Assessment of economics of improved cattle management and on-farm costs of disease	Economic analysis of improved cattle management practices	Dec 2012	<ul style="list-style-type: none"> <li>• Toch Sokunthea thesis completed.</li> <li>• Analysis of data from wider project delayed following severe flooding followed by a long dry during 2013-14 which reduced forage establishment and delayed farmer training and subsequent data collection on production.</li> <li>• Farmer data collection protocols designed and distributed during Farmer training. As new farmers are recruited more will be trained in data collection.</li> </ul>
		Socio-economic cost of disease on-farm identified	Sep 2013	Not yet completed
1.8	List potential on- and off-farm interventions that may improve stakeholder participation in the market chain and assess and refine the market chain diagnosis framework.	Mid-project review workshop, presentation of results from Activities 1.2 to 1.7  Diagnostic framework refined on basis of outputs from A1.3-A1.7.	May 2014	Presentations on activities to date and interventions developed.

PC = partner country, A = Australia

**Objective 2: *Define and facilitate the adoption of market chain improvements/interventions that assist small-scale cattle producers participate in the developing cattle markets***

No.	Activity	Outputs/ milestones	Completion date	Comments
2.1	Test the potential interventions with regard to their private and public economic and social benefits and costs.	Summary of recommendations concerning benefits and costs of potential interventions	Apr 2014	Intervention proposals (5 page) were prepared and benefits and costs discussed at meeting. Main arguments of pros and cons are presented in Appendix 1. Funding available for interventions was budgeted and used for selection decisions.
		Select highest priority/payoff implementable interventions	June 2014	<ul style="list-style-type: none"> <li>• Development of branded product for sale in PP</li> <li>• Introduction of live weight for sale of cattle</li> <li>• Vaccination of project cattle (HS, worm) and whole villages (FMD) for production of branded beef.</li> <li>• Several interventions such as mobile phone market information and biosecurity warning systems were considered too difficult currently.</li> </ul>

No.	Activity	Outputs/ milestones	Completion date	Comments
2.2	Facilitate the adoption of selected on-farm interventions	Implement and evaluate cattle productivity interventions	July 2015	Not yet due.
		On-farm biosecurity improvements developed and tested	July 2015	Not yet due
2.3	Facilitate the development of a clean market chain where all stakeholders receive an economic benefit from producing and trading cattle into the developing markets	Market Chain Development Groups. Meetings held, activities agreed	Dec 2015	Several discussions and trader meeting held March 2014 with 30 attendees including Farmers, small traders and large traders and exporters from both Provinces. Discussions with supermarket and processors ongoing.
		Biosecurity interventions for post-farm sectors of the market chain developed and tested.	July 2014	Discussions with traders are underway concerning labelling and tracking of project animals through market chain.
		'Consumer-focussed' beef produced by smallholder farmers in SE Cambodia	July 2015	Not yet due
		'Consumer-focussed' beef receiving a premium price in urban markets of Cambodia	Dec 2015	Not yet due
2.4	Develop, with the assistance of other stakeholders, appropriate farmer, trader and livestock officer training packages and implement training programs in case-study locations.	Media, training and extension materials developed	Dec 2015	Training developed for farmers, village animal health workers and traders – see training section.
		Qualified government and university staff capable of providing training	Dec 2015	First train the trainer course developed and delivered. See training section for details.
		Training programs for farmers, village animal health workers, traders, retailers, project staff and university students developed. Stakeholders trained.	Dec 2015	First training courses completed in all project villages – see training section for details. Development of program planned for next training.
2.5	Monitor and evaluate market chain interventions	Tested interventions and lessons learned completed	Dec 2015	Farmer data recording sheets developed and selected farmers trained in data recording at first training session. These will be monitored and new farmers recruited.

PC = partner country, A = Australia

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## 3 Impacts

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### 3.1 Scientific impacts

Project staff from RUA and DAHP have developed knowledge of local available feed sources and cattle breeds; they have collected substantial information on the local cattle feeds nutritional values – in terms of gross energy, crude, acid and neutral detergent fibre and crude protein. This work resulted in production of five journal articles.

RUA-UNE post graduate research projects are underway or completed successfully.

The surveys have increased understanding of farmer knowledge base, behaviour, skills, and the effect of socio-economic factors on cattle management and marketing practices. Training schools will allow investigation of the uptake of knowledge and techniques within training villages, giving insight into the effectiveness in this socio-economic environment.

Prompted by concern over regular power supply failures in Phnom Penh and other parts of Cambodia, project PhD student Socheat Sieng is gathering data on cold chain temperatures in government and commercial vaccine stores, Initial findings suggest significant cold chain failures. When completed, the research findings and consequent recommendations will be provided to Cambodia's DAHP (managers of donated FMD vaccine from the regional vaccine bank) and the OIE (managers of the regional vaccine bank). Improved attention to cold chain conditions by the OIE and DAHP are likely to have significant impacts on FMD vaccination effectiveness throughout the region, particularly in the less developed countries which are the targeted recipients of large quantities of donated FMD vaccine. Given that vaccination has become a mainstay of the regional program to control FMD (SEACFMD), the impact of improved vaccination effectiveness cannot be over-stated.

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### 3.2 Capacity impacts

Farmer training and train the trainer days completed across project villages (see training below) has resulted in significant knowledge of production, biosecurity and marketing for participants. It has also increased project staff knowledge and experience in development of training resources and delivery of training programs. An important aspect will be the continual improvement of training outcomes by review of previous courses and inputting new outcomes into future training courses. To facilitate this a report was produced on the first training course that will be used to review before the next courses are offered.

DAHP staff and farmers have developed significant experience in planting forages, condition scoring and weight estimation of cattle. The difficulties of flooding and drought have provided valuable experience for the development of best practice in planting forages. One of the interventions decided at the mid-project review was to introduce weighing of cattle at the point of sale. This will add to the skills already gained in condition scoring and weight estimation. These information collection skills will build capacity in cattle movement management and the use of market information systems. These skills can also be used to develop biosecurity warning systems.

RUA staff have developed skills in assessing cattle feed nutritive value. Recently they have developed an in-vitro fermentation evaluation system to enable them further analyse the feed nutritive values, such as gas and methane production, dry matter digestibility, and ammonium concentration etc.

Several project staff at RUA and DAPH have improved their skills in project design and planning, conduct of data collection, data analysis and report writing. Staff includes Tok Sokunthea, Socheat Sieng, Bunna Chea, Lorn Sophal, Khy Youkeng and Kong Reatrey.

Mr Socheat Sieng has completed surveys and collected data on the cold chain management of vaccine. RUA, DAHP and POAHP staff have assisted in this data collection and analysis.

Toch Sokunthea has completed her masters in economic analysis. She now has unique skills in economic analysis that will be utilised in this project and the ACIAR project ASEM/2010/49.

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### 3.3 Community impacts

Communities have begun growing forage for cattle raising and via training schools have increased knowledge of cattle production, biosecurity and marketing of cattle. These are the first changes towards growing cattle for consumers rather than for traditional reasons. The project structure has resulted in many more farmers from villages being interested in growing forage and provides the opportunity for them to talk and share knowledge and information.

In order to encourage community support for project activities and to avoid resentment towards project farmers within their villages, the project will provide education and certain biosecurity interventions for all livestock farmers in the study villages. Regular FMD vaccination of all cattle and buffalo in the study villages for one (and possibly two) years of the project is expected to generate an adequate level of herd immunity to protect those communities from the worst effects of the FMD epidemics that periodically sweep through Cambodia.

The benefit to the study villages of this project's vaccination initiative is likely to extend beyond temporary protection against FMD during 2014-2016. Because past FMD vaccination initiatives in some villages have been ad hoc, poorly-planned and too limited in scale to create herd immunity, they have not been effective in stopping FMD spread within villages or even protecting vaccinated animals. Presuming that our study villages are challenged by an FMD outbreak during the life of the project, demonstrable protection of the village livestock (and the investment made by our study farmers) is likely to restore farmer confidence in the effectiveness of FMD vaccination, prompting adoption of vaccination as a trusted, cost-effective biosecurity measure.

#### 3.3.1 Economic impacts

The project has provided direct economic benefit to project partners in free seed for forage, assistance with building cattle houses and training provided. There have been sales of a small number of forage fed cattle from the project during the year- 28 in Pursat and 17 in Kampong Cham. Although the analysis of project economics will depend on the sale of larger numbers, forage already provides benefits in terms of cattle condition at the end of the dry season. One of the primary benefits identified by farmers was in time saving because they didn't have to spend time tending cattle or travel distances collecting forage. The economics of time saved and the reduction in disease risk will be analysed in future.

Results from Toch Sokunthea's Master project analysing the economics of forage production showed that forage production had good returns if forage was sold and that cattle breeding using forage gave much greater returns compared to traditional cattle rearing practices using rice straw.

#### 3.3.2 Social impacts

Project villages now have groups of farmers working with DAHP staff that are undertaking forage growing and will soon be involved in a group marketing exercise. After the lessons of the first year there will be transplanting of forage from existing farmers to new farmers

joining this group. The next step for marketing of a product will involve farmers and traders with in villages begin to be involved with the production of a regular supply of product for the market. This will require greater and more varied coordination and group interaction, and the establishment of a market chain working group.

### 3.3.3 Environmental impacts

There are no environmental impacts from the project in year 2.

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## 3.4 Communication and dissemination activities

Booklets on biosecurity and production were produced and distributed during training activities and through normal DAHP extension networks. Presentation of results at mid-project review meetings. Publication of reports and occasional papers on the project website: Cattle market chain, Consumer preferences for beef in PP and HCMC, Demand and beef imports in HCMC. Papers drafted and one submitted to a scientific journal. See publication section for details.

DAHP staff Lorn Sophal and Kong Reatreay and project provincial team members visited project villages monthly to give advice and assistance to facilitate the establishment, monitoring and irrigation of forages, building feed troughs and cattle houses/pens, use of cassava to make concentrate, etc. During one visit to each province Darryl Savage also visited and assisted to identify “key farmers”; individuals who are influential and active in cattle raising and trading within each village. These farmers will be the focus of training activities, cross village visits and engagement of other stakeholders.

Sok Muniroth visited project villages and met with traders, wholesalers and supermarkets in Phnom Penh to explain and discuss project aim of marketing of branded project beef and the potential involvement of traders. There were 5 visits in total.

Ian Patrick, Darryl Savage visited Soma Farm, a large cattle enterprise that provides a small quantity of a premium beef product to a Phnom Penh supermarket. Possible involvement in the project was discussed.

RUA organised and hosted a Policy Roundtable meeting in February. This included stakeholders from the complete market chain. Project results were briefly discussed in the new policy framework of Rectangular strategy, which includes livestock as a key resource and area for development.

#### *Reports and publications:*

Hoang N., Muniroth S., Patrick I. and G. Smith 2013. Consumer survey summary results Phnom Penh and Ho Chi Minh City. *Working Paper No. 1*, ACIAR Project No. AH/2010/046

Miriam East, Ian Patrick, Socheat Sieng, Theng Kouch, Sok Muniroth 2013. Household Survey Summary Results Kampong Cham and Pursat, *Working Paper No.2*, ACIAR Project No. AH/2010/046.

Hoang N. 2014. Ho Chi Minh City beef market demand and supply report. *Working Paper No.3*, ACIAR Project No. AH/2010/046

Sok Muniroth, Geoff Smith, Ian Patrick. 2014 The Changing Cattle Trade in Cambodia 2008-2013. *Working Paper No.4*, ACIAR Project No. AH/2010/046.

Sok Muniroth, Ly Buntheoun, Ian Patrick, Geoff Smith, Bob Martin 2014. The Cattle Market Chains in North-West & South-East Cambodia. *Working Paper No.5*, ACIAR Project No. AH/2010/046.

Patrick I., Muniroth S. and G Smith (2014), The changing beef industry in South-East Cambodia. Paper presented at A Policy Dialogue on Rice Futures: Rice-based Farming Systems in the Mekong Region Workshop, Cambodiana Hotel, Phnom Penh May 7-9

Marshall G. (2014), A diagnostic framework for food systems research: Alleviating food insecurity and rural poverty within environmental limits. Submitted to *Food Policy*

Five journal articles drafted from RUA forage and nutritional work.

*Nutritive value of Mulato II hybrid (Brachiaria spp) for cattle: effect of cutting interval on chemical composition and in situ rumen degradability.*

*Evaluation of tropical forages for cattle production in Cambodia. 1. chemical composition and in situ degradability of native grass, para grass and rice straw made from rice harvested at booting stage.*

*Evaluation of tropical forages for cattle production in Cambodia: 2. value of Leucaena, Stylo 184 and Gliricidia determined by in situ degradation.*

*Effect on intake, digestibility and rumen microbial outflow when cattle are given a basal diet of rice straw supplemented with fresh grass (Brachiaria II hybrid, Mulato II).*

*Effects of selected crop residues and forages on in vitro ruminal fermentation and production of ammonia.*

Two Seminars were given by Prof John Nolan and Dr Lily Li at RUA entitled *Principles of ruminant nutrition* (Li Li) and *Emerging animal nutrition research* (John Nolan).

Video produced about project activities by the Crawford Foundation published on Youtube:

<https://www.youtube.com/watch?v=s75bzq5UWEE>

## 4 Training activities

Farmer training schools were conducted across the project villages. Training materials was developed during the year around three modules: Production, biosecurity/animal health and economics/marketing. The day included observation of a functioning forage area, cattle house and feeding trough. Training materials were prepared and presented for each of the modules by Socheat Sieng, Lorn Sophal, Sok Muniroth and Kong Reatrey. The presentation materials were made on posters printed on vinyl. These should be durable and useful for many more training days. Further training activities are planned for later this year.

9 DAHP staff attended the train the trainer program. This was a half day course conducted at DAHP provincial office. The main training was attended by 171 farmers in 6 villages across the two project provinces as well as village animal health workers, chiefs, commune councillors and district vets (Table below). Attendance included women, men, village animal health workers and village chiefs. Darryl Savage and Geoff Smith attended the first two days of training as observers.

Table. Training participant details by village.

<b>Province</b>	<b>Village</b>	<b>Farmer</b>	<b>VAHW</b>	<b>Vil. chief</b>	<b>Council</b>	<b>Dist. vet</b>	<b>Total</b>
<b>Kampong Cham</b>	<i>Koh Svay</i>	24 (10 F)	6 (2 F)	1	0	1	32 (12 F)
	<i>Dei Kraham</i>	26 (6 F)	1	1	0	1	29 (6 F)
	<i>Teuk Nem</i>	26 (12 F)	6 (1 F)	1	0	1	34 (13 F)
<b>Pursat</b>	<i>Roleap</i>	23 (8 F)	10 (1 F)	0	2	1	36 (9 F)
	<i>Toul Krous</i>	22 (12 F)	2	2 (1 F)	0	1	27 (13 F)
	<i>Kralanh</i>	6 (1 F)	9	2 (1 F)	2 (1 F)	1	20 (3 F)
<b>Total</b>		<b>120 (49 F)</b>	<b>33 (4 F)</b>	<b>7 (2 F)</b>	<b>4 (1 F)</b>	<b>6</b>	<b>171 (56 F)</b>

The training was a full day course and participants were given training booklets and material and hats and t-shirts with project logos. Some participants weren't able to attend for the full day due to other commitments. The next training could aim for half day modules. The training was summarised in a report that will provide the basis for improvement in the next phase.

The training also resulted in recruitment of farmers who were interested in growing forage next season. Some were farmers whose forage was flooded during the previous season. In total there were 58 new farmers with 302 cattle planning to grow 6.7ha of forage. Ongoing training of farmers also took place during monthly routine monitoring of forage plots and assistance with shed construction.

More enumerators were trained for the biosecurity surveys undertaken by Socheat Sieng. Of 12 Enumerators, 5 were from RUA and 7 were independent (4 female).

Project staff were trained in the biosecurity measures that they must apply when visiting farmers. Application of these measures will demonstrate good practice and protect farmers from unintended disease introduction by project staff, who commonly move from farm to farm.

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## 5 Intellectual property

NA

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## **6 Variations to future activities**

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## **7 Variations to personnel**

Dr Geoff Smith travelled to Phnom Penh in November 2013 and has since taken on the role of project leader and will assume most of Ian Patrick's responsibilities. Ian Patrick will continue to provide guidance and oversight of the project.

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## **8 Problems and opportunities**

Flood and drought: unusually heavy rain during the first wet season caused mortality of a significant amount of forage. Then several farmers ran out of forage due to an unusually long dry season. These farmers will be invited to re-enroll.

The opportunity presented is through successful uptake of forage feeding and training attendance and many more farmers interested in growing forage. This situation presents the opportunity to proceed with the development and trialling of a branded premium beef product.

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## 9 Budget

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## Appendix – Project interventions proposals.

The project structure allowed for the development of interventions based on findings within the project in the first two years. A list of proposed interventions and the main points raised in discussion at the mid-project review that resulted in acceptance or rejection are listed below. Several proposed activities were rejected, including the use of microfinance for feed gap solutions and the use of mobile phone systems for dissemination of market information and disease outbreak information.

*1. Recruit increased number of farmers.* It was suggested to recruit more farmers into the project. These could be: 1. re-engaging farmers who dropped out (due to failed forage), 2. farmers in new villages, 3. new provinces. Unit costings need to be developed for the cost of recruiting a farmer in existing and new villages. Re-engaging farmers was agreed to be a good idea. Recruiting new villages may not be possible at this stage due to time constraints on staff, however may be best attempted in the last year as part of a scaling-up of proven project results.

*2. Liveweight of cattle.* It was generally agreed this would be a significant advance in the marketing of cattle. All project cattle will be weighed and an extra scale purchased and training undertaken to try and increase the sale of cattle by liveweight. This would also facilitate the collection and distribution of market information (see mobile phone suggestion below).

*3. Biosecurity.*

- Cold chain management, survey work and vaccine storage were agreed to be necessary and had already commenced as part of Socheat Sieng's PhD. It was suggested that assessing the effectiveness of vaccine due to half doses being administered was a regulatory issue and it could be assumed that it would be ineffective and that it doesn't need confirmation experimentally (this would replicate work done by vaccine developers).

- The effectiveness of different forms of training and communication was discussed. E.g. given low levels of literacy it was suggested digital stories or video may be a good supplement to written material. An example of a video on youtube using a Smartphone was demonstrated. These technologies would be just as appropriate for production extension. Costing on video production was needed.

- Whole village vaccination/deworming vs just project cattle. At the meeting conclusion it remained unclear whether the project should proceed with vaccination of project cattle, whole villages or just concentrate on issues surrounding the administration of vaccine. This is because if decisions are taken to vaccinate it would need to be every 6 months and may be ineffective if insufficient proportions of populations are vaccinated. As whole village vaccination would be quite expensive, a decision needs to be made in relation to available funding and other priority interventions.

- Renovation of wells was put forward although not a biosecurity issue. Several farms have functioning wells and ponds. Details of which farms weren't given. Farms were initially selected to have ponds and wells? The costing of well renovation was very low and needs revising – probably on a case by case basis. This may be a case where farmers could borrow money as there is a clear benefit and little risk, however the cost benefit wasn't presented. If water was available would they choose to grow forage or other crops? A desktop analysis is needed on the economics of growing forage – this will come later.

*4. Microfinance for feed-gap and cattle purchase proposal.* The consensus was this is a difficult area for the project to ask farmers to take risk on unproven technologies/proposals made by the project. It was also clear that expertise in microfinance doesn't exist within the project. An example was quoted of World Bank subsidised finance in Vietnam– it is not available in Cambodia - why? Also interest rates are currently prohibitively high at 36% annum. There are also problems with financial management and literacy, e.g. some

farmers go to several banks and borrow too much. Other points raised included the need for yearly interest not monthly to avoid cash flow issues as raising cattle needs a longer time frame. Farmers can't service a monthly interest bill.

Conversely, it was suggested that farmers need to have some stake in proposals to maximize ownership and uptake. Several microcredit groups exist for other purposes and some farmers have used finance – e.g. for the bio-digester project. It was suggested these existing examples be investigated further and could be introduced later in the project for activities that have been identified as needed and demonstrated to be effective such as pond and well building and repair for irrigation.

There are many technical solutions to the feed-gap available (e.g. irrigation of forage, silage production methods developed in NW project, use of feed supplements for low quality residues such as rice straw, cassava chip, leguminous tree crops). However, these also present technical barriers as well as financial – the implementation for many of these was discussed however how the project could facilitate this was inconclusive. It was proposed that the provincial staff be charged with overseeing measures aiming to provide a regular supply of project cattle for sale as premium branded beef product at traditional market and supermarket.

5. *Mobile phones* for distributing market data (or disease outbreak) information was a difficult area as there are issues with availability and reliability of market data. It was tried in a previous project although the aim was much more ambitious – predicting cattle movement. Although DAHP collect market data (Chetra stated that this has been happening for some time on standard format ) it may not be comparable – e.g. cattle are sold by visual assessment rather than live weight and many different factors effect animal price (breed, sex, age, condition) . There are also technical challenges and the capacity of farmers to use SMS may be limiting. However this is a rapidly evolving technology and it was suggested it should be reviewed later. It could be as simple as price information from project sales distributed via recorded message.

6. *Premium Product clean market chain* – perception of what is good about project cattle that would appeal to consumers. Discussion of what characteristics could be used to sell project beef centred on the problem that there is no audit of trained project farmers so quality cannot be guaranteed. Characteristics settled on were 1. forage fed, 2. farmers trained in animal health management and production, 3. from Pursat and Kampong Cham.

There is considerable detail needed to plan and cost this intervention. Steps to follow: Animals need to be weighed on farm after sale and before transport, price and destination information passed to project staff, animals identified with ear or neck tags, marketing material designed and produced, number of project cattle estimated, incentives for farmers to partake in product developed (e.g. transport subsidies), formation of market chain working group, launch of product into supermarket and wet market.

7. *Market Study - Price monitoring HCM city*. Continued monitoring of price and cattle imports into HCM from Australia was proposed at minimal cost. It is important to investigate the impacts of the ongoing supply change on market beef price in HCMC/Phnom Penh region. This would be useful given the current market volatility and the possible effect on the project activities, such as the introduction of a premium branded product. Currently all NW project cattle go to Vietnam with very specific requirements (6-8 month Haryana castrated males). However, the utility of some aspects of the proposal were questioned – e.g. studying facilities in Vietnam processing Australian cattle. Determining the destination of Cambodian cattle would be useful, although perhaps more difficult.

8. *Seed bank for forage*. Setup of a seed bank for forage was suggested to overcome seed supply issues. This would require considerable work in the research and development of seed production, storage and distribution. It perhaps represents a business opportunity for a University. It was thought to be beyond the scope of the project and would yield no benefits during the life of the project.