



## Rural Enterprise Development (RED) Through Innovative Goat Production Systems

Edgar A. Orden<sup>\*1</sup>, Emilio M. Cruz<sup>1</sup>, Fe L. Porciuncula<sup>2</sup>,  
Neal A. del Rosario<sup>1</sup>, and Ana Marie P. Alo<sup>3</sup>

<sup>1</sup>Small Ruminant Center and <sup>2</sup>Research Extension Training Office, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, <sup>3</sup>Livestock Research Division, Philippine Council for Agriculture Aquatic and Natural Resources Research and Development, Department of Science and Technology, Philippines

*\*Email for correspondence: [eaorden@yahoo.com](mailto:eaorden@yahoo.com)*

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### ABSTRACT

The RED project which was implemented in four focal villages (with interventions) in the municipality of Guimba, and control site (no intervention) in Maragol, Science City of Muñoz, both in the province of Nueva Ecija in the Philippines aimed to transform goat raising from subsistence farming into a viable livestock-based rural enterprise. Baseline data on biophysical, socio-economic, institutional, infrastructure, goat production systems, marketing practices and previous technical performance were determined using structured questionnaires, key informants, secondary data and participatory rural appraisal (PRA)-focus group discussion (FGD). Farmer-partners are small hold livestock raisers who cultivate an average of 1.5 ha paddy-rice. Farmer's skill and knowledge, attitude, skills, aspirations and social competence were enhanced using Crop Animal Systems Research Network (CASREN) modalities, capacity building, and S&T interventions. The adoption of technology mixes learned by farmer-partners that included upgrading, housing/stall feeding, strategic deworming, and intensified use of forage legumes improved goat productivity. Establishment of a community-based selection and breeding system through upgrading using Anglo-Nubian or Boer bucks in the focal sites produced bigger and heavier ( $p < 0.05$ ) kids at birth (2.30 kg), at weaning (13.87 kg), and at slaughter (22.63 kg). The heavier animals at slaughter provided a net benefit of PHP 1,046.40 per head to the farmer-partners. Moreover, animal holdings increased by 55.84% because of the improvement in the quality of their stocks. The pre-weaning mortality was dramatically reduced ( $p < 0.05$ ) from 30.57% to 14.40% while the conception rate was higher at 89.5 % in the focal sites. RED facilitated the empowerment of communities depending on goat for their livelihood, transforming traditional goat raising from subsistence farming to profitable enterprise. RED is not just about successful science-based goat raising, it is about building enterprises and generating opportunities to enrich the lives of farmers.

**Keywords:** Goat technological options, rural enterprise, ISP technical targets

## INTRODUCTION

Goats are considered as rural asset. Although not properly quantified, the contributions of goats to rural farming communities are well recognized. Goats have the potential for increased production in a relatively short period. They require minimal capital investments, can utilize local feed resources, and provide opportunities for women and children to participate in building a sustainable livestock enterprise while ensuring food security for the family. Moreover, goats also play other significant socio-economic and cultural roles, i.e. insurance, savings, minimal risk accumulation of assets, diversification of farm resources, and fulfillment of various socio-economic obligations of underprivileged rural farmers.

However, the full economic potentials of goats are yet to be realized. The wide variability in the production performance (e.g. birth weight ranging from 1.7 kg to 3.16 kg; slaughter weight ranging from 10 kg to 20 kg, etc.) and product quality (e.g. meatiness) of goats in smallholder farms is considered a major deterrent to its utilization as a reliable livelihood option for smallholder farmers. Major causes of these are the low productivity of existing stocks and low adoption of improved goat production technologies/practices. Nevertheless, the experiences and results of projects previously implemented in various areas of the country as reported by Alo (2003), Brown et al. (2003), Venturina et al. (2003), and the Philippine Council for Agriculture Aquatic and Natural Resources Research and Development (PCARRD) (2003, 2004b, 2005, and 2006) have demonstrated that application of improved packages of technology in smallholder farms can effectively enhance the production performance and thus, profitability of goat production in smallholder farms. Moreover, through the said projects, modalities for effective and efficient adoption of technology packages by smallholder farmers have been developed and tested on-farm.

The aforesaid successes achieved by smallholder farmers demonstrated the positive responses of goats in smallholder farms to improved packages of production technologies. Moreover, the increased productivity (e.g. 98% improvement in growth rate) of goats in these farms presents smallhold goat production as one of the potential livelihood options for rural farming communities to flee from poverty.

This project is anchored on the successes and learnings in enhancing goat production that were gained from completed ILRI-IFAD TAG 443 and CASREN projects and from a CGIAR-funded on-going project now being implemented in Bambang, Nueva Vizcaya (PCARRD 2005-2006). It hopes, among others, to contribute in the attainment of the technical targets, i.e. reduction of pre-weaning mortality from 25% to 10% and increase in slaughter weight from 15 kg to 30 kg by 2020, of the Industry Strategic Plan of the Pasture-Ruminant Cluster.

The primary goal of the project is to contribute to the Philippine government's poverty alleviation program in rural areas by transforming goat raising from a subsistence type of farm activity into a viable livestock-based rural enterprise.

## MATERIALS AND METHODS

### Selection of project sites and farmer-partners

The project sites/focal villages were selected based on the following criteria: (a) high goat density; (b) goat production recognized as economically important; and (c) accessibility. There were 22 farmer-partners selected in the project sites (Municipality of Guimba) and 6 farmers from Science City of Muñoz (adjacent from project site) that served as the control. The farmer-partners

were selected based on their enterprising characteristic, willingness to participate and receptivity to innovative technologies/development projects, with animal holdings of at least 4-5 doe/household.

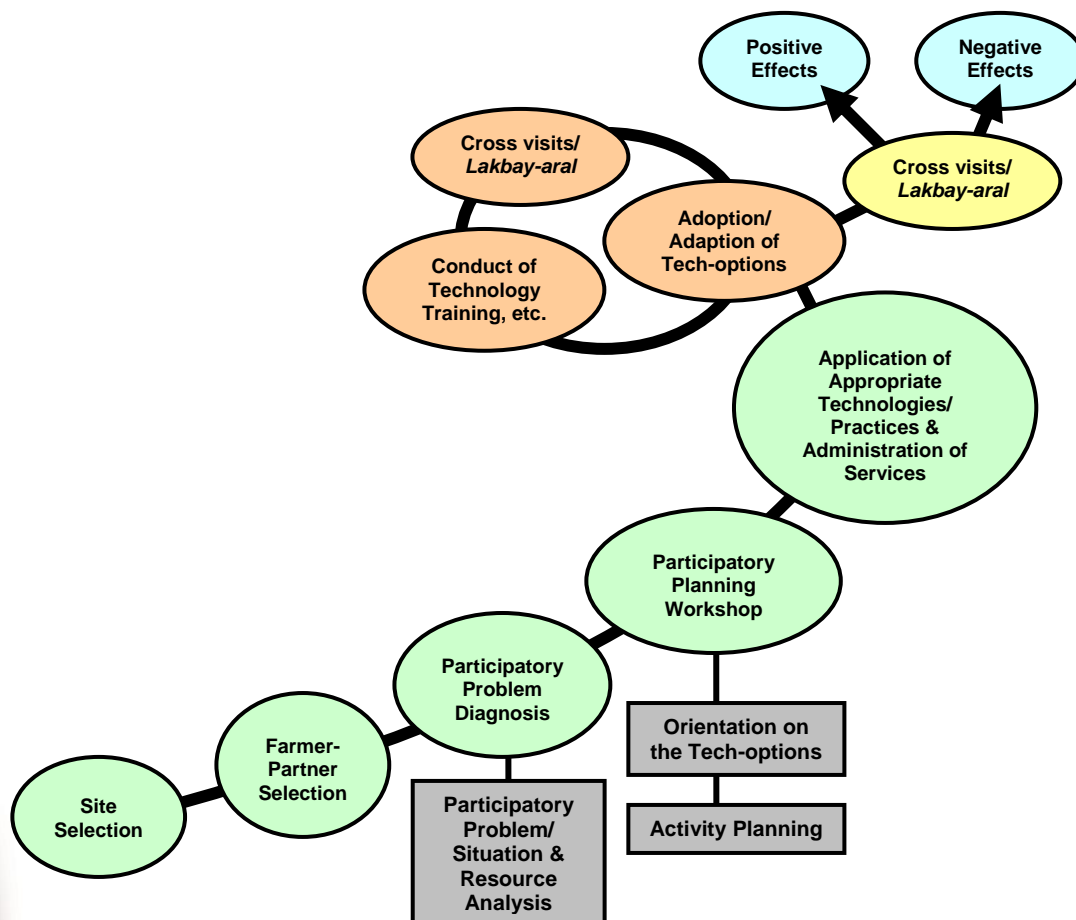
### Capability building

To empower the farmer-partners, project activities were undertaken, such as technology trainings, cross visits/*laktbay-aral*/field days, exhibit to existing goat farms, training on entrepreneurial skills development, formation of farmers' association, and participation in goat shows. The capability building strategy used was patterned from the modalities developed by CASREN Philippines (2003). These activities encouraged the farmer-partners to adopt goat-technology options through action learning strategies developed by the ILRI-IFAD and CASREN projects (Alo 2003; CASREN 2003; Venturina et al. 2003).

Specific activities have focused on enabling strategies for the farmer-partners to gain access to technologies and develop innovations to benefit these technology inputs into their resources and capabilities and enhance their access to markets by producing animals that possess characteristics preferred by consumers as described by Orden and Jamandre (2003). Community-based selection and breeding strategies were presented as an option to improve productivity and quality of goats.

### Participatory approaches

The project followed a framework (CASREN Philippines 2001 with modification; Lanting 2007; Figure 1) based on the premise that any development endeavor, to be truly participatory, must first consider the farmers' realities – their situation, aspirations, and capabilities.



**Figure 1.** The CASREN participatory methodology

## Data collected

The body weight (birth, weaning, and slaughter), conception rate, mortality rate, and economic data of the farm were collected and subjected to ANOVA using General Linear Model (GLM) of *Statistica* for Windows, Version 8 to determine significant differences between focal and control sites, and in focal sites versus baseline data. On the other hand, financial data were subjected to partial budget analysis to determine marginal effects of the different mixes.

## RESULTS AND DISCUSSION

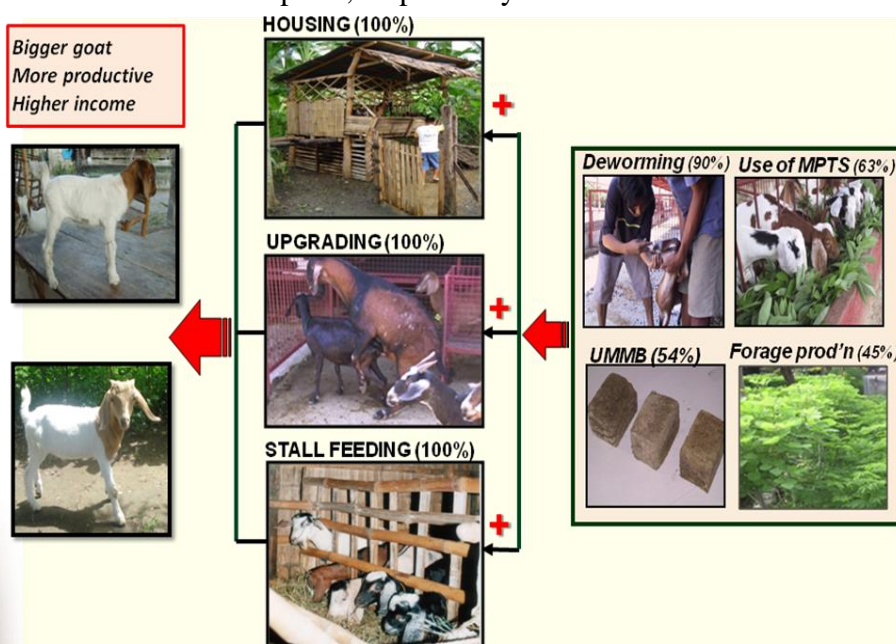
### Project sites

The project sites belong to Type 1 climate with two distinct dry and wet seasons, and classified as lowland irrigated which are ideal for goat production. Major crop-animal production system is rice-buffalo-goat. Goat farming is characterized by the tethering and grazing that utilizes locally available feed resources without any concentrate supplementation. Goat housing is usually shed type where natural mating is practiced using inferior quality bucks.

Some technical parameters on goat performance collected before adoption of the technology mixes revealed that the average age at 1<sup>st</sup> parturition was 9.8 months with an average birth weight of 1.85 kg, weaning weight of 5.2 kg, and marketed at 14 months old. Slaughter weight that ranged from 13-15 kg in the project sites was very low, justifying the need for technological interventions.

### Adoption of technology options adopted by farmer-partners

Figure 2 shows the technology options adopted by farmer-partners after a series of capability-building processes conducted in the project sites. The technology mixes with 100% adoption are provision of housing, stall feeding, and upgrading. Other technology interventions preferred by farmers include strategic deworming, feeding of multi-purpose tree species (MPTS), urea-molasses-mineral block (UMMB) supplementation, and forage production with 90.0%, 63.0%, 54.0% and 45.0% adoption, respectively.



**Figure 2.** Pictures showing the percentage of adopters by technology



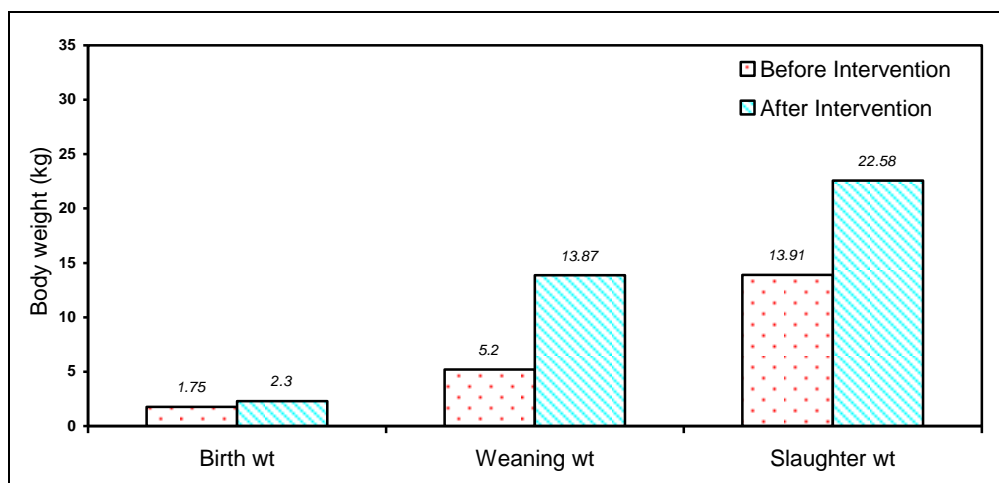
## Goat productivity as influenced by technology adoption

Goat productivity as influenced by the adoption of technology mixes was determined using the “before and after” and “with and without” framework. Baseline data on goat performance were collected before the farmers adopted the technology mixes and data collected after adopting the technologies were compared. For “with and without,” goat performance in focal sites was compared with those from control sites.

### *Before and After Scenario*

Effects on animal performance. There is higher productivity in focal sites after the adoption of technology. The effect of upgrading through the infusion of superior breeder bucks to the existing stock significantly improved the quality of offsprings that resulted in bigger size and heavier kids in all focal sites (Figure 3). Moreover, conception rate increased and pre-weaning mortality was significantly ( $P<0.05$ ) reduced (Figure 4). Apparently, these results are complimentary effects of the various technology interventions adopted by farmer-partners. These technologies are the provision of housing, stall feeding, upgrading, and strategic deworming, and the application of other important management practices on goat production.

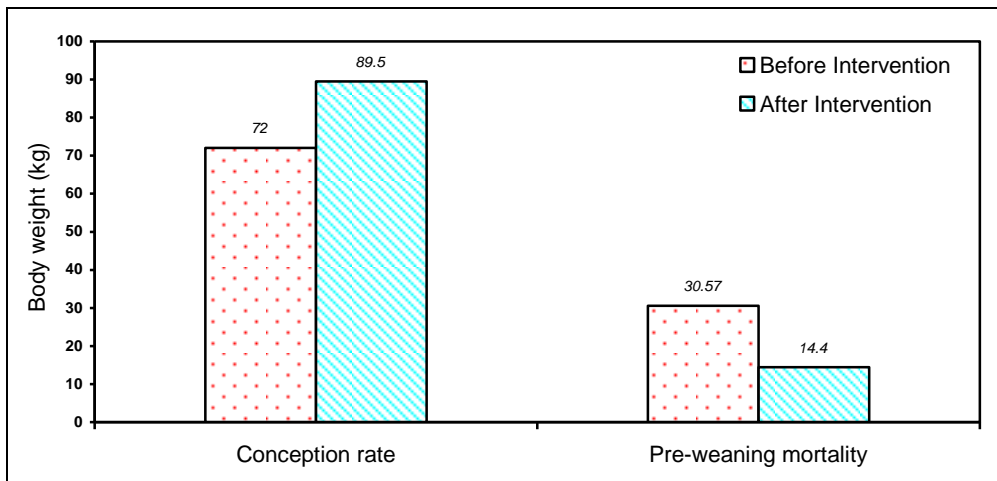
The over-all improvement in the management systems from traditional to innovative practices is clearly manifested in the growth performance of goats (Figure 3). Result supports the observation of Cruz (2005) that F<sub>2</sub> progenies sired by Anglo-Nubian and Boer have higher birth weight, weaning weight, mature weight, and average daily gain than native goats.



**Figure 3.** Liveweight of goats before and after technology intervention in selected villages in Guimba, Nueva Ecija

Effects on animal inventory. Table 1 presents the change in the doe-level inventory of farmer-partners in the focal sites. After adopting appropriate technology interventions on goat production, there was a marked increase in animal holdings in the intervention sites. Inventory of doe had increased by 43 head, from 77 head to 120 head. The 55.84% increase in doe level was influenced mainly by the presence of buck service in the community, and farmers were more confident in raising more animals as a result of the knowledge and skills they developed through various capability enhancement activities they attended. Farmers realized the advantage of infusing superior bloodlines in their predominantly native stock. Farmers tend to keep stocks with better genetic qualities than their previous native animals. On the other hand, there was a significant

reduction in the number of animals in the control site mainly due to high pre-weaning mortality (Figure 4).



**Figure 4.** Conception rate and pre-weaning mortality of goats before and after technology intervention in selected villages in Guimba, Nueva Ecija

**Table 1.** Change in the inventory of does among farmer-partners in the focal sites

Project Sites	Inventory of Doe		
	Beginning	Ending	% Change
Ayos Lomboy	40	58	45.00
Bantug	21	34	61.90
Sta Lucia	10	15	50.00
Sta Ana	6	13	116.67
<b>TOTAL</b>	<b>77</b>	<b>120</b>	<b>55.84</b>
Maragol	<b>63</b>	<b>61</b>	<b>(3.17)</b>

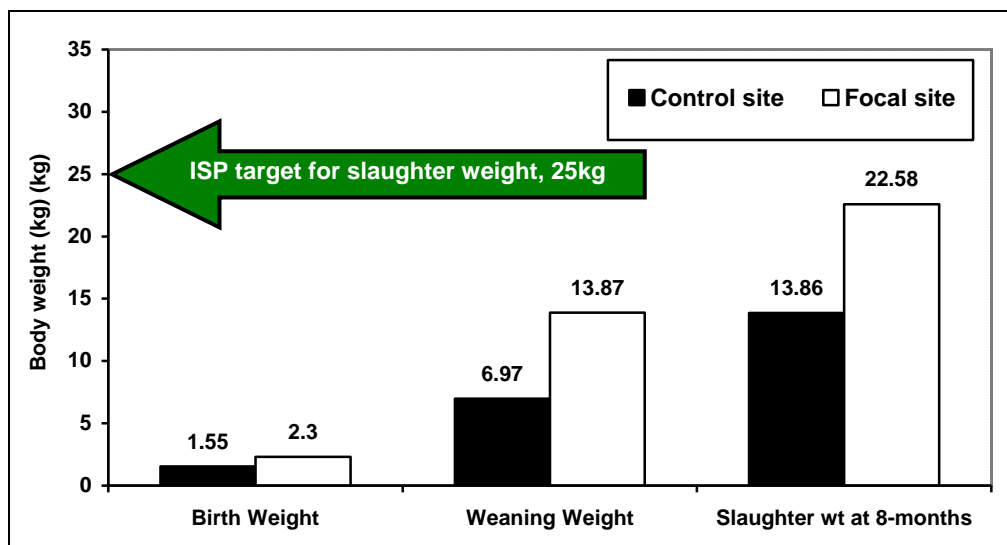
#### *With and Without Scenario (Focal vs Control Sites)*

Effects on body weights of kids. The establishment of community breeder farms using superior quality bucks in the focal sites produced bigger and heavier ( $p < 0.05$ ) kids. The genetic superiority of upgrades is manifested by the 2.30 kg mean birth weight of the  $F_1$  and  $F_2$  progenies ( $n = 233$  kids) compared to 1.55 kg among newly born kids in the control sites (Figure 3). Results support the recommendation of Cruz (2005) that Boer or Anglo Nubian bucks could sire native female goats producing offsprings with improved genotype for body size.

Figure 6 shows that more than 65% of the newly born kids in the focal sites were products of multiple birth. Twinning was high at 43.54% while triplets accounted to 10.27%. The higher incidence of multiple births resulted in higher kidding size at the focal sites, 1.67 compared to 1.52 in the control sites.

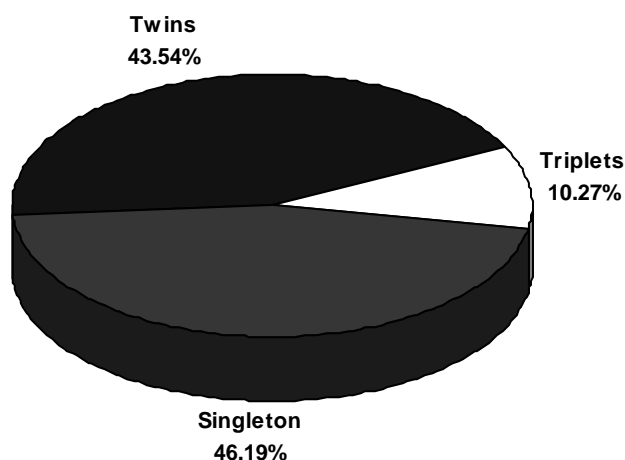
Weaning weight. Kids were weaned at four months of age in both sites. Weaning weight of offsprings in focal sites were higher ( $p < 0.05$ ) than control site (Figure 5). This was attributed to the infusion of purebred lines into the predominantly native stocks in the project sites. The genetic superiority of  $F_1$  and  $F_2$  progenies sired by Anglo Nubian or Boer bucks in focal sites was exhibited

by bigger and heavier kids at four months of age at 13.87 kg live weight as compared to 6.96 kg of the purely native kids in control sites.



*Mean values in the focal sites are significantly higher ( $p < 0.05$ ) than control sites*

**Figure 5.** Body weight of growing kids in the focal and control sites in selected villages of Guimba, Nueva Ecija



**Figure 6.** Proportion of single and multiple births in the focal sites

**Slaughter weight.** The positive effect of infusing exotic bloodlines through upgrading technology is well manifested by the genetic superiority of goats produced by farmer-partners (Figure 6). Results of the genetic improvement showed that  $F_1$  and  $F_2$  progenies in the focal sites were relatively bigger and heavier than those produced in the control site. Their average daily gain of 84.44 g in the focal sites resulted in a live weight of 22.58 kg at 8 months old as compared to 13.86 kg in the control site.

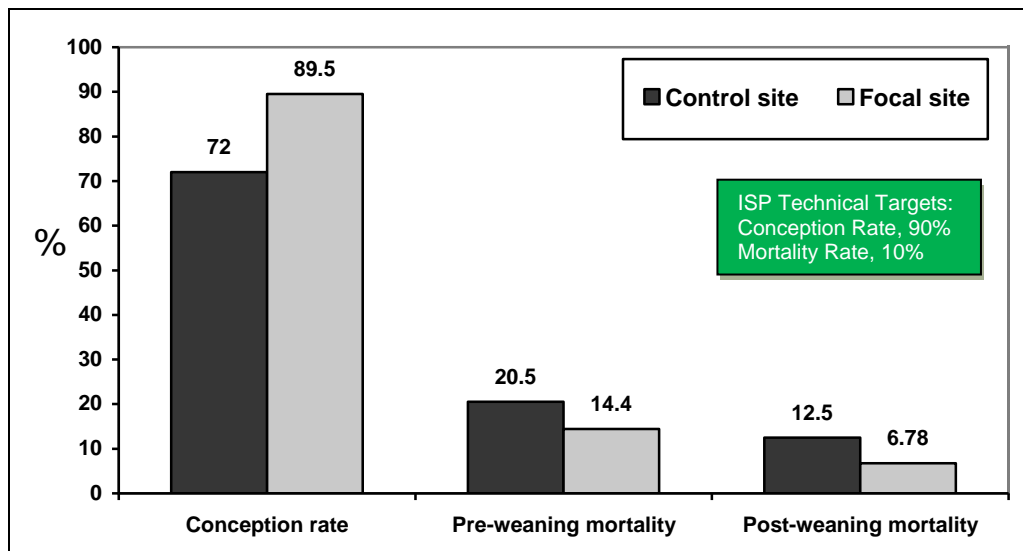
Results clearly showed the advantage of raising crossbreds produced from mating Anglo Nubian or Boer bucks and indigenous goats that are more productive and suitable to local environment. Combining the superior phenotypic characteristics of exotic breeds in terms of body size, growth rate, and milk production with the environmental adaptability of indigenous goats

produced heterosis or hybrid vigor that resulted in considerable improvement in body size (Fahmy and Shrestha 2000).

The establishment of community breeder farms in strategic locations and selection following standard phenotypic parameters for meat type goats resulted in the production of bigger and heavier animals. This proves further that estimates of genetic and phenotypic correlations on body weight among crosses is large and positive with an estimated heritability of 0.55 at 5-7 months of age (de Brito Ferreira et al. 2000). Genetic progress was exhibited by the faster growth rate of kids that attained desired slaughter and market weight in shorter period.

As pointed out earlier, the project technical working group implemented a holistic approach to improve goat productivity in the area covered by the project. Thus, farmer-partners adopted other improved management practices such as intensified proper feeding and nutrition using locally available feed resources and sustainable parasite control. Regular monitoring activity and strict selection of stocks resulted in the production of quality animals that conform with the desired age and size at slaughter.

**Conception rate.** Figure 7 presents the significantly higher ( $p < 0.05$ ) conception rate in the focal sites than in the control sites. Since the establishment of community-based goat breeding farms in strategic location, a total of 143 successful breeding services were recorded. The 89.5% conception rate contributed to the dramatic increase in the goat inventory in the focal sites. Interestingly, the ISP target for conception rate proved attainable with the adoption of RED-technology mixes. The conception rate in Sta. Ana was exceptional at 96.50% while the lowest was observed in Ayos Lomboy with only 85%.



*Mean values in the focal sites are significantly higher ( $p < 0.05$ ) than control sites*

**Figure 7.** Conception and mortality rates in the control and focal sites

**Mortality rate.** Figure 7 presents the low mortality rates of kids at different physiological stages of production among farmer-partners in selected villages of Guimba, Nueva Ecija. Pre-weaning mortality of kids was lower ( $p < 0.05$ ) by 6.1% while adult mortality was 5.72% lower among technology adopters. Common death of kids that happened before weaning was due mainly to herd health problems rather than maternally associated factors (Alo, 2003). Permanent housing provided ideal conditions for both the dam and offsprings that greatly ensured the survival of the neonates. Cruz et al. (2000) pointed out that appropriate goat-housing facilities are important components of sustainable parasite control that could minimize kid mortality. Moreover, feeding



with locally available fodder trees and mineral supplementation using urea-molasses mineral lick improved the nutritional status of the dam that resulted in better nourishment of the kids during suckling stage. Among the 145 kids born, 2 (1.37%) cases of dystocia were recorded. Although this was an isolated case, the bigger size of kids at birth brought about by the ongoing upgrading technology, might have contributed to this condition. On the other hand, only 2 (1.47%) cases of mortality were recorded among female breeding animals in the focal sites. The cause of death that occurred during the rainy season was respiratory infection.

### Market value of slaughter goats

As shown in Table 2, significantly higher live weight was obtained from goats raised within the focal sites. They were bigger and heavier at the age of 8 months. With superior genetic characteristics and bigger body size, goats raised by farmer-partners commanded higher market price than those raised by farmers in the control site with price differences ranging from PHP 1,011–1,046. Therefore, higher value of goats at market was derived by farmers who adopted the recommended technology mixes. This corroborates with the recommendation of Cruz (2005) who emphasized that financial benefits from goat upgrading can even be maximized if other basket of technology options such as proper feeding, improved herd health management, and sustainable parasite control will be adopted.

**Table 2.** Bodyweight and market value of goats raised by farmer-partners in the focal and control sites at 6 and 8 months of age

Project Sites	6 months		8 months	
	BW (kg)	Value (PHP/hd)	BW (kg)	Value (PHP/hd)
Focal Site	18.08*	2,169.60	22.58*	2,709.60
Control Site	9.65	1,158.00	13.86	1,663.20
<b>Difference</b>	<b>8.43</b>	<b>1,011.60</b>	<b>8.72</b>	<b>1,046.40</b>

\* Higher slaughter weight within column ( $p < 0.05$ ); PHP 120.00 per kg live weight

### Comparison of RED project output with baseline data and ISP targets

In general, there is an improvement in farm performance with the implementation of the project. Average birth weight increased by 0.55 kg (Table 3). The 2.30 kg birth weight of kids in the focal site is just 0.20 kg away from the ISP target of 2.50 kg. With the adoption of the different technologies espoused by the project, the birth and weaning weight of the animals is 92% and 92.46% toward attaining the ISP target, respectively. It is interesting to note that the 22.58 kg slaughter weight of goats produced in the focal site is 90.32% towards the attainment of 25 kg ISP target. Initially, the conception rate of the animals in the farm was 72%. However, with the implementation of the project, it was increased to 89.50%, about a 24% improvement from the baseline data. The 90% ISP target on conception rate is 99.44% attained with the project. Pre-weaning mortality was reduced from 30.57% to 14.4%; however, mortality in the focal site is still 4.4% higher than the ISP target of 10%. Results support previous findings (Alo 2008; Brown et al. 2003) that the primary benefit from technology adoption is decreased mortality and increased animal productivity.

**Table 3.** RED project outputs versus baseline data and ISP targets

Parameters	Baseline Data	RED Project	Improvement based on Baseline Data		ISP Target	% attainment of ISP Target
			Value	%		
Birth wt (kg)	1.75	2.30	0.55	31.42	2.5	92.00
Weaning wt (kg)	6.91	13.87	6.96	100.27	15	92.46
Slaughter wt (kg)	13.91	22.58	8.67	62.32	25	90.32
Mortality (%)	30.57	14.40	16.17	52.89	10	44.90
Conception rate (%)	72.00	89.50	17.50	24.30	90	99.44

### Profitability of adopted technology mixes

Table 4 presents the partial budget analysis per animal of the benefits and costs of RED-espoused technology interventions that include among others goat upgrading and stall feeding using multipurpose tree species which represent the common combination of technologies utilized by farmer-partners in the focal sites. The benefit of technology adoption resulted in 8.72 kg increment in live weight of goats produced by farmer-adopters which is valued at PHP 1,046.40 based on the selling price of PHP 120/kg live weight (refer to Table 2). The additional cash cost per head includes the buck service for upgrading at PHP 100, while the non-cash cost includes depreciation for housing at PHP 100 and labor for stall feeding or cut and carry at PHP 150.

Farmer-partners realized that a net cash benefit from raising bigger and heavier slaughter goats amounted to PHP 946 per head or a total net cash gain of PHP 11,352, given the average animal holding of 12 head per farmer in the focal sites. Considering all costs (cash and non-cash costs), the net value of incremental benefit amounted to PHP 696 per head or PHP 8,372 for 12 animals. Results showed that farmers could generate more income by adopting the recommended technology mixes in rural-based goat enterprises.

**Table 4.** Partial budget analysis of adopting technology mixes (housing, upgrading, and stall feeding) in the focal sites

Incremental benefit arising from technology utilization				Incremental costs arising from technology utilization		
<i>Nature of benefits</i>	<i>Form</i>	<i>Qty</i>	<i>Value (PHP)</i>	<i>Nature of benefits</i>	<i>Form</i>	<i>Value (PHP)</i>
Weight	Cash	8.72 kg	1,046	Buck service	Cash	100
				Dep'n cost	Non-cash	100
				Labor cost	Non-cash	150
Total additional benefit = <b>PHP 1,046</b>				Total additional cash cost + non-cash cost: <b>PHP 100 + PHP 250 = PHP 350</b>		
<b>Net value of incremental cash benefit ( cash benefit - cash-cost ) = PHP 946</b>						
<b>Total net cash gain (PHP 946 x average animal holding of 12 hd) = PHP 11,352</b>						
<b>Net value of incremental benefit (cash benefit – cash cost + non-cash cost) = PHP 696</b>						
<b>Total value of net gain (PHP 696 x average animal holding of 12 hd) = PHP 8,352</b>						

*Buck service = PHP 100 per successful breeding*

*Value of housing = PHP 5,000 with 5 years life span that can accommodate 15 hd of goats*

*Labor for cut and carry = 2 hr/day for 30 goats; 1MD = 8hrs; 1MD = PHP 100*

*Selling price per kg live weight = PHP 120.00*

## **Organization and enterprise development**

The RED projects' concept goes beyond production with evolving process toward developing goat-based enterprises as an innovative approach in livestock enterprise development, thereby transforming traditional backyard goat raising into a viable and profitable agribusiness venture. Goat-based rural enterprises with specific market plans and implementing guidelines were identified. As revealed in a focus group discussion, farmers agreed to strengthen the "Guimba Goat Raisers Association" to promote greater opportunities in the thriving and promising goat-based industries.

When "Goat Negosyo" was implemented through a seminar/workshop to develop the market and business component of the RED project, various business opportunities on goat-based enterprises were discussed. It provided farmers with a better and wider perspective about establishing village-type goat-based enterprises. This was attended by 46 selected farmer-partners from the focal sites.

During the planning session, the participants identified the following goat-based enterprises to be implemented in their respective areas:

- Community-based Breeding Enterprise - All focal sites
- Community-based Slaughter Goat Production Modules - All focal sites
- Community-based Forage Seedling Production - Sta. Ana, Bantug, Ayos Lomboy

As an output of the day-long seminar/workshop, a market plan was developed as the basis in launching the various goat-based enterprises identified by the cooperating farmers. It is envisioned that this important component of the ongoing initiatives in the focal sites will increase livestock contribution to household income that could eventually result into a sustainable rural-based business enterprise. A marketing plan was prepared using a prescribed format that includes the following important components:

- Description/Identification of the product/enterprise
- Characteristics of the product/enterprise
- Strategies to promote the product/enterprise
- Plans/strategies to market the product
- Cost of production and selling price of the product
- Income statement
- Return on investment

## **Implementation of identified goat-based enterprises**

Two goat-based rural enterprises were successfully implemented in the focal sites; these are the community-based goat breeding farm (buck service) and slaughter goat production modules. Initially, there were four operational community-based goat breeding farms located in the villages of Ayos Lomboy, Bantug, Faigal, and Sta. Ana. Since their establishment, more than 143 breeding were recorded that resulted in an 89.7% conception rate. With the training of another 10 identified goat raisers from different villages in Guimba, 10 additional community-based goat breeding farms were established at the end of 2011. The establishment of these goat breeding farms is funded by the Guimba local government unit (LGU) through the Office of the Mayor.

The Forage Seedling Production Module was not as promising as the two goat-based enterprises. Although it was the first enterprise to be established in Ayos Lomboy, the required

scale of operation was not followed as stipulated in the market plan. The volume of seedlings produced was too small to make it economically feasible.

### **Establishment of 10 additional community goat breeding farms**

As an off-shoot of the RED Project's on-going genetic improvement program in the focal sites, the Municipal leadership in Guimba sponsored a two-day training course on the establishment of community-based goat breeding farm in 10 selected barangays. The two-day seminar/training was conducted at the Municipal Hall, Guimba, Nueva Ecija. The training module consisted of lectures on RED Project's goals/objectives, upgrading technology, selection and culling, feed resource generation, housing concepts and design, and sustainable parasite control; and hands-on activities on restraining, disbudding and dehorning, castration, drug administration, and urea-molasses-mineral block (UMMB) preparation. The trainees were also toured around the different community-based breeding sites and they were provided with briefing materials indicating the experiences and success stories of the RED project farmer-partners in managing their goats. Moreover, a simple project planning exercise was done to conceptualize their timetable of activities to be implemented prior to the provision of bucks in the different villages.

The establishment of 10 additional community-based goat breeding farms in Guimba is a significant spill-over/radiation effect of the RED project's presence in the municipality. The training and provision of breeder bucks to these goat raisers were sponsored by the LGU of Guimba through the Office of the Mayor. On the other hand, goat farmer's counterpart is the provision of housing and sustainable feed supply for the provided breeder buck. Since the start of RED project, the LGU of Guimba has been very supportive to the attainment of the project's objectives as they see the huge potential of goat raising as a source of livelihood within the locality. The RED project team provided technical backstopping during the establishment and operation of their individual community-based goat breeding farms.

### **Social impact of the RED project**

After five years of implementation, the RED project has motivated 48 additional farmers from neighboring villages to venture into goat-based enterprises. The RED-espoused technology options are effective in transforming goat raising into a viable rural enterprise that attracted farmers within the locality to follow and emulate the original goat-farmers. Goat raisers' knowledge, attitudes, skills, aspirations, and social competence were enhanced. These farmers were considered as radiation or ripple effect of the RED project either farmers visited the original goat-farmers or has attended the cluster advocacy briefing and orientation conducted by farmer- experts or scientist. Other farmers and private individuals in the neighboring villages have signified their interest to enroll in the upscaling of the RED project. Indeed, the most striking impact is the so-called "KASA" change in the farmers' lives—"K" stands for knowledge, "A" for attitude, "S" for skills and "A" for aspirations of the farmers. Eventually, they became promising and practicing entrepreneurs.

## **SUMMARY AND CONCLUSIONS**

As animal productivity improved, enabling environments for self-help were created, enhancing competence of the communities in the process. Farmers learned to organize themselves into associations, eventually claiming their stake not just in the village market but in the province and regions, as well. Over time, markets were established, prices improved, and goat-based operations become more viable. The LGU supported the expansion of the project and refocused their priorities towards goat raising.



All efforts not only made the attainment of the goat ISP targets possible, but more importantly, it facilitated the empowerment of communities depending on goat for their livelihood. As the project continues, traditional goat raising is thus transformed from subsistence farming to profitable enterprises. RED is not just about successful science-based goat raising; it is about building enterprises and generating options to enrich farmers' lives. The higher live weight of slaughter animals as influenced by the adoption of technology options which are integral components of rural-based goat farming showed their potential in increasing household income. This provides evidence that goat-technology options should be adopted by more smallholder farmers for greater impact to the community. In effect, this could bring genetic improvement program (GIP) closer to its vision of mainstreaming and institutionalizing the creation and establishment of goat-breeding and selection programs within the LGU.

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