



In the framework of ACTAE Regional Project CANSEA component

TAG Project

"Trade-off and synergies of integrating intensive Livestock production with AGroecology in Mountainous regions"

> CIRAD, NIAS and EFICAS Project VIETNAM-LAOS 2017-2018







INTERMEDIARE REPORT Period: September to December 2017

Melanie Blanchard Date: December 15, 2017

1. Short description of the project

1.1. Project name:

TAG Project, "Trade-off and synergies of integrating intensive Livestock production with AGroecology in Mountainous regions"

1.2. Partnership involved

The project is based on four research institutions of teams involved in projects on the development of intensive livestock production and/ or projects of agroecology options in mountain areas in northwest of Vietnam and the northeast of Laos: **CIRAD** (UMR Selmet, UR Aida), the National Institute of Animal Science (**NIAS**). With collaboration with the *University of Tasmania* and *University of Queensland* through the Beef Cattle 2 project (ACIAR, LPS/2015/037) and Maize project (ACIAR, SMCN/2014/049).

1.3. Project date and reporting period

Onset: September 01, 2017 End: December 31, 2018

Reporting period: September 01 to December 10, 2017

1.4. Countries and area target:

Vietnam: Chiềng Chung commune (Mai Sơn District, Sơn La Province) and Thanh Yên

commune (Điện Biên District, Điện Biên Province)

Laos: Luang Prabang Province.

2. Reminder of the essence of the project

2.1. Context of project TAG -ACTEA

Conservation agriculture (CA) and agroecology are being advocated to enhance soil health and sustain long term crop productivity with no tillage practice and the maintenance of soil cover, retaining a proportion of crop residues on the field (Valbuena *et al.*, 2012). Traditionally, CA and livestock production systems are considered in competition for the use of crop residues (Mueller *et al.*, 2003). In crop-livestock integrated system, biomass residues are grazed or uses as fodder making it difficult to maintain mulch on soils. In the conceptual model of conservation agriculture, livestock is seen as a negative factor (Jaleta *et al.*, 2013) but in farming system, livestock production is a necessary multifunctional activity. Today, there is a strong need that science reflects on creating synergy between CA and livestock production in order to promote larger CA diffusion (Andriarimalala *et al.*, 2013; Sanderson *et al.*, 2013).

In North West of Vietnam and North of Laos, the mountainous regions are dominated by small-scale crop-livestock integrated system with highly diversified agro-ecological complexe (Castella *et al.*, 2013). Those regions have known a significant population growth accompanied by deforestation and extension of monoculture mostly on the hill slopes generating soil erosion and nutrient losses. Agroecology options and CA were tested for many years in these regions on the reference sites and on-farm with many technical options. Grasses and legumes have been identified as cover crops for CA and potential source of quality forage for beef-cattle breeding (Husson *et al.*, 2001).

The implementation of agro-syvlo-pastoral system at territorial scale has also been the subject of a lot of research (Martin *et al.*, 2002) but with little consideration for pasture and forage. Animal mobility is part of a functional agro-syvlo-pastoral system in northern Vietnam (Eguienta *et al.*, 2004). Upland pastures, natural forest and forage fields are used to feed animals. CA, integrated inside an agro-sylvo-pastoral system, can provide a quantitative and qualitative improvement of the agricultural system in Vietnamese and Laos mountain area at the condition to be able to integrate livestock production in the landscape. The integration of

these complex and intensive production system could allow development of mixed farming systems with high environmental value and highly productive meeting the challenges of these regions (production, income and sustainability).

How to bring farmers and village communities to adopt the agroecology options and CA while combining beef cattle breeding characteristic of the mountains of North Vietnam?

We propose to build on ongoing researches on the agroecology and the intensification of livestock (Beef cattle 2 project, Maize project and Eficas project) an analysis of the conditions for insertion of these two complex and intensive systems with a process of Research Action in Partnership (RAP, Vall and Chia, 2014). This approach enables the design with field workers (crop-livestock farms and agricultural extension officers) of technical and organizational changes for a reasoned integration of agroecology options and intensive livestock production across the diversity of farms mixed farming and territories. We propose to generate knowledges on innovations favorable to the integration of intensive livestock production and agroecology in smallholder mixed farms. These knowledges could be used to promote integrated systems.

2.2. Objectives

Analyze with smallholders mixed farms and agricultural extension officers, the conditions for insertion of intensive livestock production in complex agro-ecological systems based on CA: trade off and synergies in terms of flows of biomass, use of space and resources, mobilizing simulation tools for the use of resources and space.

2.3. Activities description

The TAG project proposed approach focuses on four successive activities.

1. Synthesis on production and use of forage, conservation agriculture and agroecology in Northern Vietnam and Laos

<u>Originally planned activities</u>: A synthesis will be done on techniques tested, practiced, developed or vulgarised in North-West Vietnam and North-East Laos on production and use of forages, the conservation agriculture options, and agro ecology. The report also will take an interest in role of institutions in promoting agroecology in the both country.

This activity will be conducted by the NIAS team by using bibliography, interview with resource persons on forage production techniques and conservation agriculture, interview with institutional resource persons on the activities on agroecology.

This work will provide technical knowledge on production and utilization of forage, conservation agriculture and agro-ecology that will not necessarily be implemented by the farmers of the study sites but serve options potential that could be discussed with farmers in thinking about the synergy and trade-off between intensive beef cattle production and agroecology development.

Originally planned period: September-November 2017.

Originally planned deliverable: A synthesis in December 2017.

2. Diagnosis of the production and use of resources and spaces in farms and landscape in a village in Diên Biên and in Son La

<u>Originally planned activities</u>: The work will continue with two diagnostics on the management of biomasses in farms and territories on selected villages in Vietnam in the province of Diên Biên and Son La. These diagnostics will analyze on a diversity of farms, the practices of production and use of forage, intercropping, crop residues, and manure. They will analyze the dynamics on farms with the ongoing development of beef cattle or emerging agriculture, the mobility of animals in landscape and the dynamics of use of resources and spaces (crop area, forest, crop residues).

The work will be done by two students (master), through individual interviews with a diversity of mixed farming systems and agricultural extension officers involved in the development of

intensive beef cattle, and analysis of map data of the villages (using individual and collective representations and maps).

This work will also benefit from the field presence and exchange between research teams from the NIAS, the University of Tasmania, the University of Queensland and CIRAD (UMR Selmet and UR Aïda) to complete the understanding of crop-livestock systems and ongoing dynamics in production systems and landscape. With ACIAR Maize project, ACIAR Beef Cattle, Eficas and TAG project, research teams will complete the map data on project sites and data on biomass flows between livestock and agriculture on farms and villages. These studies will form the basis for the adaptation of simulation tools with specificities sites.

A kick-off meeting will be done in each pilot site to inform local authorities about the activities and progress of the project.

<u>Originally planned period</u>: a kick-off meeting in October-November 2017 and a diagnosis to November 2017 to April 2018.

<u>Originally planned deliverable</u>: a kick-off meeting report (December 2017) and two internship reports (master 2) on the diagnosis of the production and use of biomass in farms and territories (May 2018).

3. Multi-scale modelling for assessing trade-offs and synergies of integrating intensive livestock production and agro ecology options

<u>Originally planned activities</u>: The work will build on the mobilization of existing simulation tools of crop livestock integration in mixed farms systems and territories (Andrieu *et al.*, 2015; Castella *et al.*, 2005). These tools should be adapted to the specificities of the study sites (diversity of farms, specificities of livestock systems and landscape) and the issues of production and management of biomass (crop residues, animal feed, intercalary crops, manure, etc.).

The tools should allow analyzing the trade-off and synergies on the use of biomass between the development of intensive livestock production and the agroecology options in a diversity of farms and in village scale. This activity will build on the results of diagnostics (production of biomass, use, diversity of spaces etc.), on the synthesis on production and use of forage, conservation agriculture and agroecology and on additional data collected by the research teams on different terrains.

Originally planned period: February to October 2018.

<u>Originally planned deliverable</u>: a simulation tool of livestock agriculture interactions on farms and territories and a report on the synergies and trade off of use of biomass produced between intensive livestock development and agroecology options (November 2018).

4. Validation workshop of diagnostic results, co-design of technical and organizational solutions

<u>Originally planned activities</u>: The last step will be to organize, in two villages in northern Vietnam a workshop with farmers and agricultural extension officers to validate the diagnostic results, the analysis of trade off and synergies between intensive livestock production and the agroecology options. During the workshop, the participants will be invited to reflect on implementation scenarios for the most relevant options, preliminary step that could be used later in co-design of technical and organizational solutions to the benefit of strengthening the complementarities between intensive beef cattle production and conservation agriculture. The farmers and agricultural extension officers will have to assess the effects of the most relevant options on their production systems, local area and relations with other actors (Subedi *et al.*, 2009).

Originally planned period: October and November 2018.

<u>Originally planned deliverable</u>: a report of the final workshop on the validation of diagnostic results on production and use of biomasses and implementation scenarios (December 2018).

The schedule and the expected deliverables are described in the Table 1 for each planned activities.

3. Implementation of the activities of the project

The implementation of activities under the TAG ACTAE project is described in Table 1 for each of the expected activities. For each planned activity, we present the activities carried out during the period and the list of products. When necessary, we explain the changes made in relation to the forecasts of the project document. Finally, we present the continuation of the work expected for each activities with a new updated schedule of execution. This first period is concerned by the three first activities.

Table 1. Report of the actions carried out, and products provided for each of the planned activities

Activities	1. Synthesis on production and use of forage, conservation agriculture and agroecology	2. Diagnosis of the production and use of resources and spaces in farms	3. Trade-offs and synergies of integrating intensive livestock production and agro ecology options	4. Validation workshop of diagnostic results, co-design of technical and organizational solutions
Period expected	September- November 2017	October 2017 to April 2018	February to October 2018	October to November 2018
Expectd deliverable	- A literature revu repport "Synthesis on production and use of forage, conservation agriculture and agroecology (December 2017)	A kick-off meeting report (December 2017) Two Master reports on the diagnosis of the production and use of biomass (May 2018)	 A simulation tool A report on the synergies and trade off between intensive livestock development and agroecology options (November 2018) 	A report of the final workshop (December 2018) A project proposal on interactions livestock and agro ecology (December 2018)
Implemented activities	The literature revu in progress: a set of reports and article collected, analyzed and synthesized. the synthesis report in progresse	A kick-off meeting realised The data collection for the diagnosis took place: (mission and 90 interviews of farms) analysis and report writing is in progress.	A master student has been identity (Fébruary to Jully 2018)	

3.1. Activity 1 - Synthesis on production and use of forage, conservation agriculture and agroecology in Northern Vietnam and Laos

Implemented activities: The NIAS team «Economic and Farming Systems» initiated a literature review. A set of reports and article in English and Vietnamese, from different institutions have been collected, analyzed and synthesized. The synthesis report is being written.

The postponement of this activity initially planned for early December will not affect the continuation of the work. The results will be available before the start of the modeling work that will be initiated in February-March 2018.

Implemented period: November to December 2017 **Deliverable realized**: a synthesis report in progress.

Perspective: The first version of the synthesis is expected early January (01/05/2018). The final summary will be validated and finalized by the end of January 2018.

3.2. Activity 2 - Diagnosis of the production and use of resources and spaces in farms and landscape in a village in Diên Biên and in Son La

Implemented activities: Prior to the diagnosis, a <u>kick-off meeting</u> was held with the authorities of the two study areas to present the project, the main activities and collect the expectations and recommendations from the technical services for the realization of the activities. These meetings took place in October 2017 (the 10/18/17 in Diên Biên and the 10/19/17 in Son La). They were the subject of a meeting report gathering the opinions of the authorities concerning the project.

<u>The diagnosis</u> of the production and use of resources and spaces in farms and landscape in a village in Diên Biên and in Son La was carried out through an initial joint mission of researchers and engineers from NIAS and CIRAD and then carrying out intervieuws from a diversity of mixed farms from both study sites.

The mission allowed to supplement with DARD resource persons certain information on the production systems and natural resources of study sites: general characteristics, economic activities, the land and collective management of natural resources, evolution of crop and livestock systems, and the ambitions of livestock development and agriculture in the study sites. A set of data and DARD reports was provided. Subsequently, the team was able to test a survey questionnaire for mixed farms to analyze the production and use of resources and spaces in farms and landscape in a village in Điện Biên and Sơn La. The questionnaire concerned the structure of a diversity of farms, crop-livestock practices, biomasses management (production and use of forage, intercropping, crop residues, and manure), dynamics on farms, animal mobility.

Subsequently, two NIAS engineers carried out <u>surveys of 90 mixed farms</u> in the two study areas (45 in Chiềng Chung commune and 45 in Thanh Yên commune). The surveys were conducted between 20/10/2017 and 02/11/2017.

Survey data is being validated and entered into a database. The data will be analyzed and will be the subject of the production of a report entitled "Diagnosis of the production and use of resources and spaces in a diversity of farms in two communes in Điện Biên and Sơn La Provinces".

Initially the work was to be carried out through the supervision of two master 2 students. The end-of-year period did not allow us to identify good English or French speaking candidates. It was decided to carry out this activity with the help of NIAS engineers (service delivery) and by a fine collaboration of researchers CIRAD and NIAS.

Implemented period: October-December 2017

Deliverable realized: A report of kick off meeting and initial mission meeting was produced. A report of the field mission of two NIAS engineers to conduct the interviews is produced. A database of 90 farms (+/- 700 variables) is in progress to be entered and validation.

Perspective: The database of farms will be delivered in January 2018 (01/05/2018). A first version of the report entitled "*Diagnosis of the production and use of resources and spaces in a diversity of farms in two communes in Điện Biên and Son La Provinces*" will be proposed for the end of January 2018 (01/31/2018). A final version of the report will be delivered in February 2018 (02/15/2018).

3.3. Activity 3 - Multi-scale modelling for assessing trade-offs and synergies of integrating intensive livestock production and agro ecology options

Implemented activities: A master student has been identity to realize this activity. The subject proposed is intituled "Assessing trade-offs of integrating livestock production and agro ecology options in mixed farming systems in the north of Vietnam".

Perspective: this internship will be realized between the 02/15/2018 and the 07/31/2018. The student will be in charge to adapt the available tools of crop livestock integration in mixed farms systems. She will defin some scenarios of livestock development and agro-

ecological options and assess the impact of livestock development and ecological options in a variety of mixed farms. The student will provide a master report for September 2018.

4. Proposal to integrate a complementary preliminary study on cattle mobility

We have submitted a complementary study proposal (CATTRACK-SEA / Pilot Phase, in November 2017).

Cattle mobility plays a key role in socio-ecological processes and ecosystem services by linking different compartments of the system. Livestock circulation contributes to fertility transfers, to the optimal use of biomass and to securing rural livelihoods (Le Thi Thanh Huyen et al., 2016). However, movements of cattle also impact on the health status and productivity of the animals and may negatively impact on natural resources and biodiversity conservation (Chaiyarat & Srikosamatara 2009).

However, until now, very few research have been conducted to characterize and to analyze in details the dynamics and the impacts of cattle mobility in South-East Asia. Specifically, one of the constraints for the implementation of such research has been the lack of easy and cheap monitoring system for individual animal tracking in order to collect appropriate quantitative data (spatial accuracy and temporal frequency).

The technical and methodological stakes are to develop a tool and a method for tracking free grazing animals, in the absence of shepherds and with departure over several days. We propose to initiate the design of a tool and method for the tracking of free grazing animals, in the context of new collaboration of the TAG project team with researchers from CIRAD (UMR ASTRE) and Kasetsart University (Faculty of Engineering and of Veterinary Medicine.

Objectives of the new proposal: To understand the role of cattle movements, the preliminary study seeks to develop adapted technologies (GPS tracking devices) and analytical tools to monitor daily and seasonal movements of cattle in upland rural landscapes in SEA and their test on the fields. The study will focus on the role of cattle mobility in the adaptation of livestock husbandry to intensification and its contribution to rural livelihoods and conservation of natural resources and biodiversity.

The aim of this preliminary study is to prepare the setting up of a project on livestock mobility and the contribution of livestock mobility to rural livelihoods and to the resilience of local socio-ecological systems (fertility transfers, local ecology, disease transmission, resources and land-use trade-offs)

Expected activities: For this preliminary study, we concentrate the efforts on the activities of creation of the prototype of GPS tracking system. We propose 3 sequential activities:

- Design of GPS tracking devices and data management units
- Test of GPS tracking system in various field conditions and with different methodologies
- Prepare the setting up of a full proposal for a more comprehensive project on livestock mobility in SE Asia

Expected deliverables

- The tracking system is designed and validated. It has been experimentally tested on a variety of fields and research topics. A report with critical analysis of strength/weaknesses of GPS prototype development
- 2. A report collating the tests results of prototypes and software in various field conditions and applied on varied questions
- A research proposal is being developed to continue and expand the study of livestock mobility and its impacts on socio-ecosystems through soil fertility, resource and space use, and disease transmission. A project proposal for a regional survey of cattle mobility submitted for funding

5. Products list

- Blanchard M., Đỗ V. Đ., Hàn A. T. 2017. Report of mission "Kick-off meeting with the DARD of Sơn La and Điện Biên Province, and diagnosis of the production and use of resources and spaces in farms", Project TAG, Small Grant ACTAE, from 10/17/17 to 10/20/17. 11p.
- 2. Đỗ V. Đ., Hàn A. T., 2017. Report of mission "Field survey of cattle raising households in two provinces: Sơn La and Điện Biên Province", Project TAG, Small Grant ACTAE, from 10/21/17 to 11/02/17. 3p.
- 3. A database describing the structure, crop-livestock practices, biomasses management (production and use of forage, intercropping, crop residues, and manure), dynamics on farms, animal mobility, for divers farms with cattle production (90 farms, 698 variables, Excel)

6. Budget execution

The budget has been spend at 21% since the beginning of the project. If the proposal for the complementary preliminary study on cattle mobility, proposed in November is accepted, the first tranche will be fully executed at the beginning of the year with the finalization of the diagnostic work, the reviewed literature and the development of tracking devices. The payment of the second tranche of funding is expected in January 2018 to support these activities. The remainder of the budget will be executed during the second quarter mainly through the fieldwork (modeling internship, missions and analysis cattle mobility) and during the beginning of the 3rd quarter with the final meeting. A summary of the proposal, excecuted and estimated budget for the next period is presented in the Table 3. For more details see the Table 3.

Table 2. Summary of the proposal, excecuted and estimated budget

	Proposal		Realised		Estimated			
	Total	Total	Total	Total	1e trim	2e trim	3e trim	
	10 ³ VND	USD	103 VND	Euros	10 ³ VND	10 ³ VND	10 ³ VND	
1. Capitalization of research work livesto								
TOTAL	22 440	961	-	-	20 454	-	-	
2. Kick-off meeting (Dien Bien + Son la)								
TOTAL	112 832	4 832	61 396	2 285,76	-	-	-	
3. Diagnosis Son La & Dien Bien								
TOTAL	133 684	5 725	66 303	2 468,47	68 482	59 498	25 680	
4. Field expenses – Vietnam team								
TOTAL	151 400	6 484	12 199	454,16	13 500	56 051	ı	
5. Field expenses - Laos team								
TOTAL	85 000	3 640	-	ı	1	85 000	•	
Pilot Phase "a preliminary study on cattle mobility" *								
TOTAL	310 770	13 309	-	-	260 542	50 228	-	
6. Meeting final (Dien Bien + Son la)								
TOTAL	144 776	6 200	-	ı	-	-	144 776	
5. Various other expenses								
TOTAL	25 000	1 071	1 893	70,48	22 201	21 200	16 500	
TOTAL without the new proposal	675 132	28 913	141 791	5 278,87	124 637	221 749	186 956	
TOTAL with the new proposal *	985 902	42 222	141 791	5 278,87	385 179	271 977	186 956	
Cumulative total without the new proposal					266 428	488 176	675 132	
cumulative total with the new proposal *					526 970	798 946	985 902	

^{*} With the proposal for the complementary preliminary study on cattle mobility (nov 2017)

Table 3. Details on the proposal, excecuted and estimated budget

	Proposal		Realised		Estimated				
	Total	Total	Total	Total	1e trim	2e trim	3e trim		
	10 ³ VND	USD	10 ³ VND	Euros	10 ³ VND	10 ³ VND	10 ³ VND		
1. Capitalization of research work livestock and agro-ecology on Dien bien and Son la									
Working days, copie, communication	22 440	961			20 454	-	-		
TOTAL	22 440	961		-	20 454		-		
2. Kick-off meeting (Dien Bien + Son Ia)									
Remuneration Authority, farmers, etc.	6 000	257	7 740	288,16					
Perdiem Resaercher and translator	26 400	1 131	4 000	148,92					
Working days Researcher, translator	9 432	404	24 900	927,03					
Tea break, lunch, meeting room rental	17 000	728	5 500	204,77					
Car rental (Son La) and Fuel	21 000	899	9 622	358,23					
Travel - aircraft (Dien Bien)	30 000	1 285	8 543	318,07					
Accommodation 6 pax	9 000	385	1 090	40,58					
TOTAL	112 832	4 832	61 396	2 285,76	-	-	-		
3. Diagnosis Son La & Dien Bien				· ·					
Training grants	93 684	4 012			24 295	48 590	16 197		
Fieldwork expenses	24 000	1 028			-	2 850	1 425		
Travel (Dien Bien & Son La)	16 000	775			-	8 058	8 058		
Remuneration and per-diem		-	66 303	2 468,47	44 187	-	_		
TOTAL	133 684	5 725	66 303	2 468,47	68 482	59 498	25 680		
4. Field expenses – Vietnam team									
Travel (Dien Bien & Son La)	68 000	2 912				25 000			
Perdiem (3 pax)	38 400	1 644				17 551			
Working days Translator	45 000	1 927	12 199	454,16	13 500	13 500			
TOTAL	151 400	6 484	12 199	454,16	13 500	56 051	-		
5. Field expenses - Laos team									
Car rental (Son La) + Fuel	70 000	2 998				70 000			
Accommodation (4 pax)	10 000	428				10 000			
Working days Translator	5 000	214				5 000			
TOTAL	85 000	3 640				85 000			
Pilot Phase "a preliminary study on c	attle mobility"	*							
Development of tracking devices *	260 542	11 158			260 542				
Field missions *	50 228	2 151				50 228			
TOTAL	310 770	13 309	•	-	260 542	50 228	•		
6. Meeting final (Dien Bien + Son la)									
Remuneration authority, farmers	6 000	257					6 000		
Perdiem Researcher and translator	35 200	1 507					35 200		
Working days Researcher, translator	12 576	539					12 576		
Tea break, lunch, meeting room rental	21 000	899					21 000		
Travel (Dien Bien & Son La)	58 000	2 484					58 000		
Accommodation 6 pax	12 000	514					12 000		
TOTAL	144 776	6 200	-	-			144 776		
5. Various other expenses									
Media and Press	16 000	685	-	-					
Photocopies, doc and telephon	5 000	214	1 493	55,59	1 701	1 700	1 000		
Others	4 000	171	-	-	4 000	4 000			
Part du salaire de traductrice	30 000	1 285	-	-	13 500	13 500	13 500		
Frais de gestion bureau	14 200	608	400	14,89	3 000	2 000	2 000		
TOTAL	25 000	1 071	1 893	70,48	22 201	21 200	16 500		
TOTAL without the new proposal	675 132	28 913	141 791	5 278,87	124 637	221 749	186 956		
TOTAL with the new proposal *	985 902	42 222	141 791	5 278,87	385 179	271 977	186 956		
Cumulative total without the new proposal					266 428 526 970	488 176	675 132		
cumulative total with the new proposal *						798 946	985 902		