

Perceptions on Sustainable Livestock Training in the Biosphere Reserve La Sepultura, Chiapas, Mexico

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ABSTRACT The perceptions on sustainable livestock training given to farmers from different communities of the Biosphere Reserve La Sepultura (BIRESE) were analyzed. The research was conducted from January to December 2011 through a socio-anthropological study based upon an evaluative diagnosis, with semi-structured interviews, ethnography, observations, and collection of training materials. The information was synthesized in tables, considering the points of view of livestock farmers, representatives from the institutions supporting the training and the training team. The analysis focused on the background, topics, methods, results and expectations of the training. Results showed that farmers and representatives of the different institutions perceived few changes in livestock systems as a consequence of the training given in the context of BIRESE. However, farmers stated that there were some changes in the system, for example, the increase of production as an indirect result of the training received. Both the farmer groups and the representatives of the institutions are optimistic for the future and acknowledge that cattle raising can be done in an environmental friendly way. The reason of this perception is the permanent presence of actors promoting sustainable livestock. Farmers consider adopting the acquired practices as a very important issue, although they refer to lack of financial resources and technical assessment as the main limitations for its implementation. It is concluded that the perceptions on training are very similar among all actors involved in the BIRESE, which can be considered as an advantage for the initiatives or processes to be encouraged at short and middle terms in relation to sustainable livestock.

INTRODUCTION

The training to farmers in Mexico started in the early 50's of the last century, conducted by governmental extension agencies. Linear models were used which implicated that the information originated from research centers who passed it on to extension workers, who on their turn “transferred” it to producers (Aguilar et al. 2010). In this sense, farmers’ training has generally been made from a conventional scheme. This granted the privilege of the trainer-instructor as

persuader or simple protagonist of commercial programs, conceding a passive or receptive role to the people who were trained. This imposed scheme assumes that professional knowledge is superior and may fulfill an emptiness of knowledge that should not exist (García 1997).

At present, training represents one of the most important components of farming systems and for that reason, different methods, models, approaches and techniques have been developed to meet “the emptiness” of farmers’ knowledge (Guevara 2007). However, the training methods based on traditional schemes prevail in the rural context of Mexico, giving priority to the technology adoption as an objective instead of as a result of the process itself. This has demonstrated that many efforts prove to be weak, inefficient and lack technical adaptation to the diverse agroecological, socio-economic and cultural contexts (Guevara 2002; Alemán et al. 2003; Ovando 2010).

During the last years, some stakeholders of both the academic and development sector have

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proposed to properly address training towards people, basing it on alternative models using tools based upon a Freirian constructivist model (Guevara et al. 2012; Rodríguez et al. 2009). It has been proposed to work without excluding the training main objective, which is to strengthen farmers' capabilities in order to adapt themselves to a changing productive context and, thus, maintaining and improving their farming systems. This type of training has been conducted mostly in regions where the preservation of natural resources is an essential task, due to the importance of using, managing and preserving the soil, water, flora and fauna in priority areas (Gómez et al. 2010, 2012).

The Academic Research Group on Agroforestry (ABLA) of the Faculty of Agricultural Sciences of the Autonomous University of Chiapas (UNACH) has provided some training in order to attend certain technical problems of extensive cattle raising from villages in, or surrounding natural protected areas, at the time when Mexican extension services and programs to attend the agricultural sector were privatized. The training proposed by ABLA has been requested by institutions in charge of environmental programs from the government, and by international agencies promoting sustainable technologies, particularly in the natural protected areas (NPA) of Chiapas (Gómez et al. 2011).

However, neither farmers' achievements nor application and effectiveness of methods and tools used during the last eight years are well-known. Apparently, it is because of the lack of attention of stakeholders involved in the training. In this sense, the objective of this research (which took place between January and December 2011) was to construct and analyze the perceptions of farmers and representatives of institutions with regard to the training provided. In other words, to collect field evidence on the effectiveness of methods and tools used during the training sessions. This was done through a study on the perceptions of farmers and institutions regarding the training process on sustainable technologies implemented by the ABLA, particularly in communities from the buffer zone and surrounding areas of the Biosphere Reserve La Sepultura (BIRESE), as part of the NPA system in Chiapas. Field work was conducted and based upon a socio-anthropological study, as suggested by Guevara (2007), in order to gather information by means of participatory approach-

es. This study intended to reconstruct the training processes considering the implemented curriculum, materials used and tools developed by ABLA, and to identify the main training bottle necks. Thus, field evidence was collected from farmers and representatives of institutions, and different perceptions were drawn and analyzed. Field information was corroborated with inputs from the ABLA members. This was done with the intention to determine the main elements that could lead to improvement of the training programs offered by ABLA and others in the UNACH.

METHODOLOGY

Study Area

The field study was conducted with 44 farmers of 12 communities of the BIRESE and located at Villaflores, Jiquipilas, Arriaga and Tonalá municipalities. All the farms are located in the Southwest region of Chiapas, in the northwest portion of Sierra Madre. The BIRESE is located at latitude 16°00'18" and 16°29'01" North, and at longitude 93°24'3.4" and 94°07'35" West. It borders on the central depression of Chiapas to the North and Northeast, to the East with Sierra Madre, to the South with the Pacific coast of Chiapas and to the West with the foothills of the Sierra Madre, towards the Oaxaca state; it comprises the municipalities of Arriaga, Cintalapa, Jiquipilas, Tonalá, Villacorzo and Villaflores (CONANP 2006).

The field study was carried out from January to December 2011. The methodology used was proposed by Guevara (2007) and Guevara et al. (2009, 2011). It was based on a reconstruction of the local perceptions from a socio-anthropological approach. The field research consisted of a preliminary consultation on the general information about the training provided by four members of the ABLA in the facilities of the Faculty of Agronomic Sciences of the UNACH, and the identification of institutions financing the training during the period 2002-2010. Second, 44 farmers and 6 representatives of institutions of the CONANP-BIRESE and the Zanatenango Basin Committee (BCZ) were individually interviewed in a semi-structured manner. The farmers interviewed owned paddocks and cattle and have lived permanently in the community. They were also willing to participate in the interview

sessions and field tours. The tours around farmers' paddocks were made to verify the information retrieved from the interviews and; finally, informal conversations were also carried out to collect missing information. A data matrix in Excel was developed with the information gathered, in order to represent percentages and to do a systemic analysis in relation to the perceptions obtained. A similar analysis was addressed to the training components: precedents, subject matters and methods, results and expectations. Likewise, an ethnographic interpretation was also conducted from the opinions of some interviewees, applying approaches developed by Chambers (2000), Long and Long (1992) and Nuijten (2003, 2005).

RESULTS AND DISCUSSION

Diagnosis of Training

The results of the training diagnosis are shown in Table 1. It is relevant to state that the communities in which cattle farmers live are char-

acterized by extensive bovine production, as it is their main household income strategy, followed by maize sowing and beans for self-consumption. In some cases coffee is also growth for both marketing and self-consumption.

Table 1: Expectations on training in cattle raising within the BIRESE

Variable	Representatives of institutions (%)	Farmers (%)
Interest in more training	100%	100%
Matter preferred: SPS, artificial insemination, animal nutrition	100%	100%
Monitoring of the training provided	100%	86%
Cattle rearing as a risk for the BIRESE	80%	100%
Willingness to share experiences	100%	100%

The institutions in charge of involving the ABLA in the trainings are CONANP, BIRESE and BCZ (Fig. 1). Initially the CONANP request-

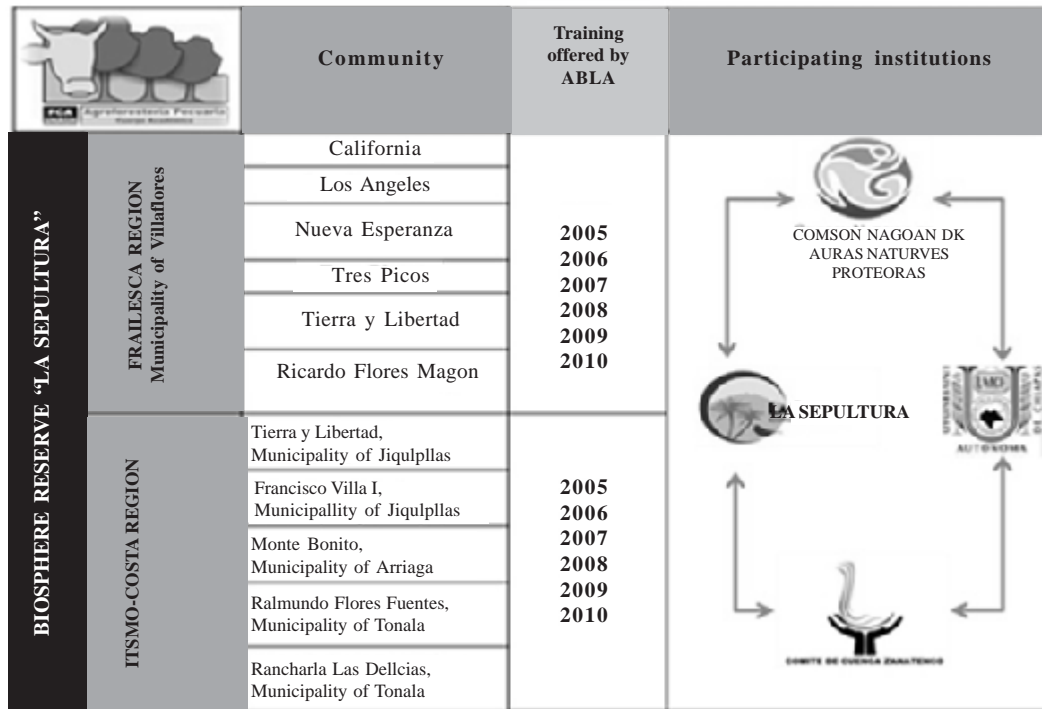


Fig. 1. Summary of training provided in the BIRESE communities during 2005-2010

ed the training services for the farmers involved in cattle raising in surrounding or buffer zones at the Biosphere Reserves in Chiapas from 2004 to 2008. The trainings were given in order to find alternative practices that are supposed to contribute the preservation of natural resources, and hold the cattle frontier inside the NPA.

The inquired livestock farmers agreed on their participation in the training provided by the ABLA from 2005 to 2010, seeking for feeding alternatives. The topics farmers remembered to have boarded were: the silvopastoral systems (SPS) establishment through Farmer Field Schools (FFS), the exchange of experiences on sustainable cattle management for intensive livestock raising and the integral health management of animals. The majority (60%) of the BIRESE farmers are dedicated to dual-purpose cattle (meat and milk production). They generally use creole breeds which are resulted from cross-breeding with Zebu and Swiss-American (Araña 2009).

The institutions representatives affirmed to have requested ABLA to provide trainings to farmers from inside or surrounding communities of the NPA, particularly on topics like: animal feeding, SPS, protein banks, nutritional blocks and forage trees. However, they admit that trainings on topics related to herd improvement are scarce, especially regarding health and genetics. These results concur with CONANP (2006), De la Cruz (2011) and De la Cruz et al. (2011). Their studies also asserted the existence of several livestock problems in BIRESE, such as environmental deterioration, forest fires, lack of permanent training programs or technical assistance and inappropriate cattle management. In this sense, Guevara (2007) and Cruz (2009, 2012) found in this NPA that, during the last ten years, cattle activity has increased around 30%; likewise, at present, about 20% of the total area of the reserve is used for this purpose. The same authors insisted on the fact that training should be looked as a complementary activity to prevent soil and water sources deterioration and flora and fauna extinction, caused by non-sustainable activities, like extensive livestock and conventional agriculture.

Training Provided: Perceptions from Representatives of Institutions *versus* Farmers

a) Training Precedents

The perceptions of all the interviewed representatives from institutions confirmed that farm-

ers received training between 2005 and 2010; likewise, all of them easily remembered the ABLA participation. On this respect, Alexser Vázquez, chairman of the Reserve, affirmed: "...we started in 2003 and 2004 by inviting different professors from the UNACH to train farmers on sustainable practices for livestock; and in 2008, we already had a direct relationship with the ABLA professors of the Faculty of Agronomic Sciences". Similarly, the representatives of institutions confirmed that training was conducted annually during the aforementioned period, supported by organizations as CONANP and BCZ, who still participate directly in the reserve. They acknowledge, in this way, having been in charge of managing training and finding professionals to conduct it (Figs. 1 and 2).

The 95% of farmers declared having received a series of training sessions between 2005 and 2010. This was confirmed by Juan (37): "We received continuous training but I remember we were trained in the California camp, together with other farmers from neighboring ejidos [type of Mexican land tenure]; actually this was in 2009". Meanwhile, 89% of them easily recalled the trainings provided and those people who transmitted the knowledge on new technologies, as mentioned by Agustín (38): "I remember they introduced themselves as professors of the UNACH"; in this sense, Humberto (38) said: "It was an exchange of experiences in a professor's farm, where farmers from different communities came together".

The farmers (95%) declared the ANP and the Zanatengo Valley Program (CRZ) as resource providers for such training. According to farmers, the institutions' mandates consisted of leading a training program that could contribute to solving the main problems of livestock, as their main purpose was to assure the natural resources preservation.

This information was consistent with the information provided by the ABLA members, who confirmed that they were contacted by CONANP and CRZ officers during 2006-2008 to conduct training in the communities of the BIRESE. Regarding this, Guevara et al. (2010) and Guevara (2009) affirmed that the ABLA worked on a model called Units of Educational Link (UEL). This model consisted of an educative and training strategy for assisting cattle raising problems in the communities of the BIRESE during 2007-2009. The model applies the Farmer Field School

(FFS) approach, with the intention to strengthen local capacities. In the FFS, environment-friendly practices were promoted to counterbalance the problems caused by extensive livestock such as deforestation.

Hence, the study verified that the perception related to the starting point of the training is similar for all the stakeholders. There is consensus that the training began in 2005, and was given by members of the ABLA (UNACH), and having participated for more than three years in training events (Fig. 1 and Table 1).

b) Topics and Methodology of Trainings

In Figure 2, it is shown that 93% of the representatives confirmed that both they and the farmers received a printed copy of the materials used during the training sessions. This included technical bulletins, manuals, brochures and magazines, which explained the steps to be followed to apply new and sustainable practices. A 95% of the representatives expressed that farmers appreciated the teaching documents. They also confirmed that some practical exercises were conducted during the training, such as techniques for the identification of local forage species, and micro-silages and nutritional blocks

elaboration (Díaz¹ and González²: personal communication 2011).

Similarly, all institutional representatives stated that farmers initially had scarce knowledge on the topics dealt with during the training, since almost none of them had ever received courses on sustainable bovine livestock. Therefore, the topics were new for both farmers and representatives. According to them, this also represented a very significant learning for farmers. In this sense Trujillo (2009) affirmed that SPS are consolidated as an option in regions with NPAs, towards improving animal productivity and allowing the turning of extensive livestock into semi-intensive.

In the case of farmers, Figure 3 shows that 93% was satisfied with the training. This perception was related to the type of training, and they emphasized the use of theoretical and practical exercises by trainers. Besides, they denoted that such exercises were very distinctive, due to the use of local natural resources as didactic materials; in this case, the local forage tree species the farmers have in their farms. In this sense Juan (37) commented: *“The training was theoretical and practical, and included discussions on topics like silvopastoral systems, cattle feeding and elaboration of nutritional*

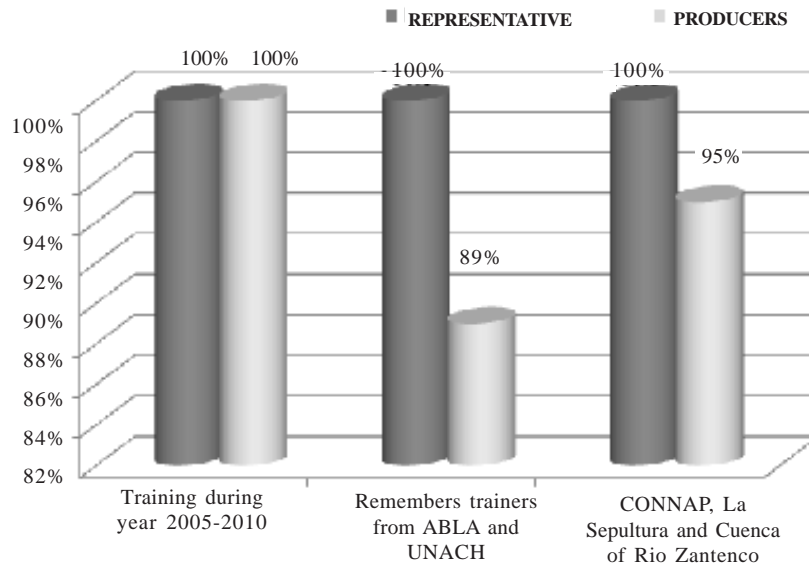


Fig. 2. Perceptions on the precedents of the training provided in the BIRESE

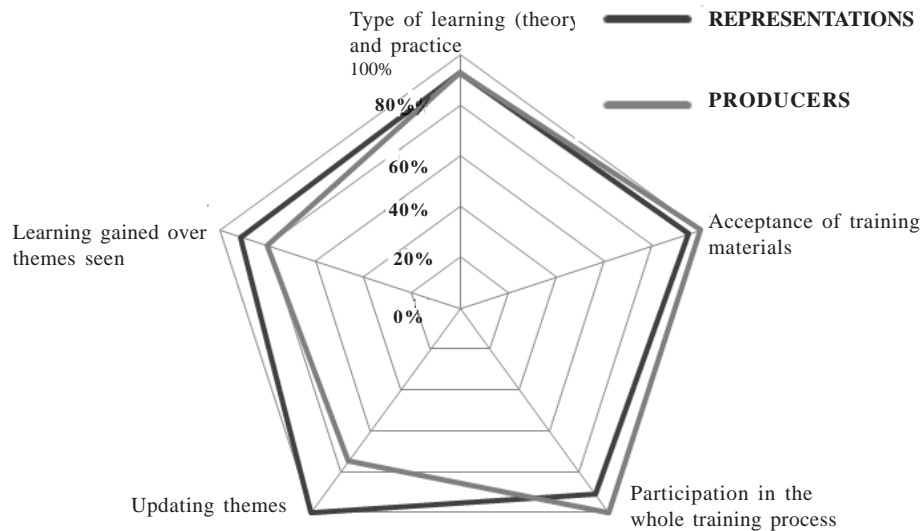


Fig. 3. Perceptions on the topics and methods used for the training provided in the BIRESE

blocks, apart from the protein banks they taught us”.

In this respect, 100% of the farmers appreciated training documents and mentioned: *trainers are well prepared and experienced persons*. A 75% affirmed that taught topics were new and 100% liked the supportive materials. Besides, active participation of all cattle farmers invited to the training was excellent. Moreover, 80% of them admitted having learned new topics like: identification of local forage trees, seeds collection and scarification, establishment of nurseries, tree transplanting or the elaboration of nutritional blocks. In this sense, Martín (38) said: *“It was new for me as I did not know trees could be used as forage”*. These results coincide with Aguilar (2010) who asserted that an efficient production of local and regional supplies may increase the livestock offer in the agricultural sector.

Farmers and institutional representatives agreed on training topics and methodology, and acknowledged the approach used by ABLA. Besides, they also expressed about their learning; and to testify it, field visits were done in order to see the activities implemented on their paddocks and if didactic materials were kept or used as supporting documents. According to López et al. (2008), these are indicators of well training.

These evidences concur with the interviews conducted to the ABLA members, who stated

that training to cattle farmers from the BIRESE was carried out mainly in the facilities of Los Angeles camp, located in the *ejido* California, Villaflores municipality. Concerning the topics and methods used, the group based its training on the diffusion of sustainable technologies. The methodology used was the FFS and it was addressed for the strengthening of local capacities and the technological innovation in SPS (Gómez et al. 2010, 2011, 2012; Nahed et al. 2010).

In regards to this matter, Thijssen (2003) mentions that the FFS and the Participatory Technology Development (PTD) are approaches for sustainable development, characterized by sharing knowledge and its comprehension through group learning, mainly on the basis of adult education strategies. In the BIRESE, farmers are intended to learn and/or generate proper alternatives for sustainable livestock, using technologies for preserving natural resources. Hagmann and Guevara (2004) and Rodríguez and Guevara (2009) regard this as necessary, and affirm that a participatory approach for local innovation helps the evolution of positivist into constructivist science.

c) The Training Results

According to Figure 4, 100% of the institutional representatives interviewed assured that farmers liked the training due to its high-quality,

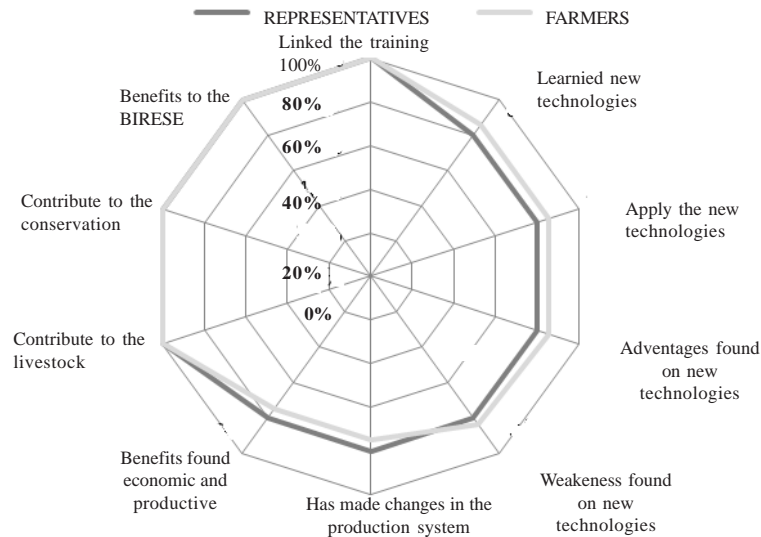


Fig. 4. Perceptions on the results of training

like affirmed by Noé González, one of the BIRESE officers: *“Of course farmers liked the training, even I liked it because trainers are professionals and gave priority to the technical attention of problems... besides, they (trainers) have an important balance between theory and practice, that was very nice”*.

The 80% of institutional representatives also indicated that farmers got a great learning opportunity and to apply new techniques, even some initial results in the cattle plots were about to be seen, although farmers are at an initial process of change in their livestock practices. Those farmers who have already learned and applied some new practices are into a permanent learning process, as mentioned by the BIRESE manager, Vázquez³: *“It is a process at middle and long term, in which farmers try, modify and apply the new techniques, but consistent results are still missing, it is a matter of time, but the training and technical assistance is still needed.”*

The same 80% of the representatives consider that farmers perceive advantages on the new techniques, since they are easily accessible, allow the use of local resources and can be applied at low costs. That is, it is simple for farmers to conduct the SPS practices within the BIRESE. In respect to the limitations, the same percentage denoted the economic aspect as a disadvantage, as the SPS imply a relative high initial establishment costs. In addition, 60% of the farmers are not yet interested or not entirely persuaded of investing in forage cutter machines

as they expect to receive them for free by the BIRESE. Moreover, the representatives consider that farmers do not have yet the most tangible economic and productive benefits related to the use of the SPS. Nevertheless, they do notice an initial decrease of expenses to obtain animal feeding, especially those committed to milk production. Vázquez and González (officers) agreed in the following: *“The real benefits for the farmers are not yet assessed, as specific methodologies are necessary, but the first steps are already being walked out”*.

In relation to the BIRESE training benefits, 100% of the representatives expressed that farmers are now more conscious and have also observed some differences in cattle management as result of the training, but real and direct benefits for the reserve are still in their early stages. Darinel Díaz (BIRESE officer) stated: *“...it is important to describe, initially, everything we observe in the field, as the forest coverage increasing or the root growing of tree species. The CO₂ sequestration is an immediate effect not yet measured in the BIRESE, and it is actually a product of the trees growing as part of the SPS, and it would allow farmers to receive a compensation for environmental services”*.

However, 86% of farmers acquired knowledge on new techniques, and made use of them. The same percentage has noticed some benefits of its use on their paddocks, for example, the capability of carrying out the practices due to the availability of materials and the low costs of some of these. Like a farmer named Oscar (28)

confirmed: *“We find advantages because the plant materials are local and the expenses are not too high... It is just a matter of willingness and time.”*

A 75% commented on some benefits from the training, as Carlos (39) stated: *“We have benefits because we were used to destroy our forest for extensive cattle practices and now we have learned to integrate forage trees and reduce the paddocks”*. Antonio (57) said: *“Certainly, the benefits are not as many as we would like, but we used to spend a lot of money for feeding our cattle... with the forage trees we expect to save a bit of money or if I feed my animals with forages from the home-made silages.”*

Nonetheless, 84% of the farmers confirmed that buying some extra materials and other necessary equipment for a proper management has been one limitation, since these are very expensive. José (38) stated: *“The forage cutter machine represents a problem for making my silos as it is very expensive...”*, while Ramón (59) said: *“The forage cutter machine was one of my limitations... I could save some money and now I am about to buy my miller, but now the problem is a rodent pest... that is why I make the silages on plastic bags, but they are very expensive.”*

Yet, 75% of the farmers considered their production system have slightly changed, as they use some of the recently acquired techniques or technologies: silos, protein banks and forage backups, and have also reduced the massive use of their paddocks. The same percentage stated that they have already noticed some savings resulted into economic benefits, mainly because the quantity of animal feeding to be bought is not equal in the dry season, and part of that feeding comes from the pasture silages, as well as from the protein banks. In spite of this, they consider benefits are still low. On the other hand, all farmers mentioned that the use of this knowledge contributes to cattle improvement, preservation of the natural resources and, thus, benefits the reserve.

These perceptions coincide with versions of the ABLA members, who state that farmers learned to use local forage tree species for cattle feeding. However, they were not well acquainted with the manner many farmers apply this knowledge in the BIRESE, as those that received the training have not been followed up. They have only declared to experience few changes on their production system, as the techniques

or technologies have not been applied despite knowing about them. This was also referred to by Pérez, from the BCZ: *“Unfortunately, not everybody has applied the techniques...but I consider they have changed their attitude and are more interested; and at this time, those not daring to adopt these technologies are scarce”*. Besides, a follow up of activities implemented has not been done by the institutions who demanded the training.

d) Expectations on the Training

The perception of all the representatives is that 100% of farmers would like to receive more training to gain new knowledge and learning other techniques to be applied on their livestock systems. Likewise, they know that farmers agreed on the topics, which could be according to the local needs and their importance to enhance the livestock system, such as the SPS diversification, artificial insemination, animal nutrition, management of pastures and also, animal diseases. The representatives also consider that farmers need additional technical assistance to ensure the effectiveness of training. That is why they suggest offering this service. This corresponds with Trujillo (2009) who states that cattle farmers in the BIRESE do not have a permanent training and technical assistance program to ensure the farming systems sustainability.

In this sense, 80% of the representatives confirm that cattle breeding activities still affect and jeopardize the core areas of the BIRESE, as there are some cattle farmers that do not respect the agreements between the communities and the CONANP, especially on respecting the forest and implementing environmentally friendly practices. All of the representatives agreed that they would like farmers to share their experiences and knowledge with others, in order to acquire strength their knowledge and share successes and failures in cattle raising within the BIRESE.

Table 1 shows that all of the interviewed farmers would like to receive more training in order to gain additional knowledge, as confirmed by Mariano (36): *“Certainly, we would like to participate in more courses because we want to continue learning, as you can see we had little possibilities to go to school... in this case it is for our benefit as we depend on livestock, and we want to our production to increase.”*

This shows the interest in training of both parts, as they want to assure and gain new knowledge for economic and productive benefits. On this matter, the farmers were asked about what topics they would like to be trained on, and the unanimous responses were: more about SPS, specifically on protein banks, animal nutrition and genetics (artificial insemination). Juan (28) said: *“Training on artificial insemination would help us improve the animal breeds and, thus, it will result in a better quality of dual-purpose production”*.

An 86% of farmers suggested more training, but also major technical assistance, as well as a monitoring strategy, as confirmed by Jesús (38): *“We were trained but we would like to be constantly advised, because that way we could proceed correctly and with the technical assistance it would be much better. We can conduct the activities properly and we will not fail.”*

Similarly, 100% of the farmers considered that cattle raising still endanger the BIRESE; however, the damages could be less if new, more sustainable, technologies would be put into practice. That is why the CONANP representatives have trained them to improve the cattle systems, in a way they can preserve natural resources and be environmentally friendly. In this regard, Horacio (54) commented: *“One of the main problems here is deforestation, but now I take care of the trees and make fewer paddocks, so I do not affect nature as much as I used to do”*.

All farmers furthermore confirmed they would like to share their experiences and learn new techniques to be used on their paddocks, as mentioned by Franco (39): *“Exchanging experiences would be great, I will share my experiences with some other fellows and them with us, and we will progress for our benefit and that of the reserve.”*

CONCLUSION

The ABLA has provided trainings to the communities within the BIRESE, applying a combination of traditional (top-down) and participatory approaches. It was proven that the knowledge of local cattle farmers was complemented with an initial implementation of new techniques and technologies. First, to improve their cattle production and later, to contribute to the natural resources preservation. It is concluded that the training has given alternative practices in exten-

sive livestock which are more environmentally friendly. Through its methods and participatory approaches, the trainings furthermore have proven to lead to a higher consciousness and real interest from farmers to manage their resources in a more sustainable manner. However, changes are not yet sufficient, because there is still a lack of economic resources to continue the trainings and counseling of farmers. Regarding this matter, the stakeholders believe that better results will be achieved in the middle and long terms, as soon as they actively participate towards an environmentally friendly livestock.

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NOTES

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