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Beyond worm control in small ruminants: a cross-country assessment of impacts of ILRI-IFAD TAG 443 in Vietnam, Indonesia and the Philippines

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Summary

Livestock is an important element in the pathway out of poverty for millions of rural people in Asia and the Pacific. However, helminth parasites, particularly roundworms, have been a problem in the region, causing millions of dollars in productivity losses.
Over the years, many technologies have been developed for worm control in large and small ruminants, but their uptake has been low (McLeod, 2000). Hence, various international agencies have begun to introduce a user perspective into adaptive research. This was propelled by the observation that if "agricultural research is to achieve impact that benefits the poor people, then it is vital that farmers participate directly in technology development" (CGIAR-PRGA). The active participation of stakeholders helps in coming up with technologies that are not only "well-developed" but are also adopted in a sustained manner.
The ILRI-IFAD TAG 443 project capitalized on this paradigm and offered to the farmers the opportunity to be local scientists on integrated goat worm control (IGWC). This paper discusses the processes used to develop, test, redesign, and diffuse technologies on IGWC in community settings, the impacts derived and how such practices were sustained in three TAG 443 participating countries—Vietnam, Indonesia and the Philippines. Although the process taken by each was different, the lessons point to one thing: it is indeed crucial that the small ruminant raisers be involved at all phases of the project. Not only did it accelerate the adaptation and advancement of new farming practices but it likewise improved the livelihoods of participating small livestock keepers.

Keywords: small ruminants, participatory research, ILRI, IFAD

Introduction

Livestock is an important element in the pathway out of poverty for millions of rural people in Asia and the Pacific. However, helminth parasites, particularly round worms, has for years been a problem in the region, causing millions upon millions of dollars in productivity losses.
Researches show that if these losses could only be reduced by at least 15%, much economic benefits could be gained. Over the years, many technologies have been developed for worm control in large and small ruminants (SR), but adoption was observed to be low (McLeod, 2000). Hence, various international agencies have begun to introduce a user perspective into adaptive rsearch. This was propelled by the observation that if "agricultural research is to achieve impact that benefits the poor people, then it is vital that farmers participate directly in technology development" (CGIAR-PRGA). Several approaches to technology development have been tried; they differ though in the extent to which they involve the end-users in decision-making about the innovation.
Technology development is said to be a complex, multi-stranded, and multi-directional process, involving many actors other than scientists in the formal research system (Cramb, 2000). The evolution of a particular technology depends not only on its scientific merits but also on the actions of many stakeholders who combine their resources to push for a particular path of technical change (Biggs and Smith, 1998 in Gabunada, et.al, 2003). There is thus a need for active participation of stakeholders to come up with technologies that are not only "well-developed" but are also adopted in a sustained manner (Gabunada, et. al, 2003).
The challenge therefore was to develop approaches that could effectively sustain farmer interest in adopting sustainable parasite control technologies, while working with a wide range of partners like farmers, scientists, extension workers and government officials can help control internal parasites as constraint to SR production.

It was against this backdrop that the Technical Assistance Grant 443 (TAG 443) of the International Livestock Research Institute (ILRI) and the International Fund for Agricultural Development (IFAD) was conceived. In 2000, ILRI implemented the Participatory Diagnosis Sub-project in three countries---the Philippines, Vietnam and Indonesia; two years later, Cambodia and Lao were added. Although ILRI explicitly identified the goal of curbing productivity losses from SR mortalities, it nevertheless allowed each country to design its approach to technology delivery based on cultural norms and biases.

After three years of project implementation, it was agreed to characterize these approaches, identify their similarities and differences, and estimate their impacts on stakeholders. In a way, this was an evaluation of the project; but more importantly, it was an opportunity for the project teams to review their own progress and for ideas and experiences to be shared among the three countries. Previously this had happened mainly at annual meetings of the National Liaison Officers, meetings which did not involve other members of the national teams. This was an opportunity, therefore, for review, evaluation and communication. This paper therefore highlights the cases of the Philippines, Vietnam and Indonesia and tries to answer the question, '*What impacts can be attributed to the approaches employed?*'

As this paper looked into the processes of how participation in TAG 443 affected sustainability of adoption and the impacts in each country, lessons are therefore useful as a guide not only to community-based livestock project managers, but also to planners, funding agencies and country sponsors, who are packaging development projects. This paper not only relates the strategies with the effects but it showed how people reacted when given the chance to plan, decide and evaluate what they really wanted. Hence, it is hoped that this will serve as a political lightning rod to project managers so used to the traditional approach that they are out of contact with the reality of rural people.

Methodology

Each terminal country evaluation was coordinated through the national collaborating agencies: PCARRD for the Philippines, GRRC for Vietnam and ICARD for Indonesia. As each country evaluation was meant as a multi-stakeholder assessment, it was attended by the primary (i.e., farmers) and the secondary stakeholders (i.e. the local government unit representatives), the Project Team, ILRI representatives, and the Overseas Evaluation Team (OET), composed of the country coordinators from Vietnam, Indonesia and the Philippines.

Each country evaluation consisted of field validation, a multi-stakeholder workshop and a special wrap-up session of the OET with each country team. Country visits were preceded by a review of project reports and data. Field validation involved visits to the cooperators' farms, ocular audit of practices, and interviews. In the workshops, participants were asked to recall processes and impacts, and visually present them using mapping tools, including:

1. Process diagrams to graphically plot in a loop the activities carried at each site; discuss who were involved; and what results were obtained.
2. Participation matrices using matchsticks as counters, to describe the extent of involvement by each set of stakeholders in the activities identified in the process diagram.
3. Impact matrices using cards to estimate the effects of the project on the lives of stakeholders and their communities.

In the Philippines, additional techniques were used to further analyze the project impacts:

4. Workable approach imaging using card and chart method to produce mental images of community-based approaches to deliver technologies.
5. Workable basket of technology identification using brown paper and pens, to tabulate the technology options followed, and agree which worked and which did not. This was followed by story telling of why they did or did not work.
6. Success rating using a graphical image of a ladder of success in which participants rated the accomplishments of the project in their site and justified their rating.

In all these sessions, the evaluation team served as facilitators. At the end of the evaluation workshop in each country, there was a special wrap-up session with the country team during which the daily outputs and analysis of the evaluation team were presented and critiqued.

Evaluation Teams

Philippines. A three-day evaluation workshop was conducted in Cebu, Philippines on September 9-11, 2003. This was attended by 29 farmer representatives from Pangasinan and Cebu provinces, local government representatives, the Project Team as well as Drs. Douglas Gray and Somkiat Saithanoo representing ILRI. Vietnam, Lao, Indonesia and Cambodia were no longer invited to this workshop, as they were part of the international group that visited the project sites a few months back.

Vietnam. A two-day evaluation workshop was conducted for all the Vietnamese stakeholders on 20-21 April 2004 at the Goat and Rabbit Research Centre (GRRC). This was attended by farmer representatives, extension officers, technicians and researchers from Hatay, Hoabinh, Ninhbinh, Thainguyen provinces and GRRC. The OET, Somkiat Saithanoo (ILRI), Anna Marie Alo and Dwi Yulistiani, were present along with external observers, Dr. Le Viet Ly (National Institute of Animal Husbandry, Vietnam) and Dr. Le Tat Kien (National Extension Department of Ministry of Agriculture and Rural Development, Vietnam).

Indonesia. The evaluation in Indonesia started with the conduct of a two-day evaluation workshop for all the stakeholders on 26-27 April 2004 at the Indonesian Council for Agricultural Research and Development (ICARD), Bogor. It was attended by 19 farmer representatives, local government extensionists and technicians, researchers from ICARD, the Assessment Institute for Agriculture Technology (BPTP) and an observer from CASREN project-Indonesia. The overseas participants were S. Saithanoo (ILRI), AMAlo (Philippines) and Dinh Van Binh (Vietnam), with external resource person, Maimunah (consultant) a practitioner of participatory research for forage technology development.

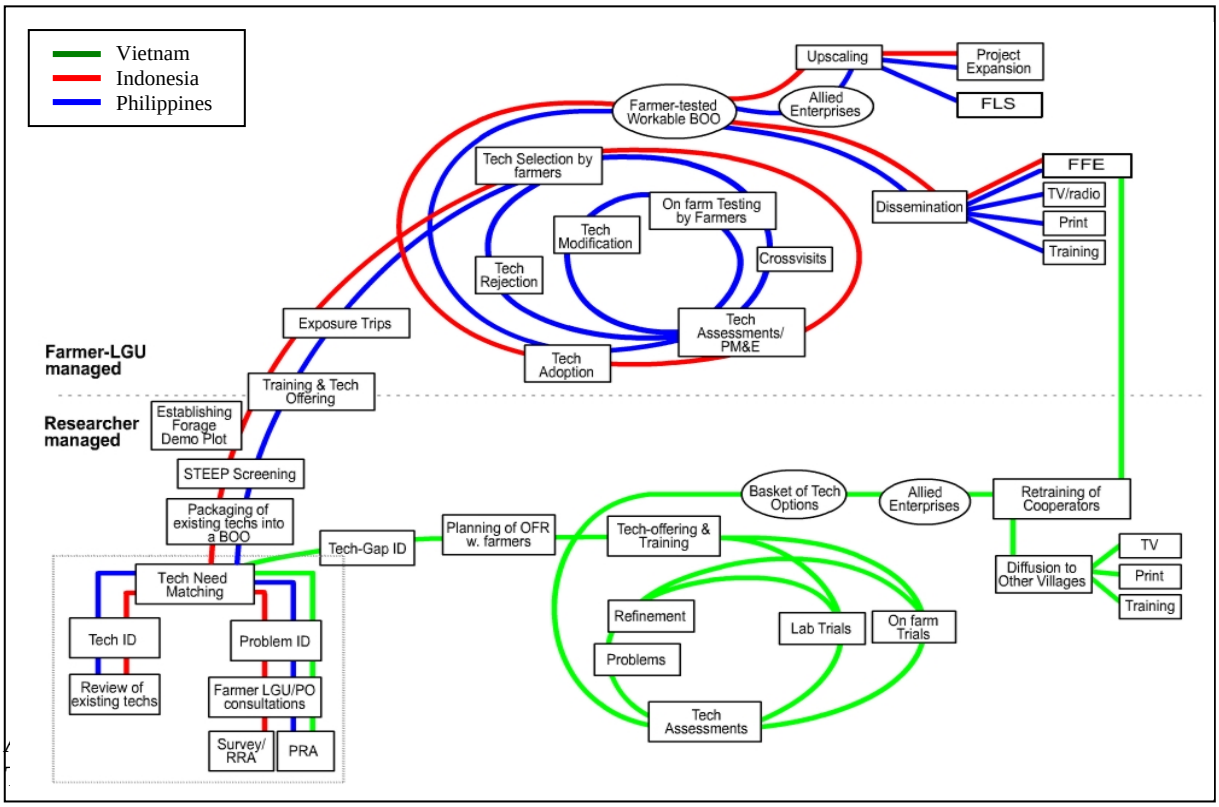

Fig. 1. Flow of activities during the implementation of TAG443 in Indonesia, the Philippines and Vietnam. .

Results

All countries started with problem assessment and needs identification, and ended with farmers deciding what options to adopt. The overall approach to the development of the basket of

technology options, the process of technology delivery, the extent of farmer participation in activities, and the range of accomplishments differed as described in Fig. 1. The project in Vietnam started with the development of technology options while that of the Philippines and Indonesia started with field validation by farmers..This difference could be explained by lack of previous research in Vietnam on suitable technologies for internal parasite control in goats and the lack of familiarity and training of researchers on small ruminant parasitology. Most previous parasitology studies conducted at GRRC had been on-station. There was a need, therefore, to first generate appropriate technologies through researcher-managed research before technologies could be confidently offered to farmers for testing. Initially, therefore, technology development was a researcher-managed process although jointly planned and assessed with farmers.

In contrast, the Philippine and Indonesian teams had benefited from preceding projects including the ACIAR-SPC Project 97133. Thus there were several technologies ready for testing in the field with farmers. Other special projects such as the CIAT-ADB Forages for Smallholders Project and the completed IDRC-Small Ruminants Coconut Systems Project for the Philippines and the USAID-ICARD Small Ruminant Collaborative Research Support Program for Indonesia, also offered mature technologies that could readily be packaged for application by farmers. These conditions therefore made it easy for both countries to offer technologies to farmers for on-farm testing right away.

In both the Philippines and Indonesia, technology testing was farmer-planned, designed and managed. This means that right from the start, farmers were given the freedom to design their own projects, mix and match options to address their needs and manage their own on-farm trials. In that process they were responsible for finding the required resources and in modifying the technologies to fit their resource endowments and capabilities, without much dependency on the researchers or project team (Alo, 2003; Subandriyo, 2003; Cross-country report Indonesia, 2004; Terminal Project Evaluation Philippines, 2003).

Process of Technology Delivery

The process to technology delivery in the three countries were highly similar and all tried to work on the principle of participatory development; however, differences based on technical resource endowments were noted.

Vietnam. After site appraisal and initial technology identification, researchers planned on-farm research with farmers using both indigenous and new technical knowledge. Then, farmers selected technologies and tested them under the guidance of research technicians. Most of the researches were carried out on farm depending on field condition and situation, but in some cases, like in the evaluation of the effectiveness of medical plants on larvae, experimentations were done in the laboratory.

To implement the experiments, some farmers were fully financed and supplied with materials for pen construction, forage establishment and deworming. The technical team guided the farmers in their experiments. Researchers also facilitated group discussions and helped collect and analyze the data. After 6-12 months of on-farm testing, the focus (treatment) and non-focus (control) farmers along with the researchers and technicians met to evaluate the effects of the experiments. Technologies that had ‘good impact’ were then packaged as ‘best-bet options’ for sustainable parasite control. The researchers revised options rejected by farmers. Problems emerging during testing that were not originally identified during the diagnosis stage were also tested. As more problems emerged after every testing, more investigations were required; hence the process of technology development was repeated a number of times. The focus farmers were then retrained on the revised options, and other interested farmers were invited to replicate what the focus farmers did. As more farmers became aware of the positive effects of the best-bet options on the focus farmers, more spillover farmers were encouraged to adopt. Over time they were no longer guided by researchers but were allowed to do things on their own (Binh, 2003, Cross-country report, 2004).

Philippines. Non-traditional participatory rural appraisal methods were used for the selection of project sites. In facilitated group discussions, farmers identified their problems, analyzed their causes and discussed ways how each problem could be solved. The results of

these discussions were presented to various potential stakeholders including other farmers, local government units, representatives of the regional Department of Agriculture and the Provincial Veterinary Office. Through these consultations, further problems and possible solutions were identified. Consultations with the ACIAR-SPC technical experts identified mature technologies that could be considered as options for intervention. These options were then subjected to screening by the researchers to determine their social acceptability, technical feasibility, economic viability, environmental soundness, and political acceptability.

Once all the problems have been laid down and the initial basket of technologies screened, there was a further round of consultations, which served, not only to present the possible technological options, but also to gauge stakeholder receptivity to these interventions. They were also a way to generate support from the local governments units (LGU) for possible project needs. This chain of consultations and problem diagnosis thus served as a non-biased way of matching needs with available technologies, generating research data faster than traditional survey methods.

After raising awareness about possible interventions, farmers were then invited to pick any technology component needed in their farms. Along with this was the responsibility of finding the needed resources and managing their chosen projects. Farmers chose not just one technology component but mixed and matched options to solve existing problems. When they felt that the technology was not good enough for them or their animals, they tried another technology mix. In effect, options were laid down and everyone was given the liberty to revise recommendations to suit every aspect of their situation; hence farm testing went on and on until the farmers had finally found the right mix.

Participatory monitoring and evaluation (PM&E) was undertaken quarterly to assess this dynamic process where the farmers chose an initial technology-mix, tested it on-farm and altered its composition until they arrived at the one which best suited their circumstances. This resulted in workable baskets of options (BOO) for specific resource endowments that farmers felt were best suited to them and thus can be scaled up or disseminated to other farmers and communities. Therefore, at the end of the project, what were generated in the Philippines were farmer-crafted technology options, refined through months of testing and modification.

Indonesia. Rapid rural appraisal and an ex ante survey were used to obtain baseline data on the village conditions and farmers' situations. Although these methods produced the needed data, it took six months to decode and analyze the survey results and identify the site, which delayed the mobilization of the communities for action. Field-based experiential training courses were then conducted to orient the farmers on technical options appropriate to their problems. A forage demonstration plot was also established before the onset of farmer testing of technologies.

After conducting the training and exposure trips to goat production areas, farmers were invited to try the technology components in their farms. They were given the responsibility of finding the needed resources and managing their chosen projects, which technicians monitor monthly. Technologies were assessed by the national working group (NWG) every six months. It was noted at these meetings that farmers adopted all recommendations without modification.

Technology baskets offered

As all countries went through the gradual process of problem identification and recognition of possible solutions, variations of traditional practices were developed. Core interest was on worm control but the baskets were holistic enough to address all aspects of goat management that could add income to all farmers. Hence, across the three countries, almost the same baskets of technologies were offered (Fig. 2). These were on disease management with special focus on worm control; grazing, nutrition and feeding management; breeding; and sanitation. All these provided answers to the farmers' major problems on goat production, foremost of which was mortality due to poor management (Alo, 2003; Subandriyo, 2003; Binh, 2003).

Although the initial focus in each country was goat worm control, over time, this changed, such that at project's end, more consideration was given to profitability and enterprise building. All these technologies were geared towards improving farm productivity and building income-generating goat-based enterprises. Most notable was the effort of the Vietnamese Team

Fig. 2. Technology baskets offered to farmers for testing in Indonesia, Philippines and Vietnam.

to integrate chicken, goat, milk and biogas into a profitable enterprise.

As was observed in Hatay Province, Vietnam, goat manure is collected and used as culture medium for earthworm production. Earthworms, which are harvested after a month, are fed to chickens. This manure is changed every three months and the compost produced is used either as fertilizer for vegetables and landscape plants or sold at VND 1, 500/kg or US $1/10kg. Goat milk is sold to GRRC and other shops at VND8000/li (US$0.50) and biogas produced from goat, pig and cattle manure are used for home cooking. Over and above these are the direct products of goats---the meat, milk and the breeders, which all make up a profitable business venture (Fig. 3).

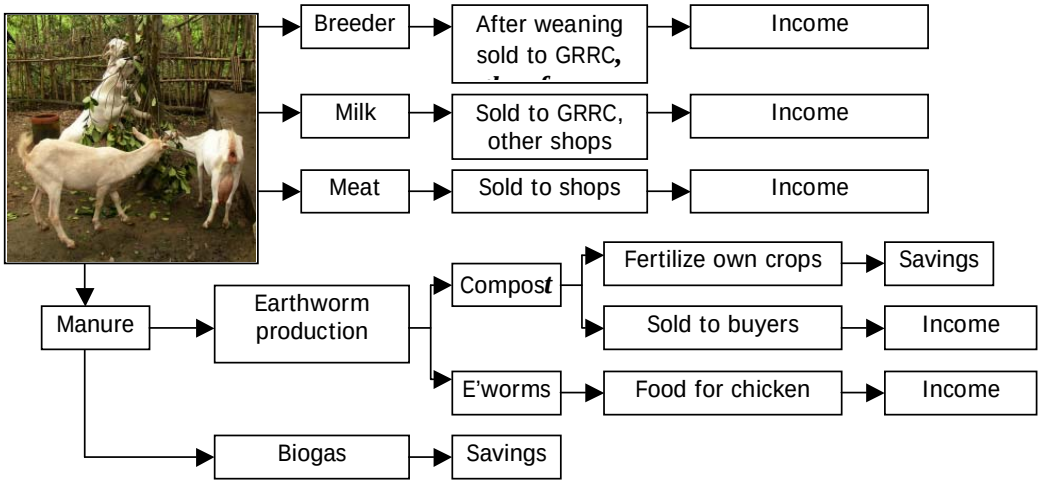

Fig. 3. Integrated dairy goat-chicken enterprise of farmers in Hatay Province, Vietnam.

Extent of stakeholder participation

To assess the extent of stakeholder involvement in project activities in each country, stakeholders were grouped into farmers, extensionists and researchers for each site (Malasiqui, Liloan and Danao for the Philippines; Purwakarta and Majalengka for Indonesia and Hatay-Thainguyen and Ninhbinh-Hoabinh for Vietnam). These groups were then asked to divide counters among themselves to show how they participated in the project and answer the question, "How much was each group involved in project activities?"

For the Philippines, there were 21 counters divided among five groups of stakeholders while in Vietnam and Indonesia, 10 and 38 sticks, respectively were divided among three groups of stakeholders. The results were then converted to percentage weights. As the activities cannot be weighted equally, the overall percentage figures are a very rough guide to overall participation. There were 38 respondents in Indonesia, 20 in Vietnam and 25 in the Philippines.

There was considerable variation among the countries as shown in Table 1. Farmers contributed to decisions about equally across all three countries, although in the Philippines they were involved much earlier in the selection of cooperators, sites and technologies. The declining role of the NWG group is evident in all three countries.

Philippines. Farmers and secondary stakeholders were more involved in planning and designing activities. Farmers had greater participation in project activities, with the project team and the other local stakeholders like the Department of Agriculture (DA) and Provincial Veterinary Office (PVO), playing a lesser role. All stakeholders participated in all activities, and almost 40% of all decisions were made by farmers. Stakeholders agreed that farmers had almost total control of the selection, on farm testing (OFT) and redevelopment of the technologies. They were also very active in problem diagnosis, cooperator selection and community action planning (CAP).

The LGU, the Project NWG, DA and the PVO had almost equal share in involvement (Table 1). For site selection the Project Team and DA made the decisions, with little involvement from the farmers and the PVO. The role of farmers in the creation of the team was also insignificant. It was DA-led, as they had better knowledge of the people and institutions in the area. Capacity building was Project-led, although the farmers had a big say in the 'what', 'where', 'who' and 'how' of each training session. Monitoring was a joint activity of the LGU and farmers most of the time, with evaluation, being led by the project team and farmers.

Table 1. Extent of stakeholder participation in the TAG 443 project in the Philippines.

Activity*	DA	PVO	LGU	F	NWG
Site selection	28	7	23	14	28
Problem diagnosis	13	14	13	44	16
LWG creation and Project Institutionalization	32	22	20	5	21
Cooperator selection	12	11	31	44	2
Capacity Building	15	15	11	27	32
Community Action Planning	12	12	21	36	19
Technology Selection and on-farm testing	0	0	6	92	2
Monitoring	16	16	30	28	10
Evaluation	16	16	17	27	24
Technology development	12	12	11	51	14
Mean Percentage	15.6	12.5	18.3	36.8	16.8

* *Distribution of project activities in the Philippines among the National Working Group (NWG), the three component groups of the Local Working Group (LWG) – DA, PVO and Municipal extensionists representing the LGU - and Farmers (F).*

Indonesia There was equal participation between the farmers and the project researchers (37 and 36%, respectively), while the local working group (LWG) took a supportive role (Table 2). Probing showed that activities such as team selection, site selection, project planning, and cooperator selection were roles of the National Working Group or the researchers.

Farmers, as expected, had the greatest participation in project implementation and technology adoption, as they were the ones raising the animals. But over and above their role as animal caretakers, they were active in diagnosing the extent of problems at the start (problem diagnosis) and in monitoring and evaluating the effects of the basket of technology options during the testing period. Since they were the ones frequently in contact with other sheep raisers coming to the communal grazing areas, they were the ones mainly responsible for spreading good news about technologies and encouraging others to follow. Hence, they felt they had the highest stake in the scaling up activities.

Training was an interesting activity in Indonesia as researchers and farmers shared equal involvement. It was commented that although the researchers were the trainers and the source of the information, farmers identified the course content that the NWG discussed. All the technologies were based on the farmers' needs. The LWG, as seen in Table 2 played a facilitating role, strengthening the linkage of the researchers with the farmers.

Table 2. Extent of participation of the NWG, LWG and Farmers in project activities in Indonesia and Vietnam.

Activity	**Indonesia**			**Vietnam**		
	NWG	LWG	F	NWG	LWG	F
Problem diagnosis	26	24	50	35	25	40

Project planning/ Community Action Planning				60	25	15
Team selection	74	26	0	60	30	10
Site selection	61	32	8	45	40	15
Project implementation/institutionalization	47	29	24	30	25	45
Cooperator selection	42	29	29	20	50	30
Training	39	21	39	45	25	30
Technology selection and testing	26	24	50	30	25	45
Monitoring	18	39	42	45	25	30
Evaluation	16	21	63	35	30	35
Scaling up/Expansion*	5	26	68	50	20	30
Mean Percentage	36	27	37	41	29	30

Vietnam. Overall the NWG had the greatest involvement, as they decided, performed and led almost half of all activities (41%). The extension people and the farmers shared almost equal responsibilities and decisions (29 and 30%, respectively). Project planning, team selection, site selection, monitoring, training and project expansion were roles of the NWG or the researchers. The Local Working Group, which was composed of extension officers and technicians, led in choosing the farms and farmer-cooperators. In all other activities, they implemented decisions made by the NWG. Farmers, as expected, had the greatest participation in project implementation and technology development, as they were the ones raising the animals. However, they were also active in problem diagnosis and in technology assessment at the end of every trial.

Project researchers, therefore, had the greatest participation, with farmers and the LWG playing supportive, follower roles. This was to be expected as the focus in Vietnam was on developing technologies, and the researchers initially did not see farmers as able to make equally important contributions to the research process. Although, their approach was top-down, researchers started to appreciate the merits of the participatory process.

Comparison of extent of stakeholder participation across countries. Looking at the extent of beneficiary participation in the various project activities, a simple analysis to summarize the cross-country results can be made, where:

- F>R (farmer participation is greater than researchers), corresponds to optimal beneficiary participation;
- F=R: moderate beneficiary participation; and
- F<R: low beneficiary participation.

Against this simple analysis, it can be said that of the three countries, the Philippine TAG 443 allowed optimal farmer participation; Indonesia allowed moderate, and Vietnam, low farmer participation. These differences in extent of participation produced varying degrees of outputs and benefits.

Impacts of the processes

The cross-country evaluation showed that TAG 443 had positive effects for the farmers and their communities and also for the Project Teams and their institutions. By increasing competence among all stakeholders and introducing new technology, a wide range of other impacts were achieved.

Improvement in the stakeholder internal competence. Across countries, the primary effect of the project, as described by all stakeholders, was the improvement of knowledge, attitudes and skills on goat development and parasite control in particular. Table 3 shows that because farmers had hands-on experience in technology testing, they saw how the interventions affected their animals. They also took part in trips and cross visits to other goat production sites, widening their perspective of the world outside their villages or offices.

As farmers in the Philippines were given the freedom to manage, monitor and evaluate their chosen projects, they were able to understand the problems they face in goat production, the knowledge they need, the resources they have and those they can access, and the effect of the technology options on their ability to manage parasites and successfully raise goats. As they

became more knowledgeable and skillful, they were not only able to solve their original problems on parasitism and inbreeding but also redesign aspects of the technologies to suit their needs. Representatives from DA and PVO improved their competence on goat production and health and became skilled in participatory processes and fund generation. Their self-esteem improved through exposure to better career opportunities because of their involvement with the Project.

Table 3. Improved farmers' competence over time, 2001-2003.

	Rate of Change (%)		
	Indonesia	Philippines	Vietnam
Improvement in Knowledge	No data	323.2	167
Improvement in Attitude		74.8	288
Improvement in Skill		High (No numerical equivalent)	637

Decreased morbidity and mortality and increase in stocks. As small ruminant raising is a family endeavor, improved competence of the household led to better goat management, reduced morbidity and mortality, more breeding females to breed and increased quality of stock. Table 4 summarizes these benefits. Because of the decline in mortalities, stock increased from 13 to 16 animals per farm for Indonesia; 8 to 26 in the Philippines; and 13 to 22 in Vietnam. These increases in stocks can be attributed to the decrease in worm-related diseases and mortalities, which in turn was due to improved competence in goat management.

In the Philippines, the decline in morbidities led to a big decrease in mortality from 67% to almost 3%. This was over almost two years from start of 2001 to December 2002 (Venturina, et.al, 2002). The conclusion for these data is that the farmer-generated baskets of technologies were effective in controlling worm-related production losses.

Table 4. Changes in morbidity, mortality and goat numbers, 2000-2003.

		Indonesia	Philippines	Vietnam
Worm-related morbidity (%)	Before	78	50	82
After		2	6	63
Change rate		97%	82%	23%
Mortality (% mortality/farm/yr)	Before	1.8	67	40
After		.9	3	17
Change rate		52%	95.3%	57%
Numbers of goats	Before	13	8	13
(mean number/farm)	After	16	26	22
Change rate		23%	227.6%	69%

Economic benefits. As morbidities and mortalities went down and stocks grew in size, more animals were sold, and income increased. Because animal manure was managed properly, pollution (in terms of foul odor, presence of flies) was reduced. All these led to improved farm productivity. Commercially the goat farmers have become very visible in their communities. They are primarily recognized as a source of stocks by buyers and visitors. More than the increase in buyers, the farmers take pride in having established a better price for goats. In the Philippines, the farmers in Pangasinan have united to peg the price at P100/k (US$ 2/kg) during lean months or P150/k (US$3/kg) during the peak season. The running price in Vietnam is VND 34,000/kg (US$ 2.26). Moreover, farmers in Vietnam are now earning from allied enterprises such as goat manure, earthworm, and bio-fertilizer commercialization. Hence, as enterprises increased, so also did income. Net incremental income for goat production in 2000-2003 increased in Indonesia from $86 to $169/yr, in the Philippines from $77 to $170/yr and in Vietnam from $170 to $266/yr.

These above changes are very large, as a number of the cooperators, especially in the Philippines, started with just 3-4 head. As mortalities were reduced, it became possible for them to engage in breeding, as female stock multiplied considerably. As income improved, quality of

life among the stakeholders also improved, such that they were able to send their children to school, settle their hospitalization expenses, and finally buy needed dentures, clothing, furniture and appliances. Some were able to buy jewelries, more lands, and had their houses renovated. Because pollution from the farm was managed, lesser illnesses in the family were reported; hence medical expenses went down. One cooperator in the Philippines was even able to buy a utility vehicle to fetch and ferry goods to and from his store and another farmer was able to purchase a motorcycle, all from the proceeds of their goat sales. Still other farmers used the money from selling their native goats to buy upgraded ones, which they are now using to turn their project into a more profitable enterprise.

Improvement in social competence. As farm productivity of the cooperators improved, an enabling environment for self-help was created. One of the changes the farmers initiated was to expand their breeding base by infusion of exotic genetics into their stocks using their new linkages with partner institutions such as the LGUs and research institutions. This created an environment for continuation or expansion of the project in each site. The initiative of farmers in the Philippines to form associations is a further step. Their participation in the project transformed their subsistence goat farming into viable enterprises.

As was evident from the stakeholder analysis, changes in internal competence led to improvements in animal productivity, thereby creating an enabling environment for self-help. This in turn affected the way the farmers related to people outside their households and how people now look up to them. Improved competence also led to better interactions among the farmers, the extension people and the project researchers. Specifically, there were marked improvements in the following:

1. *Farmer-to-farmer extension activities*-In almost three years in the Philippines, cooperators were able to teach other farmers what they learned, as other farmers who saw the improvements sought their help. As interaction improved, more "spillover farmers" were encouraged to raise goats properly. This was made possible by farmer-to-farmer mentoring and LGU-to-LGU promotion. As visitors come almost every month, interactions improved within and outside the villages. The numbers of technology testers in 2001-2002 increased from 30 to 421 in Vietnam and 16 to 722 in the Philippines. In Indonesia there has been little spread of testing (or at least it has not been recorded) which has remained limited to the 42 participating households. Adjacent municipalities have taken on some aspects of the project.

2. *Departure from government dependency syndrome*-In all three countries farmers graduated from dependence on government for most of their needs. In the Philippines, some farmers initially depended on their LGU for dewormers, detection of parasites, forage garden materials and even housing materials. As their competence improved, there was marked departure from this dependency. Similarly, in Vietnam, although initially financed by the Project and supported by People's Committees, focus farmers eventually were able to purchase needs from the proceeds of their enterprises. In Indonesia, the Team noted that those who were initially helped in obtaining dewormers learned to adopt the technology and later sustain it with their own resources.

3. *Policy changes in local government*-When the local government saw the impacts of this project on the farmers, they included goat production into their programs, allocated additional funding for project expansion to other sites and institutionalized some policy changes on the technologies disseminated by extensionists in villages, using the basket of technology options offered by the Project. In Vietnam, for instance, goat production has been included as a program of the district in Hoabinh in the next 5-10 years. Because of the project impacts, the Chairman of the District's People Committee supported the project, allocated VND 200M (USD 13,000), and generated VND1Bn (USD65,000) from the Province. With this involvement of the chairperson, who is an influential figure in the District, local public investment in the project for poverty alleviation is assured. In the Philippines, goat production was not a priority program in any of the participating LGUs. Although vaccination for major diseases was conducted, other activities on goats were

considered unimportant. Usually only programs on cattle and carabao were funded. Now, goat programs are given priority by the Sangguniang Bayan/Panlunsod (Municipal/City Council). Through the initiative of the Municipal Agriculturists, who were also members of the Project's Local Working Group, funding for the expansion of the project in their municipalities outside the original focal village, was granted. In Liloan, for instance, because TAG 443 technologies had positive effects, it became easy for the Municipal Agriculturist to persuade the local leaders to expand the project to other villages. As the local executives saw the potential of goat as a business enterprise, they incorporated it into their regular program and initially allocated US$ 4500 for project expansion and purchase of additional stocks. A private company also entrusted US$ 3500 to the municipality for the expansion of the goat-raising project to other barangays (villages). Similarly in Indonesia, through farmer-to-farmer extension, merits of the technologies were gradually disseminated to other farmers within and outside the focal villages. The District Livestock Services in Purwakarta expanded the coverage of the project to another village, where 25 farmers are now adopting deworming technology; in Majalengka, the DLS was able to expand to five other villages with 1000 farmers adopting the same technology.It can thus be seen, that at the local level, the LGUs have made goat production a priority program. This was evidenced by the allocation of funds from the budget of the municipality and other collaborating agencies. This was brought about by their recognition of the potential of goats and the impact of TAG 443 in the lives of their constituents.

4. *Improved community strength*-In the Philippines, an impact in the communities is the building of community spirit among goat raisers that resulted from being part of the Project. This bond stemmed from having been through the same experiences and having problems on goat mortalities and abating them over time. Now they share a common goal to make their individual villages an important goat-raising village. In Pangasinan, because cooperators recognized that the project had been a new pathway out of poverty, they initiated a goat raisers' association to bring the benefits to others and contribute to the economy of their municipalities. When asked to rate their change in wealth from the project, farmers felt extremely wealthy because they were able to abate mortalities not because they were able to sell goats. The experiences, knowledge and skill that they gained, the people and places they came to know, and the possible opportunities all these initial gains may bring to them, were counted as non-material benefits. Moreover, their greatest wealth according to them is the fact that they, although classified as poor, were able to help pull many households out of poverty. They did this through mentoring; hence, they felt 'wealthier than the wealthiest in their community'.

5. *Paradigm shift in Vietnam*-Another critical impact that surfaced in Vietnam was the change in attitude of researchers towards farmers. Whereas before they felt superior over farmers, now they feel that farmers can be their partners in technology development. Traditionally, researchers tell farmers what to do, listening very little to their views; but after experiencing the participatory evaluation with the IFAD Overseas Evaluation Team, researchers realized the importance of listening and putting themselves in the shoes of the farmers.

6. *Improvement of communication skills*-Communication skills of farmers and Team members, as described in both Indonesia and Vietnam, improved from interacting with different institutions and country representatives, such that now they are better in speaking in English and in using the computer to communicate with people around the world.

7. *Farmer livestock school*-A very important offshoot of the TAG 443 in Pangasinan, Philippines was the development and testing of the Farmer Livestock School (FLS) to fast-track the dissemination of the technologies on integrated goat management (IGM) to more farmers in the region. This is another component that strengthened the 'self-help environment' in Pangasinan.

The FLS-IGM was piloted in two phases in Balungao, Pangasinan and was found to be a good modality for technology development and transfer. It is a condensed version of the two-year program used by TAG 443, and can show the same impacts in six months. With the FLS in place, the diffusion of the TAG 443 technologies to other farmers by the local facilitators has been sustained. FLS-IGM was successful in Balungao, Pangasinan. Farmers in Tobor barangay, the initial site for TAG443 significantly influenced the FLS-IGM and must be given substantial credit for providing access to their successes and failures.

Summary and recommendations

The ILRI-IFAD Technical Assistance Grant 443 capitalized on the participatory paradigm and offered farmers the opportunity to be local scientists on integrated goat worm control. Significantly, the donor (IFAD) and international implementing agency (ILRI) allowed each country to design its own approach in delivering the SPC technologies to the farmers based on each country's cultural norms.

Vietnam took a different path and engaged its Team on a researcher-managed approach to technology testing; Indonesia and the Philippines, on the other hand, went on to do community-based, farmer-managed, on-farm research. Despite these differences, many benefits have been reaped by the stakeholders. On top of these is the improvement in internal competence, which radiated to the way the farmers managed their farms and dealt with people in their community. These approaches lowered worm-related mortalities, increased stocks and improved the living conditions of the farmers. In the end, not only were practices sustained but subsistence goat farming was transform into income-generating enterprises, which became the farmers' yardstick in determining their project's sustainability.

There are many lessons from the project. The main ones are:

1. The bottom-up participatory approach employed produced good results in both Philippines and Vietnam. The LGUs learned that farmers can be educated and can actively participate in technology testing. As long as the technologies give them benefits, they can eventually sustain themselves. Farmers can therefore be partners, not mere objects of research. (Terminal Evaluation-Philippines, 2003; Cross-country Report-Indonesia, 2004).
2. Through need assessment, stakeholders can learn what problems exist and what farmers need. The basket of technology options should therefore be anchored on these, as farmers adopt technologies that meet their needs (Cross-country Report-Indonesia. and Vietnam, 2004).
3. Good networking with LGUs, the universities, farmers and other stakeholders is also important and should be undertaken right at the beginning of the a project. There must be good support, interaction, sharing of experiences and expertise with other regional counterparts (Cross-country Report-Vietnam, 2004).
4. The multi-disciplinary approach to project implementation is critical for project success. Good cooperation among the members of the multi-disciplinary team is needed to help communities overcome their problems. Good collaboration among NWG, LWG and farmers is thus very much needed (Terminal Evaluation-Philippines, 2003, Cross-country Report-Indonesia, 2004).
5. Formal linkages with the LGUs and the inclusion of the municipal planning officer were essential for project support and appropriation of funds for project expansion. Because of their involvement in the project, their minds were opened and goat production was

prioritized as a municipal program. Future projects, therefore should also capitalize on this (Terminal Evaluation-Philippines, 2003).

6. Right from the start, ILRI allowed each country to design its own project approach based on cultural norms and biases. Had ILRI imposed on just one method, this Project would not have been this successful, as it would have curtailed the natural flow of experiences that guided the eventual design of the Project. In future projects, ILRI should continue this approach (Terminal Evaluation-Philippines, 2003).
7. Good planning leads to good results. As in the case of the project, the "masterplan" or guidepost activities were very well thought of and the lead-time for preliminary activities was adequate. Although activities evolved as experience was gained, still the planned guidepost activities really helped keep the project on track. Hence, it is suggested that future projects allow adequate lead-time to plan project activities based on needs, problems and priorities of the stakeholders and not just based on corporate assumptions (Terminal Evaluation-Philippines, 2003).
8. Resource sharing in any activity leads to a feeling of ownership and responsibility. This facilitated better project stewardship. Hence, projects should always see to it that activities are co-funded and supported by all the stakeholders (Terminal Evaluation-Philippines, 2003; Cross-country report, Vietnam, 2004).
9. Goat production is truly another pathway out of poverty and the Farmer Livestock School is a good modality to promote this. As one farmer said, "Goat raising can be an enterprise that we can leave to our children as legacy." Hence, it is but fitting to allow other interested groups/institutions/countries to try to experiment on the FLS-IGM to further validate this claim (Terminal Evaluation-Philippines, 2003).

Constraints

The Country Teams believe that amidst these successes, there are still some limitations and obstacles that have to be addressed in future projects to ensure the smooth flow of development in the villages.

Vietnam

1. Knowledge of the local working group on project design, implementation, evaluation and community mobilization was still not enough; hence conduct of more training courses is envisioned in the next project.
2. Project sites were concentrated in some provinces in North Vietnam. To address the problems of goat raisers in the country, there is a pressing need to expand to other areas in the North, Central, and South of Vietnam.
3. Lack of laboratory facilities for analysis of fecal samples, such as microscope and McMaster slides was seen as a drawback in making accurate analyses.
4. Research on breeds resistant to parasite has to be continued in the future to give the people a clear idea of the breed of goats to raise.

Indonesia

1. There was not enough time for project implementation. The Team expressed dissatisfaction over the short span of time for project implementation, which to them was not enough to have substantial impacts on all stakeholders. Although all the TAG 443 projects started at the same time, Indonesia took quite some time to determine their project sites. Blamed was the inconsistency of the former consultant from ILRI, who advised them initially on using Babajurang in Majalengka and eventually changing her mind, when all things have been set. This led to another round of site searching, which took another six months of ex ante data gathering and analysis just to determine the final sites. When the sites have been identified, flooding in the area impeded implementation.
2. Delay of fund release. To aggravate the situation during start-up in Indonesia, fund release from ILRI was delayed for six months, resulting in further delay in project implementation.

3. Insufficient project funds---the Team also believes that the allotted project fund was not enough to achieve their set goals. Hence, they feel that future projects should be realistic enough to consider country-specific limitations in budget allocation.

Philippines

1. There were difficulties in monitoring some changes using the participatory approach. Specifically, in the analysis of net incremental income, it was very hard to pin down and quantify the benefits by technology mix since the farmers were given the freedom to change technology options.
2. Goat dispersal is again gaining ground, especially as election nears. Hence, alternative approaches must be institutionalized.
3. Awarding of the best goat farm per site may both be viewed in the positive and negative light. Positive, because it encouraged everyone to strive harder to improve his farm; negative, as it brought about competition and possible withdrawal of help and information especially as evaluation time approached. Hence, it may be worth reassessing the merits of contests.

Conclusions

The paths taken by each country have differences, but the lessons point to one thing: it is crucial that small ruminant raisers are involved at all phases of the project. Not only can it accelerate the adaptation and advancement of new farming practices but it can also improve the livelihoods of participating small livestock keepers.

Considering everything that had been done and however slow the initial process with farmer participation has been, it was obvious that by the end of the project, a pathway out of poverty was found. With the development of the right mix of technologies by the technology users, researchers need not push for their adoption. Once properly 'greased', technology testing by other farmers rolled like a wheel, ultimately relinquishing the need for the research team, as farmers had become scientists in their own right (Alo, 2003).

References

Alo, AMP. 2003. Basket of option development and evaluation: an analysis of the efforts of TAG 443 participating countries (report submitted in preparation for 2003 ILRI-IFAD Steering Committee Meeting)

Alo, A.M.P., E.C. Villar, F.G. Gabunada Jr.,V.M. Venturina, E.M. Cruz, E.T. Lambio and T.R. Salgado. 2002. Community-based integrated approach to goat worm control:a modality for community empowerment?. Paper presented at the Philippine Society of Animal Science 39th National and 20th Visayas Chapter Scientific Seminar and Annual Convention, 23-25 October 2002. Cebu City, Philippines.18pp

Biggs, S.D. and Smith, G. 1998. Beyond methodologies: coalition-building for participatory technology development. World Development, 26: 239-248. IN: Gabunada, FG Jr, AMP Alo; EC Villar; VM Venturina; EMCruz; and ETLambio. 2003. Harnessing essential agencies to sustain efforts on goat worm control: experiences of the TAG 443-philippines project (draft paper submitted for inclusion in the TAG 443-Philippines M&E report).

Binh, DV, NDLy, Dgray, SSAithanoo and RASani. 2003. Participatory testing technology options in Vietnam. (report submitted in preparation for 2003 ILRI-IFAD Steering Committee Meeting)

Brown, EO, AMPAlo, EMCruz, VMVenturina, ECVillar, FGGabunada, Jr and ETLambio. 2003. Financial analysis of the basket of technology options for goat worm control (draft paper submitted for inclusion in the TAG 443-Philippines M&E report).

CGIAR-PRGA (undated). "Why participatory research and gender analysis?" http:// www. prgaprogram. org/about.htm.

Cramb, R.A. 2000. Processes influencing the successful adoption of new technologie by smallholders. In: Working with farmers:the key to adoption of forages technologies. Stur, W.W., Horne, P.M., Hacker, J.B. and Kerridge, P.C. (eds). ACIAR Proceddings No. 95. pp11-22.

Cross-country evaluation in Indonesia. 2004. Unpublished report of the Overseas Evaluation Team about the multi-stakeholder evaluation workshop held on April 26-30, 2004 at Indonesian Center for Animal Research and Development, Bogor, Indonesia.

Cross-country evaluation in Vietnam. 2004. Unpublished report of the Overseas Evaluation Team about the multi-stakeholder evaluation workshop held on April 18-22, 2004 at Goat and Rabbit Research Center, Sontay, Hatay, Vietnam.

Gabunada, FGJr, AMP Alo, ECVillar, VMVenturina, EMCruz and ETLambio. 2003. Harnessing essential agencies to sustain efforts on goat worm control: experiences of the TAG 443-philippines project (draft paper submitted for inclusion in the TAG 443-Philippines M&E report).

Subandriyo. 2003. Participatory diagnosis and site selection in IFAD TAG 443. (report submitted in preparation for 2003 ILRI-IFAD Steering Committee Meeting)

Terminal project evaluation in the Philippines. 2003. Unpublished report of the multi-stakeholder evaluation workshop held on September 9-11, 2003 at DA-RFU 7, Cebu City, Philippines.

Venturina VM , EM Cruz, AMP Alo, ET Lambio, EC Villar, D Gray, FG Gabunada Jr. 2002. Assessment of farmer-developed worm control options in goats under smallhold management systems. Paper presented at the Philippine Society of Animal Science 39th National and 20th Visayas Chapter Scientific Seminar and Annual Convention, 23-25 October 2002. Cebu City, Philippines.