PERCEPTIONS OF LIVESTOCK EXTENSION EDUCATION DELIVERY AND
GLOBALIZATION EFFECTS AMONG DAIRY FARMERS IN THE NORTH COAST
OF HONDURAS

By

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This thesis is dedicated to my parents, Eduardo and Dilcia Toro.
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Abstract of Thesis Presented to the Graduate School of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Master of Science

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By

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The main purpose of our study was to determine the perceptions of dairy farmers as to extension’s educational delivery and with respect to globalization effects in the north coast of Honduras. The design for our study was descriptive research. Structured interview guides were developed for farmers, service providers, and farmer association board members located in the north coast of Honduras. Two major groups of farmers were studied. The first group was made up of 41 members of 20 Centros de Recolección y Enfriamiento de Leche (CREL). CRELs are farmer-owned milk collection and cooling centers located along the north coast of Honduras. A stratified sample based on location and length of operation of the CREL was used to select CRELs. The second major group of farmers was made of 10 large farmers selected based on the leadership they provide to the dairy industry; they had no affiliation to CRELs. Results indicated that dairy farmers in the North Coast of Honduras have limited access to formal extension services. Most of
the farmers had been exposed to sporadic, short-term technical interventions that do not include follow-up activities. As a result, service providers such as concentrate and veterinary supply companies offer educational programs on a regular basis. Farmer associations encourage and sponsor these programs but their quality is extremely variable.

CREL farmers in general have positive attitudes toward extension and are satisfied with existing support services. Nonetheless, CREL farmers had difficulty expressing their needs and envisioning extension’s benefits. Informal networks similar to farmer-to-farmer extension have emerged among CRELs as a result of the lack of extension. On the other hand, large farmers see a need for extension but believe there are major obstacles for its development. Large farmers believe the national extension services are not responsive to their needs; and expressed their need for specialized services. Both CREL and large farmers had little understanding of the potential implications of free trade agreements. Consequently, most farmers see treaties as a negative event that could seriously threaten the existence of the Honduran dairy industry. The most common extension delivery methods used by nonformal education providers are one-day seminars, result demonstrations, field days and farm visits. More-educated farmers prefer participating in programs where both foundational theory and hands-on and applicable practice are used to deliver new knowledge. Less-educated farmers prefer hands-on and experiential-learning delivery methods only. Long-term educational needs for dairy farmers are not limited to technical aspects of milk production. Finally, leadership training and organizational development are also key areas that must be targeted in CRELs and farmer associations.
CHAPTER 1
INTRODUCTION

Background of Study

Our study addressed the field of extension education services in the dairy industry of Honduras. Nonformal education programs on milk production are offered by extension and other providers (such as input suppliers and farmer associations). Using structured interview guides, we examined farmers’ perceptions about extension education programs available in four geographic areas in the north coast of Honduras. Our study sought to determine the most appropriate methods for delivering educational programs to stakeholders in the dairy industry. We also assessed farmers’ perceptions about the implications of free trade agreements being negotiated by the Honduran government at the time of our study. Felt and ascribed needs of farmers were also documented.

Milk Production in Honduras

Honduras is the second largest milk producer in Central America. According to FAOSTAT (2004), 597,500 metric tons of milk where produced in 2003 making it the country’s second most important agricultural commodity after coffee. The dominant production system is dual-purpose (85%) cattle production, where cows are milked by hand once a day. The genetic base in this production system is Bos indicus (mainly Brahman) and crossbred with Bos taurus breeds (usually Holstein or Brown Swiss). The most abundant feed resources are native forages and crop residues, but their quality and quantity is low. Consequently, milk productivity is also low (1,700 to 1980 # milk/lactation). Another constraint is that forage supply is related to availability of rains.
During the 6-month dry season, the quantity of forage available is minimal, especially grasses. This causes milk production to drop sharply compared to the rainy season when there is an abundance of green pastures (Holmann, 2001). Milk production during the dry season is about 40% lower compared to the rainy season (Argel 1999). In contrast, in the humid tropics, the lack of forage occurs during the rainy season due to excessive rainfall, lack of sunlight (clouds), and over-saturation of water in the soils. Overall, the industry there has been characterized by low milk productivity, and the average daily milk production per cow is 8.0 lb (INE, 2002).

According to the IV Censo Nacional Agropecuario in 1993 and subsequent estimations of the Instituto Nacional de Estadística (INE,1993), approximately 85,000 dairy farmers nationwide are distributed in 5 geographical areas: northeast, northwest, central, southeast, and southern (Jara Almonte, 1999). However, experts in the field believe that the number of dairy farms has decreased instead of remaining constant in the last decade because of natural disasters like hurricane Mitch and the difficulties small farmers face in marketing milk.

Dairy farming in Honduras is very labor-intensive (LSU Ag Center, 2002). The dairy industry employs approximately 300,000 people living in rural areas, which accounts for nearly 35% of the economically active population of the agriculture-and-livestock sector of Honduras (IICA, 2003). In turn, milk production has considerable importance in the economy of the country, as a source of employment and also as a major food supply, as a wealth generator, and for its contributions to the agro-industrial sector (INE, 2002).
Milk Marketing

Milk in Honduras is marketed to two types of processors: the industrial circuit and the artisan circuit. The industrial circuit collects and markets about 25% of the milk produced in Honduras (Umaña, 1998). Honduras has 5 industrial milk plants. The industrial circuit is also known as the formal sector, because milk is pasteurized and dairy products are usually sold in packaged form under reasonably good-quality standards. Industrial plants usually buy milk from farmers who produce good quality milk. The milk price paid to farmers by industrial plants is highest (about $0.26 to $0.32/kg), and it is constant throughout the year. However, this price is obtained by less than 5% of dairy farms because plants require milk to be cooled in order to obtain a product of higher hygienic quality; and farms must be located along roads with easy access throughout the year (Argel, 1999).

The remaining 75 to 80% of the milk is marketed by the artisan circuit, which is mainly constituted by small-scale rural cheese factories that do not pasteurize milk. Artisan production is also known as the informal sector because this small family-type of enterprise does not pay taxes. The milk price paid to farmers in the informal sector is generally at least 20% lower than the price paid by the formal sector because it is collected as hand-milked warm milk (i.e., not cooled) and thus, its quality is lower and it has a shorter shelf life (Holmann, 2001).

Support Services Available to the Dairy Industry

In the past half-century, a number of rural-development organizations have emerged in Honduras. These include state agriculture institutions, farmers’ organizations, and non-governmental organizations (NGO’s). Agricultural institutions and projects that have attempted to serve rural-development needs have been composed
of a variety of national, international, public, and private institutions. However, projects were deficient in terms of stakeholder input, and were designed and conducted with limited farmer participation. These projects made extensive use of outside experts, and were constituted primarily with an agricultural focus. The underlying assumption was that if agricultural productivity could be increased, then rural-development would take place (Carrasco & Acker, 2003). Services available to dairy farmers have also been limited by the lack of permanent extension-service providers in the most important production areas and by the lack of expertise in the providers.

**Directorate of Agricultural Science and Technology (DICTA)**

As a result of the Modernization Law for the Agricultural Sector in Honduras (passed in 1992), the Agricultural Technology Generation and Transfer System (GTAA in Spanish) was radically reformed, and the Directorate of Agricultural Science and Technology (DICTA in Spanish) was created. DICTA is a decentralized entity, under the Secretariat of Agriculture and Livestock (SAG in Spanish). DICTA’s main functions include privatizing services for generating and transferring agricultural technology, and regulating the market for these services. In Honduras, government institutions have provided extension services free to farmers for the last 40 years. Unfortunately, this has led to serious sustainability problems and low-quality services, lack of response to farmers needs, and costly programs (Hermosilla & Macías, 2002).

Currently DICTA offers services to small-scale commercial farmers through contracts (using donor and government funds) with private-sector service providers such as domestic consulting firms, NGOs, or individuals. The contracts are tripartite. Farmers, service providers, and a government representative (in this case, the office of Modernization of Agricultural Technology Services Project, or PROMOSTA) sign the
contract/agreement, which requires that specific services to the farmers’ organization be provided in exchange for payment. The payment to the service provider is a combination of funds from a grant fund and farmers’ contributions. Farmers’ contributions are made on a gradually increasing scale, with the annual contribution increasing from 10 to 25% over 3 years.

In addition to the agricultural sector’s modernization, the National System of Agricultural Research and Technology Transfer (SNITTA in Spanish) was formed. This group organizes and promotes the activities of the Agricultural Technology and Transfer System (GTTS in Spanish). SNITTA was designated to coordinate the actions of the public and private sectors and provide services for the generation and transfer of agricultural technology, allowing the private sector and farmers to participate more fully in the planning stage of programs (Hermosilla & Macías, 2002).

DICTA has six regional offices in the country: (1) Central-western, (2) Northeast, (3) Northwest, (4) Southern, (5) Central-eastern and (6) North coast. Each regional office is responsible for coordinating and diffusing technology-transfer systems and for supervising and evaluating private firms and consultants (DICTA, 2004). Other than DICTA there are no other permanent extension service providers in Honduras.

Nongovernmental Organizations (NGOs)

Approximately 4,000 NGO’s are registered in Honduras. However, it was not until recent years that NGOs have come to play a major role in the dairy industry. Despite the existence of a variety of NGO networks and the Association of Non-governmental Organizations (ASONOG), as well as eighteen NGO networks, the NGO community is relatively fragmented, lacking coordination and cooperation among different sectors including government and other institutions, such as universities. There is general
consensus among the NGO community that competition for project funds took precedence over research and learning. International donors contribute the majority of financial and other resources to NGOs (Meltzer, 2001).

**Farmer Associations**

Farmer associations represent farmers' interests at the national level and have proven to be very influential in the acquisition of external funds for extension programs, and this is most prevalent in the north coast of Honduras. Nevertheless, farmer associations have not been characterized for offering services that can lead to improving the conditions of farmers through educational programs or any other type of assistance. Most associations have very limited impact on their affiliates and although many are concerned with issues of food security, land reform, access to markets and technology, persistent divisions within farmer associations and other organizations continue to weaken their intentions. At the governmental level the sector remains characterized by division due to distinct political affiliations (Carrasco & Acker, 2003). Political favoritism is a major inhibitor of the development of the sector.

**Recent Events Affecting the Dairy Industry of Honduras**

During the last decade, a series of events have affected the dairy industry of Honduras. Hurricane Mitch struck Honduras in November of 1998 causing serious damage to the cattle industry. Some 78,000 hectares of grazing land were destroyed. Additionally, about 30,000 dairy cows were lost and this accounted for approximately 15% of the stock in the country (IADB, 2002). In response to the disaster, the United States Agency for International Development (USAID) allocated resources to revitalize the rural economies affected by hurricane Mitch in Honduras. Within the dairy sector it aimed to improve dairy farms at two levels: technical aspects of milk production and
farmer organization, that would lead to improvement of milk quality and marketing opportunities.

As a result of these resources, the Dairy Enterprise Initiative (DEI) directed by Land O´Lakes International Development organized initially 13 groups of dairy producers in order to establish farmer-owned milk cooling and collection centers known as Centros de Recolección y Enfriamiento de Leche (CREL) during 2000 and 2001. CRELs offer small producers several opportunities including:

- Access to premiums paid by the industrial circuit for cooled milk and volume.
- Communication and networking with other farmers.
- Development of capacity to be organized, for sharing power and decision-making.

However, due to negative experiences in the past, farmers in Honduras had been reluctant to form cooperatives or farmer groups, especially if money was involved. Nonetheless, the initial 13 CRELs started operations in late 2001. On average each CREL had between 15 and 20 small producers. Current production data show that typically, dairy farmers in Honduras are very small, the daily average is 8 # of milk, and 80% of LEYDE suppliers (the largest processing plant in the north coast of Honduras) produce 176 # or less per day (O. Javier, personal communication, June 24th, 2003).

The Dairy Enterprise Initiative provided initial training and one cooling tank per CREL. These CRELs were able to negotiate higher prices and reach commitment from processing plants in the industrial circuit that they would buy all milk produced by the CREL as long as milk quality was maintained. The contracts signed with the initial 13 CRELs represented an additional $0.04 to $0.06 per pound of milk. These contracts represented a breakthrough marketing opportunity for CREL members.
In early 2002, the Honduran Government received requests from farmers in the departments of Colón, Yoro and Atlántida in the north coast of Honduras to finance 48 additional CRELs because they realized the advantages CRELs offered. The National Office of Sustained Rural Development (DINADERS) from the Ministry of Agriculture and Livestock financed the construction of the 48 new centers, and by the summer of 2003 most of the centers had been built. However, most of the new centers did not start operating because processing plants in the industrial circuit were not willing to buy milk under the same conditions negotiated with CRELs in 2000 and 2001. Unfortunately, training opportunities and support to non-operating CRELs has been limited to basic training on improving milking procedures and milk quality from the Honduran Dairy Enterprise program.

Central American Free Trade Agreement (CAFTA)

The U.S.-Central American Free Trade Agreement concluded negotiations in December 2003. It is the most recent free trade agreement negotiated by Guatemala, Honduras, El Salvador, Nicaragua and the United States. Costa Rica finalized its participation on the treaty in January 2004 while the Dominican Republic was integrated to the treaty on March of the same year. The CAFTA will not only liberalize bilateral trade between the United States and the region, but also will further integration efforts among the countries of Central America, removing barriers to trade and investment in the region by U.S. companies (USTR, 2004). The CAFTA will require the countries of Central America to undertake needed reforms to alleviate many of the systemic problems noted below in areas including customs administration; protection of intellectual property rights; services, investment, and financial services market access and protection;
government procurements; sanitary and phytosanitary (SPS) barriers and other non-tariff bars (USTR, 2004).

The Government of Honduras, farm groups, and importers have agreed to a quasi-tariff-rate quota in which prices remains in effect until local grain supplies are exhausted, after which a 1% duty is applied to imports. Another quasi-tariff-rate quota system is in place for imports of rice. The United States has strongly opposed the Honduran policies on these grains as limiting access for U.S. agricultural products. When implemented, the CAFTA will lead to the elimination of this system. Tariffs on most grains and flour will be eliminated within 15 years after the agreement takes effect, except for rice tariffs, which will be phased out over 18 years. Under the CAFTA, textiles and apparel will be duty-free and quota-free immediately, if they meet the Agreement’s rule of origin, promoting new opportunities for U.S. and Central American fiber, yarn, fabric and apparel manufacturing. The CAFTA will eliminate tariffs on virtually all agricultural products within a maximum of fifteen years, except for dairy that will take place in 20 years and poultry in 18 (F. Fiallos, personal communication, June, 2004).

Need for the Study

The significant contributions of the dairy industry to the Honduran economy have been studied by different authors (Galetto, 1996; Merino & Avila, 2000, LSU AgCenter, 2002 & IICA, 2003). Through a review of the literature and a series of informal interviews with major actors of the sector, it has been found that despite its importance it has not been studied to as great an extent within the context of extension education.

It is widely understood that dairy farmers in Honduras have had limited access to extension services. In Honduras, as in many developing countries, it has become increasingly evident that as DICTA has grown in size and complexity, it has drifted away
from farmer clientele. The lack of relevance of programs to local needs and the limited interest from farmers to participate provides clear evidence of the problem. Although major changes have taken place at the national level to increase farmers’ participation in extension program planning and development, such as the Law of Modernization of the Agricultural Sector in 1992, there is little evidence that farmers’ needs are being targeted and met accordingly.

In their study, LSU Ag Center (2002) identified several critical needs of dairy farmers in Honduras as perceived by the different members of the industry. Two of the six recommendations made by the authors related to the provision of extension services, included: improving quality of milk and dairy products through the implementation of educational programs, and the creation of an educational program for dairy entrepreneurs to improve managerial skills. Therefore, one could infer about the need for additional training and the potential for extension services in the dairy sector of Honduras.

Secondly, limited information is available about potential extension clientele. The lack of information at the grassroots level constitutes a major constraint for proper extension planning especially in this time of rapid change. Even the demographics about the sector have not been updated in a timely manner. The most recent livestock census in Honduras took place in 1993. Results from this census along with data from the Encuesta Agrícola Nacional de Propósitos Múltiples (EANPM) conducted by the Instituto Nacional de Estadística (INE) (2002) have been used in recent years to estimate changes in livestock and farmer populations; nevertheless the accuracy of this information is limited.
Efforts to document and update databases have been undertaken by organizations like the Asociación de Ganaderos y Agricultores de Atlántida (AGAA) who in the summer of 2003 conducted a survey among 800 of its members who are dairy producers to develop a database about dairy farms. The lack of relevant information prevented AGAA in the past of properly documenting proposals and petitions to the Honduran government and other external funding agencies. AGAA is most likely the most influential organization in the north coast of Honduras because of its over 1,100 members.

Farmer’s perceptions of extension services have changed considerably in a relatively short time because of the demands the industrial circuit is placing on farmers as the country is preparing to enter the CAFTA. Farmers have traditionally been reluctant to improve production systems and facilities since they did not see any incentives from the market. However, in the last 2 years, farmer organizations and individual farmers are more actively seeking extension and consulting services. Farmers are being forced to implement the new regulations and meet milk quality standards.

Our study took place in the north coast of Honduras, in the departments of Cortés, Atlántida, Colón and Yoro in an area called Cuenca Lechera de Honduras. The importance of this area lies in the fact that although it only comprises 14% (14,118) of the dairy farms in the country, it produces 46% of milk and supplies 85% of the milk processed by the industrial circuit (INE, 1993; INE 2002). Furthermore, this is the area where the initial 13 CRELs were established.

**Statement of the Problem**

The Honduran Dairy Industry is going to experience dramatic changes in the foreseeable future. According to Umaña (1998), Honduras ranks second in milk
production in Central America only after Costa Rica. Currently, milk production and processing in Honduras is highly inefficient and non-competitive. Consequently, it could be hit the hardest by open markets since productivity is low and production costs are high (I. Matamoros, personal interview, June 2003).

Furthermore, Honduran dairy farmers have not had access to extension programs that offer non-biased, research based information to face the difficulties of milk production in the tropics. According to Umali et al. (1994), the ability of the livestock sector to attain its full productive potential is influenced by the availability and quality of livestock support services. A review of secondary data and informal interviews during 2000 and 2001 revealed that most of the educational opportunities available to farmers in the north coast of Honduras come from input suppliers such as veterinary and feed companies that seek to increase sales rather than to educate farmers. Therefore, quality of such programs has been extremely variable. Moreover, it has been hard for leaders and farmers to picture the benefits of extension, especially when programs offered have come in the form of short-term technical interventions with predetermined agendas. Additionally, farmers are facing a serious of issues such as the lack of credit and financial services, lack of infrastructure, land tenure and ownership and marketing problems (LSU Ag Center, 2002). Farmers are small landholders with few exceptions, and they are poorly organized at the national level. Although farmer associations exist in virtually every major town of Honduras, their role is very limited.

A particularly important segment of the dairy industry are CRELs. These centers are offering an unprecedented opportunity for small farmers to access better milk prices, to share knowledge and experiences with other farmers and to improve milk quality in the
country. However, CRELs need the expertise and guidance from extension and visionary leaders to become sustainable units of production. The lack of extension services or the provision of services that ignore farmer needs and views could prove fatal for rural economies as CRELs are serving as a model for a large number of farmer groups across the country. The number of CRELs nationwide has grown from 13 in 2001 to 61 in 2003, and it is expected to reach 75 by the end of 2004.

Based on the above, our study seeks to determine perceptions about extension services from New and Old CREL members as well as from leaders of the industry in order to provide foundational data that can be translated into practical recommendations for extension service providers.

**Purpose and Objectives**

The main purpose of our study was to determine the perceptions of three groups of dairy farmers (New CREL members, Old CREL members and large farmers) on extension’s educational delivery in the northern coast of Honduras. Our study focused on CREL farmers. New CREL farmers are defined as: farmers belonging to CRELs that had recently started operations at the time of our study and Old CREL farmers as farmers belonging to CRELs that had started operations in the years 2000 and 2001. The large farmer group in our study is comprised of leaders in the areas the study was conducted.

The specific objectives for the study were to

- **Objective 1**: Determine the perception of each group of farmers about extension services.
- **Objective 2**: Determine educational delivery methods used in extension programs offered to dairy farmers in Honduras.
- **Objective 3**: Determine preferred educational delivery methods for dairy farmers in Honduras.
- **Objective 4**: Determine felt and ascribed educational needs for dairy farmers in the north coast of Honduras.
Objective 5: Determine perceptions of dairy farmers on open market policies and its effects on the dairy industry in relation to educational needs.

Limitations of the Study

Due to the large number of dairy farmers in the north coast of Honduras (N=14,895) one potential limitation of the study is that it is focused on three purposive samples of dairy farmers. Thus, the findings of our study may not be generalized to the population of all dairy farmers in the north coast of Honduras.

Another potential limitation includes bias potential from assessing only perceptions of importance, rather than actual knowledge of extension services from farmers. However, secondary research indicates that knowledge-related perceptions and actual knowledge can be highly correlated (Ary et al. 2002). In addition, to decrease the potential bias in the interpretation of the findings by the researcher, a group of experts in the fields of extension and milk production contributed to the analysis of primary data collected.

Significance of the Problem

Currently, little is formally documented as to the perceptions about extension, preferred delivery methods and about the implications of CAFTA from CREL members, leaders of the dairy industry and from Honduran dairy farmers in general. This problem is significant to extension providers, farmer associations and the Honduran government because it is important to address farmers’ needs in the near future in order to strengthen rural economies. Determining the perceptions of CREL farmers and leaders of the industry will help to paint a clearer picture of the strengths and weaknesses of existing services, and it will provide foundational data to potential providers. In addition to new knowledge and strategic recommendations, an increase in the awareness of the
importance of extension in the development of the industry are important outcomes of our study.

**Definitions**

Included are the terms and definitions that appear frequently throughout our study.

- **Agricultural extension**: A series of socially sanctioned and legitimate activities which seek to enlarge and improve the abilities of farm people to adopt more appropriate and often new practices and to adjust to changing conditions and societal needs.

- **CRELs**: Centro de recolección y enfriamiento de leche (CREL in Spanish). Farmer-owned milk cooling and collection centers located along the north coast of Honduras.

- **New CREL farmers**: Farmers belonging to CRELs who were either in the process of starting operations or had recently started operations at the time of our study.

- **Old CREL farmers**: Farmers belonging to CRELs who had started operations in the years 2000 and 2001.

- **Large farmers**: Farmers who were not affiliated to CRELs but were considered leaders in the same geographical areas where CRELs are located.

- **DICTA**: Directorate of Agricultural Science and Technology (DICTA in Spanish). DICTA is a decentralized entity, under the Secretariat of Agriculture and Livestock (SAG in Spanish). DICTA’s main functions include the privatization of services for generating and transferring agricultural technology.

- **NGO’s**: Non-governmental organizations.

- **Farmer-led extension**: Multidirectional communication process between and among extension staff and farmers. It involves the sharing, sourcing and development of knowledge and skills in order to meet farming needs and develop innovative capacity among all actors. This approach seeks to involve farmers in training other farmers and trainers, and in sharing, sourcing and transferring knowledge and skills.

- **Adult education**: It is a process whereby adults gain knowledge or skills in a set of organized activities designed to enhance their quality of life involving educators.

- **Delivery method**: Is the medium through which educational content is transmitted and human interaction occurs.
• AGAA: Asociación de Ganaderos y Agricultores de Atlántida (AGAA in Spanish). Farmer association located in the Atlántida region.

• AGAS: Asociación de Ganaderos y Agricultores de Sula (AGAS in Spanish). Farmer association located in the Sula region.

• SAGO: Sociedad de Agricultores y Ganaderos de Olanchito (SAGO in Spanish). Farmer association located in the Olanchito region.

• CAFTA: Central American Free Trade Agreement. The CAFTA is the most recent free trade agreement negotiated by Guatemala, Honduras, El Salvador, Nicaragua, Dominican Republic and the United States.

**Summary**

In summary, the dairy industry in Honduras is a very important economic activity. However, milk production and processing is highly inefficient and noncompetitive. Consequently it could be hit the hardest by open markets since productivity is low and production costs are high. In addition, the lack of adequate extension and support services has hindered the development of the industry. Based on the above, our study seeks to determine perceptions about extension services from New and Old CREL members as well as from leaders of the industry in order to provide foundational data that can be translated into practical recommendations for extension service providers, farmer associations, input suppliers and farmers regarding the delivery of extension education programs related to milk production. Chapter 2 provides an overview of the literature reviewed for our study.
CHAPTER 2
LITERATURE REVIEW

To understand the importance of Extension services for dairy farmers in Honduras and the importance of documenting farmers needs, it is important to see what the relevant literature relays on the subject.

- Extension in the development of the agricultural and livestock sector
- Factors that affect the performance of extension
- Approaches to extension services
- Delivery of livestock services
- Importance and types of needs assessments
- Education in rural areas
- Principles of adult education
- Overview of delivery methods used in extension
- Organization and development of farmer groups
- Leadership development

**Extension in the Development of the Agricultural and Livestock Sectors**

In developing countries where agriculture is the principle means of livelihood for 40 to 90% of the population (Jazairy, 1992), strengthening the ability of agriculture to compete domestically and in export markets is an important premise for an economically competitive agricultural sector. The State of Food and Agriculture Report from FAO (2000) concluded that reducing poverty and food insecurity is not simply a question of enhancing agricultural productivity and production or of generating more income. Productivity is the result of complex relations that involves not only farmers but also complex relationships. Maalouf et al. (1991) have stated that the quality, capability and performance of farmers in agriculture are fundamental indicators of the level of the agricultural sectors efficiency, productivity, development and sustainability.
Furthermore, high capability and good performance in farmers are not inborn qualities—they are acquired. Most farmers in the developing world have a low level of formal education and extremely few have the opportunity to study agriculture in the formal school system. As observed in developed countries, it can be inferred that education is important to develop the agricultural and livestock sectors. In reality, extension services are continually important even to educated farmers, and research and learning that accompanies adoption of new technologies is especially important for the advancement of farmers with low knowledge levels (Rivera et al. 1991).

According to FAO (1990) the Global Consultation on Agricultural Extension has stated that farm people who receive nonformal education through extension programs generally increase their productivity and efficiency. Still, extension resources are available to only 1 out of every 5 farmers in the developing regions of the world (Rivera, 1995). Research shows that in Africa, 2 out of every 3 farmers have no contact with public extension services; in Asia 3 out of 4; in Latin America, 6 out of 7 and 5 out of 6 in the Near East (Maalouf et al. 1991).

Agricultural extension work is a significant social innovation, an important force in agricultural change, which has been created and recreated, adapted and developed over the centuries. Today, the organizations and personnel engaged in agricultural extension encompass a diverse range of socially sanctioned and legitimate activities which seek to enlarge and improve the abilities of farm people to adopt more appropriate and often new practices and to adjust to changing conditions and societal needs (Jones & Garforth, 1997).
The services provided by extension have significant public-good attributes. It is estimated that there are at least 800,000 official extension workers worldwide, and some 80% of the world’s extension services are publicly funded and delivered by civil servants (Feder, Willett and Zijp, 2001). Universities, autonomous public organizations, and NGOs deliver about 12% of extension services, and the private sector delivers another 5% (The World Bank, 2003a). Agricultural extension responsibilities include the transferring of knowledge from researchers to farmers, advising farmers in their decision making and educating farmers on how to make better decisions, enabling farmers to clarify their own goals and possibilities, and stimulating desirable agricultural developments (Van den Ban and Hawkins, 1996). Extension is a function pursuing many different purposes: livestock development, forest use and conservation, fisheries engineering and capture, food and nutrition education, as well as well as crop development. Even in programs designed to foster agricultural crop production, extension may be concerned with providing information on other crucial issues such as food storage development, processing, farm management, and marketing (Rivera et al. 2001). In addition, the effectiveness of extension programs is key to the development of the agricultural and livestock sectors. Rivera (1997) and Swanson et al. (1997) agree that for agricultural extension to be successful there has to be at the very least a viable technology system comprising four main factors:

- Commitments to a purpose-specific and target-specific extension/technology policy covering those factors that directly impact the technology system, including the utilization of technology by farmers.
- A practical research program involving a technology development system connected to basic research innovations but devoted to applied and adaptive research.
- An extension/technology transfer system organized into the sub-functions of knowledge transfer and input transfer, but responding to any and all purposes, such
as: program actions to promote sustainable agriculture, reduce non-point sources of pollution, and/or help farmers organize.

- Responsive feedback system that assesses technology utilization by farmers.

Furthermore, John B. Claar, former INTEPAKS Director offers 10 recommendations from an organizational perspective on how to make agricultural extension successful (adapted by Rivera, 2003). These include:

- Develop a clear-cut mission for the organization, stating what the scope is to be, whom it has to serve, what the expected outcomes are to be, and how it will be evaluated.

- Take account of the constraints in the external environment: policy, markets, input supply, credits, roads and cultural factors.

- Access available information: research-extension linkage, farmer interaction and feedback and informal and formal lateral linkages with industry, input suppliers and others.

- Develop internal technical capacity within extension by increasing the formal education levels, augmenting farmer in-service education and developing and deploying technical support staff such as Subject Matter Specialists so that they can better adapt to general recommendations.

- Developed balanced methodology that is re-enforcing. Use mass media, personal contacts, wholesaling through other organizations or firms, farming systems research, field-testing, demonstrations and visits.

- Develop and implement an internal management system that provides for personnel motivation, supervision, reporting, and delegation of authority and plan of work.

- Deal with the human factor. Avoid or soften top down, targeted or technology centered approaches by involving farmers in problem identification and promoting interaction in setting programs and securing feedback.

- Budget enough funds for program operations. Ensure budget not mostly for salaries and provide mobility and teaching tools.

- Organize and structure the organization so that there are clear lines of authority and that the scope of the work includes relevant areas.

- Divest the organization of roles or functions that conflict with the primary mission, such as regulatory obligations, credit or input supply functions and administrative assignments.
Innate in these recommendations are the notions that the success of extension lies in the strength of the linkages with research bodies and farmers, the expertise of field agents and the leadership of administrators.

**Factors that Affect the Performance of Extension**

Shifting trends in agriculture are affecting the traditional roles of agricultural extension. Numerous authors Qamar (2000), Rivera et al. (2001), Swanson et al. (2003) suggest that agricultural extension organizations in both developed and developing countries are undergoing considerable reexamination and change due to the “new agriculture.” This is a trend that is led by the backdrop of declining public resources, increasing corporate control over key agricultural sector components, increased competition from abroad, and new relationships among producers and between producers and end-user markets. Globalization is inextricably linked to privatization, and countries are finding themselves confronted by a new and highly competitive global market (Fresco, 2000). In view of that, the participation of farmers in these new economic relationships demands new skills and knowledge, new communication networks among like-minded producers, and the ability to identify and take advantage of emerging marketing and agro-processing opportunities.

Consequently extension organizations, if they are to remain viable institutions, need to plan and deliver extension programs that can help farmers take advantage of the new opportunities to increase their income within this new agricultural economy (Swanson et al. 2003). The threats of not complying with the new roles and responsibilities are evident, the last decade witnessed an accelerated decline in the credibility of public sector extension, and unless extension grows to beyond technology transfer, and clearly articulates its role in facilitating broader changes supportive of
evolving rural livelihoods, its ability to remain relevant in the future is extremely
doubtful (Tadesse, 2003).

According to Rivera (1997) at least nine exogenous forces began to impose their
leverage in extension in the last decade. These forces included

• Expanding international trade and the penetration of competitive global pressures
  into local markets.
• The problematic nature of food security, and access to food.
• The exponential population growth, migration and urbanization occurring in the
  world today.
• The rapid development of science and technology.
• The increasing pressures on land use.
• The need for sustainable agriculture and natural resources management.
• The growing expectations for participation and control of institutional decision-
  making.
• The imbalances in supply of and demand of well trained agricultural workers.
• The persistence of poverty, AIDS, illiteracy and the poor quality of human
  development services in most developing countries.

Furthermore, the challenge of addressing these needs are complicated by both the
limited access of farmers to relevant agricultural information and the public sector’s
apparent dearth of financial resources for agricultural extension. In this regard if
extension is to be relevant and responsive in the 21st century, it needs to service farm
families in an increasingly complex, interdependent, rapidly changing, resource stressed
world and it must be affordable (Antholt, 1991).
Approaches to Extension Services

In practice, extension organizations everywhere pursue the overall goals of technology transfer and human resource development, though within each organization there is a mix of objectives and within each country there is a mix of organizational patterns (Nagel, 1997). Technology transfer has a focus on production and technical efficiency and has been predominant in recent years while human resource development has focused more on institutional building, organization work, leadership development, increasing farmer knowledge and social change (The World Bank, 2003a). These two premises have led to a wide variety of approaches to extension. A well-recognized categorization of extension approaches is the one by Axinn (1988). His book Guide on Alternative Extension examines eight approaches to extension. These include: the general agricultural extension approach, commodity specialized approach, training and visit approach, the agricultural extension participatory approach, project approach, farming systems development approach, cost sharing approach and the educational institution approach. An alternate classification by Nagel (1997) differentiates between approaches that at least in principle, target all persons in rural areas engaged in farming and those that purposely select clientele according to specific criteria. The general clientele approach is offered by Ministry-based Extension (in most countries) and Cooperative Extension in the United States. While selected clientele approaches includes commodity-based extension, commercial services and client-based & client-controlled extension.

Anderson and Feder of The World Bank (2003b) prefer to focus on specific formats or approaches to extension that have appeared in the last three decades as an attempt to overcome some of the weakness inherent in the public extension systems of recent
decades. These include Training and Visit (T&V), decentralization, privatized extension and Farmer Field Schools (FFS). In contrast Rivera et al. (2001) distinguishes between a variety of public sector reform strategies supporting the new paradigm market-driven income-generation (Table 2-1). According to this distinction, market reforms encompass four major reform strategies. These include: revision of public sector systems, pluralism, cost recovery and total privatization.

Table 2-1. Extension Market Reform Strategies.

<table>
<thead>
<tr>
<th>Market Reforms</th>
<th>Public</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revision of public sector via downsizing &amp; some cost recovery</td>
<td>Public</td>
<td>Cost recovery via downsizing &amp; some cost recovery (OECD countries, previously in Mexico)</td>
</tr>
<tr>
<td>Delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pluralism, partnerships, power Sharing</td>
<td>Private</td>
<td>Privatization (total) Commercialization</td>
</tr>
<tr>
<td>Private</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Chile, Estonia, Hungary, Venezuela, S.Korea, Taiwan)</td>
<td>Private</td>
<td>(The Netherlands, New Zealand England &amp; Wales)</td>
</tr>
</tbody>
</table>

Source: Rivera et al. (2001)

The non-market reforms comprise two main reform strategies: decentralization and subsidiarity. Decentralization is focused on transferring central government authority to lower tiers of government, and subsidiarity is the transferring or delegation of responsibility to the lowest level of society. Table 2-2 employs illustrates non-market-oriented structural reforms. Both Table 2-1 and 2-2 highlight the main strategies adopted worldwide by countries undertaking public sector institutional reform and provides examples of countries that have followed such reforms.
Based on the above, it is deemed necessary to review public, private and farmer-led extension in order to gain a deeper understanding of the factors or reforms that can surface in the analysis of our study.

Table 2-2. Extension Non-Market Reform Strategies.

<table>
<thead>
<tr>
<th>Non-market reforms</th>
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<tbody>
<tr>
<td>Decentralization to lower tiers of government (Colombia, Indonesia, México, The Philippines, Uganda &amp; others)</td>
</tr>
<tr>
<td>Transfer (delegation) of responsibility to other entities (Bolivia, to farmer organizations; Ecuador, mixed with farmer-led NGO programs; Peru, extension devolved to NGOs)</td>
</tr>
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</table>

Source: Rivera et al. (2001)

Public Extension

The evolution of public agricultural extension arrived at a worldwide turning point in the 1980s; it was, so to speak, the end of the beginning as Rivera et al. (2001) defines it. The traditional approach of public extension led by ministries of agricultural mostly needed to be redefined and modernized. A basic premise for such change lay in the fact that the public sector in general is overly burdened with numerous activities and so it was believed that moving some of them to the private sector might allow more effective implementation of essential services (Schwartz and Zijp, 1994). At the time public sector extension worldwide had been criticized for not doing enough, not doing it well, and for not being relevant. Critics emphasized the insufficient impact in effectiveness, in efficiency, and the lack of programs that fostered equity (Rivera et al. 1991).

Furthermore, Benor and Harrison (1977), in one of the most influential extension publications ever, evaluated ministry-based extension systems and found that its poor performance was related to four leading causes. These causes included: inadequate internal organizational structures, inefficiency of extension personnel, inappropriateness...
or irrelevance of extension content and dilution of extension impact. Their findings in the late 1970s can be considered root causes for many of the problems public sector extension is facing today.

In addition, Nagel (1997) cited the contradictory nature of the goals of public extension as one of the leading causes for the lack of success. He argued that goals were too ambitious for a single organization. After all, public interest implies serving farmers and the urban population, securing subsistence production and promoting cash crops for export, reaching the masses of rural households and serving the needs of specific groups, extending assistance to high-potential and disadvantaged producers all at the same time. Consequently it has been hard for extension to program and deliver quality programs to the different segments of clientele, and often this has led extension to ignore or give less emphasis to less advantaged farmers.

Wilson (1991) found that public extension services demonstrated a bias towards farmers with better access to productive resources and larger holdings in a study conducted in Ecuador. Moreover, Nagel (1997) argues that priorities for extension have too often been pro urban in terms of price policy, favoring innovative individuals within the modern sector, neglecting poorer strata and forgetting about women farmers. In addition he considers that priority setting for research has been rarely based on extension field evaluations because the system did not foster critical upward communication. While on the technical side, knowledge has been transformed into field messages that frequently led to distorted and outdated communication.

Yet another central problem for public extension might lie in the fact that extension has never been seen as a purely educational activity by ministries of agriculture and
governments (Nagel, 1997). In contrast, Rivera (2003) blames the internal bureaucratic and field mismanagement, inadequate infrastructure and institutional support and insufficient training for the range of programmatic and specialized problems that have needed to be resolved. Nagel (1997) argues that the hierarchical and highly bureaucratic way in which services were organized hampered a full realization of their potential. Nonetheless, one of the major challenges, if not the most important, that public extension has faced is to serve large numbers of farmers using limited public funds. Realistically, large numbers of farmers cannot be reached by publicly supported extension services and consequently millions of farmers are not yet being reached by agricultural extension services (Malouf et al., 1991).

To remedy some of the problems discussed earlier in terms of coverage and fiscal arrangements, the public sector has been (1) shifting its services to the private sector sometimes totally as in the case of the Netherlands (Proost & Duijsings, 1991), New Zealand and Peru (Rivera, 2003); or (2) partially through contractual, outsourcing arrangements like in Chile, or by (3) adopting private sector practices such as cost-recovery schemes or fee-based activities for services that were once freely provided. Such is the case in Northwest Mexico where fee-based programs have been established for large farmers (Rivera et al. 1991), and in Honduras where farmers are expected to pay a portion of the costs of extension (Hermosilla & Macias, 2002). As a result, there is an increase of the private sector in extension (Rivera, 2003). Due to its importance, the provision of private extension and its modalities is discussed later in this chapter.

Still, aside from the need to partner with the private sector and to enter where markets fail, public sector services are necessary to protect the environment, ensure
public health, prevent inequity regarding access to public information, and provide for emergencies (Qamar 2000; Rivera 2003). Also, a professional public extension serves to validate information from commercial sources, transfer practices (not just technology), conduct and report accomplishments and promote organizational action (Rivera, 2003). Furthermore, one of the primary reasons for public sector extension is for its public good attributes. According to Kalambokidis (2004) public value is created when a service benefits society as a whole. When a service is recognized as having significant public value, even citizens who do not directly benefit from the service will endorse its public funding. The perception of agricultural information as a public good and subject to market failure has provided the prime argument in policy debates since the 1960s for the continued provision of government extension services (Marsh & Pannell, 1999).

Two of the most important reforms to public extension that took place in the past three decades are discussed next. The first is Training and Visit extension, developed and promoted by The World Bank in the 1970s and 1980s as a means to improve organizational and programmatic structures of public sector extension and the second is decentralization, a major reform that led to a transfer of powers, responsibilities and functions from government to market (Rivera, 1997).

**Training and visit extension (T&V)**

The T&V model in the strict sense of the word is not a separate approach but one way to organize ministry-based extension in developing countries (Nagel, 1997). This model was promoted by the World Bank between 1975-1995 as a national public extension system and was applied in more than 70 countries. T&V attempted to tackle some of the weaknesses of extension at the time. T&V extension consisted of the following features (The World Bank, 2003b):
• A single line of command, with several levels of field and supervisory staff.
• In-house technical expertise, whereby subject matter specialists are to provide training to staff and tackle technical issues reported by field staff.
• Exclusive dedication to information dissemination work.
• A strict and predetermined schedule of village visits within a 2 week cycle where contacts are to be made with selected and identified contact farmers.
• Mandatory bi-weekly training emphasizing the key set of messages for the forthcoming 2 week cycle.
• A seasonal workshop with research personnel.
• Improved remuneration to extension staff, and provision of transportation.

T&V is considered the most ambitious of all the attempts to rehabilitate extension. It is estimated that most of the $2.3 billion spent by The World Bank between 1974 and 1984 went to T&V system projects (Kaimowitz, 1991). However the appropriateness and achievements of T&V have been fiercely contested (Hulme, 1991). The World Bank (2003b) has reported that the costs of T&V structure were higher by some 25 to 40% than the systems they replaced. This made T&V extension more dependent on public budget allocations. Secondly, the design intended to tackle the accountability issue by improving management’s ability to monitor staff activities, taking advantage of the strict visit schedule, the identifiable contact farmer, and the intensive hierarchy of supervisory staff. However, the problem lied in the fact that the quality of extension services was not practically monitored, and ultimately managers and policy makers could not observe the impact of T&V extension. In conclusion, the lack of accountability to farmers was not resolved. Lastly, some of the features of the design could not stand up to practical realities. For example, the contact farmer approach was often replaced by a contact group approach because biases in the selection of contact farmers led to diminished diffusion. As a result, the consequences for extension were apparently negative.
Nonetheless, the T&V had significant impacts for extension. The first and more recognized is that approximately 60 to 70 countries government operated extension services were positively restructured (at least in part) and their internal systems redesigned. The second, and not so commonly perceived impact, according to Hulme (1991), is that T&V has been a powerful force in defending the role of the public sector in agricultural development. T&V proved to have administrative advantages including defined lines of authority and personnel management; however, it could not be sustained after extension projects ended (IFAD, 2004). The limited success of T&V in its present form as a nationwide extension system should not discredit the quality and appropriateness of many of its elements. Applied less rigidly and combined with the tools of human resource development as well as with the concept of participation, these elements may constitute a valuable base for reforming extension organizations, large or small (Nagel et al., 1992).

**Decentralization**

Recent decentralization efforts take place in a context of extension re-conceptualizing and re-structuring that generally acknowledges that supply-side extension should be abandoned for demand-driven approaches that are more responsive to farmers' needs. Several factors argue for a re-assessment of extension, including the fiscal crisis that has made it hard for governments to provide adequate resources for extension and pressures towards more participatory approaches that allow farmers to influence the design, implementation and evaluation of extension activities (Van Crowder, 1996). The chronic difficulties of maintaining a public-sector extension service and the importance of farmer participation have led to a wider scope for extension through non-governmental intermediaries such as NGOs and farmer organizations.
Financial pressures have led to exploration of ways to reduce government costs by decentralization, privatizing extension services and cost-sharing arrangements with NGOs and farmers' organizations (Van Crowder, 1996).

The decentralization of extension services retains the public delivery and public funding characteristics of traditional centralized extension but transfers the responsibility for delivery to local governments (The World Bank, 2003b). Rondinelli (1981), distinguishes between four different categories of decentralization:

1. Deconcentration is defined as a transfer of power to local administrative offices of the central government.
2. Delegation is the transfer of power to sub national governments and/or parastatals, or other government entities.
3. Devolution is the transfer of power to sub national political entities.
4. Privatization is the transfer of power to the private sector.

Decentralization not only gives local government control over personnel and finances, but in theory it focuses control closer to the level of farmers and thus can improve extension accountability to their needs. Rivera (1996) has observed three policy directions that dominate extension decentralization:

1. Decentralization shifts the burden of extension costs through fiscal system redesign with greater local government shifts for participation in financing and managing extension.
2. Decentralization of extension enables structural reform with the goal of improving institutional responsiveness and accountability.
3. Decentralization refocuses the management of extension through farmer participatory involvement in decision-making and responsibility for extension programs.

The advantages of decentralization are improvement in accountability, increased coordination of local resources and higher commitment of clientele and leaders due to increased participation in the planning and implementation stages of extension programs. Nonetheless, decentralized extension also comes with serious threats such as: greater risk
of political interference and utilization of extension staff and resources for other purposes, difficulties with maintaining agent quality due to the loss of economies of scales in training. Most critical is the fact that extension-research linkages are more difficult to organize, and issues with financial sustainability increase. In actuality, costs are not decreased but instead they are merely transferred to the local level (The World Bank, 2003b).

Furthermore FAO (1997) states that decentralization has not adequately developed alternatives to be used in places where the human resources at the local level are considered poor and illiterate as in the case of Honduras. A study conducted by Llambí and Lindemann (2001) in seven Latin American countries (Colombia, Chile, Perú, Bolivia, Brazil, Mexico and Venezuela) showed that none of the reforms leading to decentralization have reached all their alleged goals, namely increased market competitiveness, poverty reduction, environmental sustainability and sound governability. Furthermore, they affirm that after 2 decades of reform there is still a tension between macroeconomic policies and agricultural policies. They have stated “Nor in any case have we found a neat policy for the restructuring of the whole agricultural public sector (p.7).” They feel that there is always an unavoidable and unrelenting tension between the forces of centralization and decentralization. In all the Latin American cases this tension exists not only between central and local governments, but it also manifests itself in the relationships between regional and local governments. Tension even exists at the local government level between the local offices and rural communities. In contrast, the proceedings of the International Seminar El espacio municipal: nuevos desafíos y posibilidades para el desarrollo rural con participación
ciudadana from FAO (1997) state that decentralization in Bolivia has led to increased participation of peasant and indigenous groups in decision making at the local level. As a result, extension providers are tailoring their programs to needs of these less advantaged segments of rural population.

**Privatized Extension**

In its pure sense, privatization implies a full transfer of ownership from government extension to a private entity, with that entity meeting all costs and receiving any profits (Rivera and Cary, 1997). In reality what has emerged are a series of approaches like the fee-for-service for extension (where the provider may be a public entity or private firms or consultants). In developing countries it usually entails considerable public funding even if the provider is private (The World Bank, 2003b). The diverse financial arrangements adopted in the last 2 decades by governments worldwide to fund agricultural extension services provide a menu of options for consideration.

The cost recovery approach has been used in countries like Mexico where fee-based systems among large-scale farmers in the Northwest region of the country are used. The voucher system used Chile and Colombia has replaced partially or totally public extension delivery systems by vouchers distributed by government services for farmers to use in hiring private extension consultants. These vouchers are attached to agricultural bank loans, committing a certain percentage of the loan for extension services (Rivera and Cary, 1997). The gradual privatization process such as the one that occurred in the Netherlands was done by transferring one half of the field extension personnel to farmer associations while the responsibility for linking research and the privatized extension services, policy preparation, implementation, and promotion and regulatory tasks remained under the control of the Ministry of Agriculture (Le Gouis, 1991 cited by
Rivera and Cary, 1997). The technical staff of farmer associations has since transferred to a private company, the DLV Adviesgroep Inc.

Some of the criticisms to forms of privatization of extension services are that there is a focus on commercial farms. Questions arise about extension services for poor and less advantaged farmers or those for whom the value of information is lower. New Zealand is one of the few countries in the world that is on the verge of becoming fully privatized. Although there has been no formal assessment of the impact of the changes in New Zealand there appears to be less interactions between organizations, reduced feedback from farmers to science providers, and more limited information distribution, particularly to farmers who are less well-off (Rivera and Cary, 1997).

Still, Maalouf et al. (1991) believes that because of the problems agricultural extension is facing in developing countries, neither publicly or privately supported extension work can do the job alone or separately. Cooperation and complementation of the public and private sectors in the area of extension offer the potential to

- Increase resources for extension services to farmers.
- Reduce overlap and significantly increase the number of farmers reached by extension.
- Increase and improve the utilization of agricultural research findings from both public and private interests supporting agricultural research and development investment.

Farmer-Led Extension

Over the last decade, a growing number of organizations have sought models which seek to be both more effective in serving farmers needs and institutionally more sustainable. Farmer-led extension seeks to promote farmers and other rural people, rather than professional extensionists and researchers, as the principal agents of change (Scarborough et al., 1997). The proliferation of such approaches has been attributed to
the dissatisfaction with results from traditional extension programs and the contraction of funding for public extension (The World Bank, 2003b). Farmer-led extension encompasses a diversity of activities that seek to ensure that agricultural extension or research services are responsive to resource-poor farmers’ needs and potentials. Experts in the field (Scarborough et al. 1997) have defined farmer-led extension as a multidirectional communication process between and among extension staff and farmers. It involves the sharing, sourcing and development of knowledge and skills in order to meet farming needs and develop innovative capacity among all actors. Farmers have a controlling interest and are ‘center stage’ as the protagonists, and they play a key role in technology development and delivery. This approach seeks to involve farmers in training other farmers and trainers, and in sharing, sourcing and transferring knowledge and skills.

The Norwegian farmer-led Research and Extension Circles (R/E) constitute an example of successful farmer-led programs. The circles revitalized the Norwegian extension services and contributed to increased agricultural production and more active agricultural communities in rural areas. The R/E circles are farmer-initiated, based on farmer membership and run by its members. Haug (1991) attributes the success of the program to the farmer-led structure, along with government-supported fee-based private extension, on-farm adaptive research and the combination of both adaptive research and extension.

Variations of farmer-led extension include Farmer-to-Farmer extension, Farmer Field Schools (FFS), the problem census/problem solving approach; NGO-government collaboration; and other approaches that provide limited external assistance that enable farmers to manage, adapt and spread innovations through their own efforts (The World
Farmer-to-farmer extension

Farmer-to-farmer extension, in which farmers are the primary extension agents, is probably the most common form of farmer-led extension. It involves farmers undertaking extension activities, with or without the support of external agents (Scarborough et al. 1997). Holt-Gimenez in IFAD (1996) has referred to the movement as “farmers helping their brothers... so that they can help themselves... to find solutions and not be dependent on a technician or on the bank. (p.1)” The pure farmer-to-farmer vein is often found in areas where appropriate government services are almost non-existent or recommended technologies have been inappropriate. Farmer-to-farmer is founded on a spirit of voluntarism from within highly motivated groups. The two pillars of this methodology are farmer innovation and farmer solidarity (IFAD, 1996). In other words, it is largely self-contained and self-reliant. Scarborough et al. (1997) affirm that the campesino-a-campesino (peasant-to-peasant) movement in Latin America, the best-known farmer-to-farmer extension network, typifies this approach. This network is active in many Latin American Countries as well as in parts of Southeast Asia and Africa and is characterized by

- The emergence of a ‘movement’ initiated and sustained by farmers.
- The generation of most innovations by farmers themselves, with occasional external support, for instance from an NGO.
- The provision of training by farmers, to farmers, often through the creation of a structure of farmer-promoters and farmer-trainers.

The basic methodological principles for farmer-to-farmer extension detailed by Bunch (1982) in Two Ears of Corn have not changed significantly (Scarborough et al.
These principles include obtaining rapid and recognizable results, starting small and going slowly, limiting the introduction of technology, using small-scale experimentation and developing a multiplier effect. Nonetheless, the authors state that the advantage of these basic principles lies in their flexibility. Holt-Gimenez in IFAD (1996) recognizes that the development of the campesino-a-campesino technological basket has been unsystematic, evolving as campesinos from different areas become interested and begin experimenting with and sharing their innovations. The campesino learning methods documented in the technological basket are deductive, hands-on and frequently laced with humor and local folklore.

Among the benefits and advantages of farmer-to-farmer extension (Scarborough et al.1997 p.35) are as follows:

- **Language**: Farmer-extensionists speak the same language as their colleagues, both literally and culturally, easing communication and understanding.

- **Relevance**: Farmer-extensionists are likely to understand their colleagues constraints, potentials and aspirations better than more educated, non-farming professional extensionists.

- **Availability**: Farmer-extensionists can often be available at times more suited to other farmers than professional extensionists find possible.

- **Accountability**: Farmer-extensionists working in their own communities are more directly accountable to the farmers they serve than is the case with professional extension officers. This is particularly true if farmer communities contribute to the costs of farmer-extensionists work.

- **Credibility**: Farmer-extensionists have the same background, and farm under similar constraints as other farmers. Their demonstrations of new technologies and management practices can therefore be more convincing than those undertaken by professional extensionists.

- **Sustainability**: At the end of the project, the farmer extensionists stay in the community and may continue to pursue agricultural or other rural-development initiatives.
However, this approach is likely to be limited to those areas for which new technologies are available, and it is unlikely to be offered to farmers through public extension services. Still many experts suggest that extension’s new priorities should be “farmer-led” and believe that the concept of “farmer first and last” have come to prominence (Rivera et al. 1991).

**Farmer field schools**

Farmer field schools (FFS) are another form of farmer-led extension because of the central role farmers have in the program. FFS is a participatory approach designed originally as a way to introduce knowledge on Integrated Pest Management (IPM) at the grassroots level to advance the principle of stakeholder participation in program decision-making with a view of eventually giving full responsibility to stakeholders for program development (Rivera et al. 2001). The Food and Agriculture Organization (FAO) first introduced the program to rice farmers in Southeast Asia in 1990. FFS has since spread to other regions, and today it is beginning to develop in Latin America as one of the alternatives to traditional national extension activities, in such countries as Bolivia, Ecuador and Peru (Rivera et al. 2001).

FFS is mainly used in IPM programs and represents an attempt to get away from centralized extension practices and return the locus of interaction to the farmers’ fields (Scarborough et al., 1997). The FFS approach relies on participatory training methods to convey knowledge through field schools to make farmers into “.. confident pest experts, self-teaching experimenters, and effective trainers of other farmers” (p.20) (Wiebers, 1993 cited by The World Bank, 2003b). The FFS experience entails some 9 to 12 half day sessions of hands-on, farmer experimentation and nonformal training to a group of 20 to 25 farmers during a single crop growing season. Initially, paid trainers lead this
village-level program, delivering elements and practical solutions for overall good crop management practices and through group interactions. Attendees sharpen their decision-making abilities and are empowered by learning leadership, communication and management skills (van de Fliert, 1993 cited by The World Bank, 2003b). FFS requires that professional researchers and extension officers become experts both in farming and in facilitating farmers to undertake their own research.

Some of the major criticisms of FFS include issues about accountability, financial sustainability and dissemination of knowledge by trained farmers. Because it requires significant investments in time, trainers and facilities, FFS can be an expensive way of diffusing new science-based knowledge and other information to farmers. Quizon et al. (2000) add that the intense training activities are expensive per farmer trained, and they imply that the amount of service actually delivered by each farmer would be small when considered from a national perspective. The World Bank (2003b) suggest that cost effectiveness and financial sustainability could be improved if farmer-trainers were to become the main trainers, perhaps with significant community funding, and if informal farmer-to-farmer communications were to facilitate knowledge diffusion. A study conducted by Rola et al. (2002) with Rice farmers in Iloilo, Philippines suggest that there is very little diffusion of FFS acquired knowledge from field school graduates to other community members presumably because the content of the training is not easy to transmit in casual, nonstructured communications. Still the findings of this study imply that graduates retain their field school acquired knowledge.

FFS can be complementary to farmer-to-farmer extension, and most programs encourage their participants to share their methods and results through farmer-to-farmer
extension. Quizon et al. (2000) affirm that FFS provide an interesting perspective as an alternative learning or problem-solving approach. They state that other authors see FFS not as an extension approach for disseminating information, but as an empowerment and citizenship opportunity.

**The problem census/problem solving (PC/PS) approach**

The problem census is a participatory, group-based extension method that enables farmers to identify their needs and problems, and recommend appropriate solutions and action by building on the knowledge and experience of the farmers involved (Scarborough et al., 1997). Experiences in Nepal and Bangladesh document that farmers are demonstrating great interest in and enthusiasm for incorporating their felt needs into the planning process, and they are coming up with their own ways for meeting those needs. Strengths of the PC/PS include a decrease in the communication gap between farmers, researchers and extension staff and an increased presence of extension staff in the communities. This has led to increased farmer participation, built up farmers confidence, increased trust in extension staff and most importantly the development of realistic plans and programs. The problems of this approach include a lack of training for facilitators and of qualified personnel within extension to face some of the multi-disciplinary issues identified during the process.

**The NGO-government collaboration**

During the last decade several factors have led (some would say pushed) government agencies and NGOs toward more collaborative efforts in agricultural research and extension. This has been caused by two major factors. First, although traditionally dominated by the public sector, in many parts of the world extension services have been effectively provided to thousands of communities through innovative,
resource-intensive NGO programs. Secondly, public sector capabilities have been reduced by shrinking budgets, the declining relative contribution of agriculture to the economy, and poor returns on investments (Scarborough et al. 1997). As a result, comparative advantages have moved NGOs and governments to work together in order to provide better research and extension support to agricultural production. Collaborative linkages between government agencies and NGOs focus primarily on concrete, time bound activities such as training programs, but linkages can include a multitude of activities (Scarborough, 1997). Farrington (1997) considers of crucial importance the fact that because NGOs are independent, they are not mandated to collaborate with research and extension services in the way that government departments might be. He posits that NGOs will only collaborate if governments have something useful to offer.

Although much has been said about NGOs, it is important to review some of the strengths and weakness that affect collaboration with extension. According to Farrington (1997) the strengths of NGOs include

- Horizontally short lines of communication that allow flexibility and quick responses to clients needs and to changing circumstances.
- Access to remote areas. NGO concerns with the rural poor means that they often maintain a field presence in remote locations where it is typically difficult to do so.
- Access to new tools and methodologies. NGOs have pioneered a wide range of participatory methods for diagnosis, innovative dissemination and have even introduced system approaches for testing new technology. Often these efforts have extended into processing and marketing as with soy in Bangladesh and cocoa in Bolivia.
- NGOs experience with group formation based on felt needs has proven to be a valuable asset.

In contrast, some of the weaknesses of NGOs outlined by Farrington (1997) include
• Small size, independence and differences in philosophy limit learning from each other’s experience and against the creation of forums, whether at the national or provincial level.

• Some fashionable locations have become densely populated by the diversity of NGOs. Problems have arisen not merely from competition for the same clientele, but of some NGOs undermining the activities of others ( Overseas Development Institute, 1992).

• Some NGOs are more accountable to external funding agencies than to the clientele they claim to serve. Donor pressure to achieve short term impact, combined with the lack of cross-learning has led in some cases to the promotion of inappropriate technology such as protected horticultural systems in the Bolivian Andes ( Overseas Development Institute, 1991).

• The fact that some NGOs have placed great emphasis on volunteerism, sometimes promoted at the expense of financially sustainable alternatives.

  Farrington (1997) found that evident in SIDA’s farm-level forestry project in North Vietnam where the scope for supporting an emerging private nursery sector in the provision of technical advice was ignored, and complex and largely voluntary advisory services at the village level were promoted instead.

  Collaboration between NGOs and governments can take place in various forms Scarborough et al. (1997). Common collaboration activities include problem identification, planning, technology development and the provision of critical production inputs such as information, credit, seeds and animals. Furthermore, Farrington (1997) has found what he calls example configurations that offer potential for replication and adaptation in three areas: providing technical advice and feedback, training, and working with groups. Experiences of NGO-government collaboration are mixed. In Chile, the government has contracted private technology companies to cater to the larger commercial farmers, and NGOs for small subsistence-oriented farmers. However, similar attempts in India have been largely unsuccessful. One reason for this is the NGO
concern that many of the technical recommendations from governmental research institutes are not relevant to small-scale farmers. Another reason is that mechanisms for bottom-up feedback in existing technologies and for articulation of demands for new technologies remain weak (Farrington, 1997).

Nonetheless, the potential impact of NGO-government collaboration is that it allows institutions to avoid duplicated efforts in the field and to increase coverage. Still, Scarborough et al. (1997) considers it an uneasy partnership that in many cases is still built around the lack of trust and deep suspicion on both sides. Difficulties over ownership and control of individual (or joint) resources often remain an obstacle. Differing institutional agendas may prevent collaboration from being based upon a shared vision and common objectives. A common problem faced by NGOs has been that government agencies seek to implement change more rapidly than NGOs feel is sustainable. Scarborough et al. (1997) concluded that collaboration between government agencies and NGOs is usually more difficult than originally thought. In addition, Scarborough et al. (1997) outline important lessons learned from collaboration based on the experiences of 70 participants to the farmer-led extension workshop held in the Philippines in 1995. These lessons show that

- Farmers can be very active partners in extension and can set an agenda and direct a process in which government agencies and NGOs can participate to meet the needs of the farmers and their communities.
- Whatever extension approach is used, it should ensure that farmers are encouraged to share their experiences with others.
- Benefits can be achieved from NGO-government collaboration.
- During the process of collaboration, stereotypical views held by one group about the other partner can be broken down, even if quite slowly.
- It is important to get the agenda and parameters of collaboration right at the outset.
Delivery of Livestock Services

The livestock sector plays a crucial role in the economies of many developing countries as an important source of protein-rich products. It is a vital generator of employment. For many farmers in the developing world, livestock also provides a means of storing wealth, a cushion for food shortages, and a source of fertilizer and/or fuel, a means of transportation, and as source of traction in agricultural production (The World Bank, 1992). Nonetheless, the ability of the sector to attain its full productive potential is influenced by the availability and quality of livestock support services (Umali et al. 1994).

According to The World Bank (1992) livestock services can be grouped into two major functional categories: health and production services. Health services include curative and preventive services and the provision of pharmaceuticals. Curative services include the provision of clinical care, while preventive services consist of vaccination, vector control, eradication programs, and disease control measures such as quarantines, the slaughter of diseased animals and movement restrictions. On the other hand, production services include research and extension relating to improved livestock husbandry and the provision of input supplies such as seeds, feeds and artificial insemination. Production services try to improve livestock productivity by such means as genetic upgrading of livestock through artificial insemination, the improved formulation of feeds, the use of improved forages and changes in management practices.

Consequently, the major players that shape the livestock services sector are veterinarians and veterinary paraprofessionals, stockowners (commercial livestock farmers, sedentary or mixed farm producers, pastoralists, and small backyard raisers), herders, consumers, government, inter-governmental, non-governmental donors in
developing countries, and private entrepreneurs providing specialized services. In addition, veterinary paraprofessionals (field technicians, field vaccinators, producer representatives) assist veterinarians with their duties. In some countries, the limited number of trained veterinarians and their unwillingness to serve in remote rural areas has made paraprofessionals very valuable. In most cases veterinarians, sale agents of agribusiness and veterinary pharmaceutical companies, provide information regarding livestock upgrading, improved production practices, hygiene and sanitation, and feeding as a complementary service to farmers. Increasing competition in the livestock sector market has led to complementary livestock services extension, designed to promote and strengthen customer loyalty and expand market shares (Umali et al. 1994).

Countries like Argentina, Brazil and the United States have seen an increase in the number of private consulting firms specializing in the provision of technical and extension services. These private consulting firms thrive because their services are tailored to the needs of specific farmers or farmer groups and are not necessarily relevant to other producers, and this minimizes free-rider problems. Umali et al. (1994) affirmed that in Argentina and Brazil there is a growing tendency toward market segmentation in extension services. Private consulting firms tend to cater to the specialized technical and extension needs of the large-scale farmers, while government efforts have concentrated on the medium and small-scale enterprises.

The provision of livestock service has often been in the domain of the public sector (Umali et al. 1994). Over time, a growing diversity has developed in the manner in which livestock services are delivered in individual countries. In most developing countries, livestock services still remain a government responsibility, while in more
developed countries, some support service functions of the government are being performed in partnership with, or have been transferred to, the private sector. de Hann (1999) foresees strong support for livestock development in the near future as there is now increasing realization, that livestock development programs can play an important role in reducing rural poverty in the developing world. Second, the demand for animal products in the developing world is growing fast, and it can be expected to continue.

Recent projections show that over the next twenty years, the demand for meat in developing countries will increase by about 2.7% and the demand for milk by 3.2% (de Hann, 1999). In response to these events de Hann believes there is a change in focus from pure production, to an increasing attention to the milk and meat production of smallholders and mixed farmers. He believes that improving the national supply of livestock products is increasingly seen as a pure private responsibility while public services are increasingly being concentrated on environmental mitigation and poverty alleviation.

**Importance and Types of Needs Assessments**

A major struggle for extension is being responsive to the needs of clientele. Needs assessments are a systematic process to identify clientele needs in order to set program priorities and make decisions about the allocation of resources (Seevers et al. 1997). Needs assessment helps determine if gaps exist between what is and what should be in terms of the outcomes of extension programs and then determining the priority of these needs (McCaslin & Tibezinda, 1997). Some of the most popular approaches used to identify needs in communities are: needs assessment, customer profiling and asset-based analysis. The needs assessment approach is very popular in extension and community development organizations while asset-based analysis and costumer profiling are used
On the international scene, an increasing emphasis has been placed on citizen involvement through bottom-up and grassroots program planning and development (Swanson et al. 1997).

Techniques used in needs assessment include individual (face-to-face interviews, questionnaires, key informant interviews), group (focus groups, delphi technique, nominal and informal groups), secondary source (census reports, records and previous studies) and rapid rural appraisal. The most direct method of assessing needs is to ask potential learners what their interest level is for a particular educational topic (Bielema & Sofranko, 1983). If done well, needs assessment is both a process and a method. As a process, it can build leadership, group cohesion, and a sense of local involvement in the community or clientele. As a method, needs assessment is a tool that helps a community plan for and implement strategies in areas as diverse as crime watch programs, business expansion efforts, and youth recreation (Israel & Ilvento, 1995).

Needs assessment has long been an important program development tool, but one that is often expensive to undertake. A disadvantage of this approach is that it often requires staff that are well educated to conduct interviews and facilitate focus groups in order to gather information that reflects the needs and real problems of clientele. Another difficulty is that problems identified can be the cause of other problems that could be ignored by respondents and therefore not be included in the needs assessment. On the other hand, needs assessment can identify unforeseen needs in the community or problems that had not been considered. Advantages of this approach include evidence of support for policy options, and an increase public involvement in policymaking and program development.
The second approach is customer profiling. Bazik and Feltes (1999), state that customer profiles include the following information: demographics, enterprises, preferred methods of receiving information, business management practices and major sources of information used in making management decisions. Balanko-Dickson (2001) has found that most companies experience 80% of their business from 20% of their customers, and as a result, it makes sense to direct time and energy toward customers who are important. The company attempts to really get to know them, to understand their buying patterns, interests, tastes and attitudes. For extension, customer profiling can have great implications. As discussed by Bazik and Feltes (1999), customer profiling can allow extension to know in greater detail the segments of population it is serving and have a deeper understanding of their wants and needs. The use of costumer profiling can direct resources to develop programs that are extremely interesting and appealing to clientele. Marketing strategies have proven to be very successful for the private sector. However, extension has not taken advantage of this resource to the fullest and by using costumer profiling it would be the first step toward developing marketing strategies. The third approach is the use of an asset-based approach. This approach focuses on a very realistic perspective. It outlines the importance of identifying available resources and building from them. This approach allows the use of resources in a very efficient way. However, one important criticism is that clientele needs and wants can often be ignored. As a result, clientele might feel that programs are not appealing to them. Agents that use the asset-based approach have to make sure they market their programs extensively and to let clientele know how the areas being targeted benefit them directly.
Education in Rural Areas

Education and training are the two most powerful weapons in the fight against rural poverty and for rural-development. Unfortunately, these are among the most neglected aspects of rural-development interventions by national governments and by donors (Gasperini and Maguire, 2002). In addition, The World Bank (2002) has found that although the wider context of extension and education services is key to informing and influencing rural household decisions. Unfortunately rural areas usually lag behind urban areas in their access to information. Such lags jeopardize the ability of rural people to realize their full potential and improve their economic, social and environmental conditions. The researchers stress the importance that rural information and education have in unleashing the potential of rural people and enabling them to change their living situations and bring about sustainable development.

Gasperini and Maguire (2002) from FAO state that educational opportunities are not equally distributed. Quality of education is lower in rural areas and one reason is that curricula and textbooks in primary and secondary schools are often urban biased. Education is irrelevant to the needs of rural people, and it seldom focuses on issues such as skills of life and rural-development. Furthermore, curricula of vocational and technical agricultural education and higher education still focus heavily on production and productivity, and are often obsolete.

Accordingly, Rivera (1995) states that agricultural education and training must be an integral part of any agricultural and rural-development efforts since out of school rural populations represent the largest human resource group in almost every developing country, and the most urgently in need of well-planned programs aimed at agricultural education. This group of farmers, fishermen, foresters, young adults and youth comprise
70 to 90% of the rural population. They need comprehensive nonformal, community based, on-the-farm education and training programs aimed at the development of rural enterprise as well as more efficient farm production. Gasperini & Maguire (2002) suggests that the concept and practice of agricultural education should be redesigned in the developing countries as education for rural-development and food security. Indeed, many needs are rapidly emerging such as trade-related education on agro-health (plant and animal health and food safety), value-added agro-processing, and agro-market competitiveness. These needs arise from the obligations that countries take on as members of the World Trade Organization (WTO) and the increasing urgency to build competitive advantages aimed at global agricultural market niche opportunities.

Based on these facts it can be inferred that a large majority of people in rural areas who urgently need extension and educational training programs are adults. As such, it is important to understand the adult learner.

**Principles of Adult Education**

Facilitating the learning experience for adults necessitates an understanding of adulthood in conjunction with the learning process. A wide range of concepts are invoked when the word adult is used Mott (2002). Some tend to think of adults in terms of age. Rogers (1996) has stated that no single age can define an adult even within one society, let alone a comparative basis, because legal and social liabilities come into play at different ages. He argues that a more satisfactory approach may be to identify some of those characteristics inherent within the concept of adulthood. Though they may differ by the person and culture, far-sightedness, self-control, established and accepted values, security, experience and autonomy are among the most common ones.
Research has shown that adults and children learn differently. Knowles (1990) determined that two types of teaching are involved with learning: pedagogy and andragogy. Table 2-3 demonstrates the differences between the two approaches.

**Table 2-3. Characteristics of Pedagogy and Andragogy.**

<table>
<thead>
<tr>
<th>Pedagogy</th>
<th>Andragogy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent learner</td>
<td>Self directed and independent</td>
</tr>
<tr>
<td>Motivation based on external rewards</td>
<td>Internal incentives and curiosity</td>
</tr>
<tr>
<td>Climate of learning: formal authority,</td>
<td>Informal climate with mutual respect,</td>
</tr>
<tr>
<td>competitive and judgemental</td>
<td>consensual, collaborative and supportive</td>
</tr>
<tr>
<td>Planning done by teacher</td>
<td>Participatory decision-making</td>
</tr>
<tr>
<td>Diagnosis of needs done by teacher</td>
<td>Mutual assessment</td>
</tr>
<tr>
<td>Delivery by transmission and assigned</td>
<td>Inquiry projects, independent study and</td>
</tr>
<tr>
<td>Readings</td>
<td>experimental techniques</td>
</tr>
<tr>
<td>External evaluation</td>
<td>Self assessment</td>
</tr>
</tbody>
</table>


Pedagogy refers to the art of teaching children and andragogy to the art of teaching adults. These two philosophies are not necessarily age dependent, but represent different “philosophical orientations or approaches to teaching and learning (Barer-Stein & Draper, 1993 p.4)”.

Adult Education is a process whereby adults gain knowledge or skills in a set of organized activities designed to enhance their quality of life involving educators. An adult’s ability to acquire new information may have more to do with lifestyle, social roles, and attitudes rather than with an innate ability to learn (Seevers et al., 1997).

Malcolm Knowles (1990) has outlined Nine Characteristics of Adult Learners to use when dealing with any adult learner regardless of level, subject or situation (p. 194).

- Adults need to control their learning.
- Adults need to feel that learning has immediate utility, i.e., that the application of ideas has to be relayed.
- Adults need to feel that learning focuses on issues that directly concern them.
- Adults need to test their learning as they go along, rather than receive background theory and general information.
- Adults need to anticipate how they will use their learning.
• Adults need to expect performance improvement to result from their learning.
• Adult learning is greatest when it maximizes available resources.
• Adult learning requires a climate that is collaborative, respectful, mutual and informal.
• Adult learning relies on information that is appropriate to what is known at a given time (i.e., it is developmentally paced).

In conclusion, adult learners require a personal productive time, where meaningful connections are made between previous knowledge and experiences with new bodies of knowledge and/or skills that will lead to immediate results.

Implications for extension include selecting educational delivery formats and teaching methods that provide learning opportunities that produce the desired learning outcomes (Birkenholz, 1999). Furthermore, extension agents need to understand the social situation, physical conditions and infrastructure of the individual farmers (Lionberger and Gwin, 1982). In the past, approaches to agricultural changes have tended to treat farmers’ methods of gaining information as a closed system, and it has become more obvious that adults and especially farmers’ systems of information acquisition and decision-making are involved with linkages in a broad social context (Bruening et al., 1992).

**Overview of delivery methods used in extension**

To effectively facilitate the learning process, learners must engage in activities that expand their knowledge base from what is known to encompass to that which was previously unknown. Richardson et al. (1996) recognize that extensive learning research has consistently shown that learners need and want to gain some type of experience with new information as well as to be supported and reinforced in the learning process. In the process of receiving information, gaining experience with it, and being reinforced in the learning process learners need to assimilate or integrate the new information with
knowledge they already possess. Thus, to promote effective and efficient learning, a
delivery system should include methods, whenever possible, that provide desired
experiential opportunities for the learner, reinforce the learner, and provide opportunities
for the learner to integrate new information with existing knowledge and skills.

Delivery methods can be classified according to the nature of the contact, the
form of communication or function (Seevers et al. 1997). Furthermore, delivery methods
can be classified according to the stage at which the method can be used in the learning
process as illustrated by Richardson (1996).

Based on this last classification, delivery methods are classified into four
categories: experiential, reinforcement, integrative, and other. Table 2-4 provides the list
of the delivery methods that are included in each category.

The three initial categories indicate the stage at which the various delivery
methods can be used most effectively in a program delivery system.

- Other methods are applicable in a wide variety of systems or that can be used for
  limited or special situations. Obviously, many of the methods listed can fit under
  more than one category.

- Experiential methods allow the learner to gain experience with or to feel the
  information presented. This experience may occur through physical activity or it
  may involve the senses, emotions, or social interaction, depending on the content of
  the educational program. As the Father of Extension (Seaman A. Knapp) stated:
  “What a man hears, he may doubt; what he sees, he may possibly doubt, but what
  he does, he cannot doubt (Rasmussen, 1989).”

- Reinforcement delivery methods provide informational, emotional, or social
  support for the learner to facilitate learning and enhance or maintain the motivation
to continue in the learning process.

- Integrative methods provide the learner opportunities to discuss, clarify, or
  otherwise gain greater understanding of new information that can be classified.
  These methods generally provide opportunities for learners to merge new
  information with their existing knowledge.
Table 2-4. Delivery methods used in extension services.

<table>
<thead>
<tr>
<th>Experiential</th>
<th>Reinforcement</th>
<th>Integrative</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result demonstration</td>
<td>Conference</td>
<td>Factsheet</td>
<td>Radio</td>
</tr>
<tr>
<td>On farm test</td>
<td>Convention</td>
<td>Notebook</td>
<td>Newspaper</td>
</tr>
<tr>
<td>Tour</td>
<td>Seminar</td>
<td>Leaflet or flier</td>
<td>Movie</td>
</tr>
<tr>
<td>Field day</td>
<td>Panel</td>
<td>Magazine article</td>
<td>Film strip</td>
</tr>
<tr>
<td>Workshop</td>
<td>Meeting</td>
<td>Journal article</td>
<td>Photograph</td>
</tr>
<tr>
<td>Games</td>
<td>Symposium</td>
<td>Poster</td>
<td>Fair</td>
</tr>
<tr>
<td>Analysis of data</td>
<td>Colloquy</td>
<td>Book</td>
<td>Exhibit</td>
</tr>
<tr>
<td>Role play</td>
<td>Dialogue</td>
<td>Newsletter</td>
<td>Lecture</td>
</tr>
<tr>
<td>Case study</td>
<td>Institute</td>
<td>Home study kit</td>
<td>Speech</td>
</tr>
<tr>
<td>Networking</td>
<td>Buzz group</td>
<td>Pamphlet or booklet</td>
<td>Bulletin board</td>
</tr>
<tr>
<td>Skit</td>
<td>Discussion group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audio cassette</td>
<td>Brainstorming</td>
<td></td>
<td>Show</td>
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<tr>
<td>Video cassette</td>
<td>Audience reaction team</td>
<td></td>
<td>Broadcast</td>
</tr>
<tr>
<td>Interactive video</td>
<td>Listening team</td>
<td></td>
<td>television</td>
</tr>
<tr>
<td>Audio compact disk</td>
<td>Interview</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video compact disk</td>
<td>Teleconference</td>
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<tr>
<td>Method demonstration</td>
<td>Telephone conservation</td>
<td></td>
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<tr>
<td></td>
<td>Computer network</td>
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<td></td>
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<tr>
<td></td>
<td>Personal visit</td>
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<tr>
<td></td>
<td>Office visit</td>
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</tr>
</tbody>
</table>

Source: Richardson et al. (1996) (p. 2).

According to Birkenholz (1999, p. 44), when selecting an appropriate delivery method, educators should consider the following:

- **Objectives and goals.** The educator should determine if the purpose of the instruction is to create awareness, interest, gain knowledge, to apply new information, to teach or perform a skill or to help learners modify, adopt or clarify their attitudes or values.

- **Content.** The content will allow the educator to search for specific methods.

- **Resources.** The cost of instruction and availability of funds to deliver the program should be analyzed. Adequate facilities and equipment should also be taken into account.
• Skills of the educator. The skills and expertise of educators or extension agents are important to farmers. Farmers come to programs to learn new things and will often test their instructor’s skills and knowledge.

• Size and educational level of the target group.

• Desired interaction of learners among themselves and the instructor.

• Available time. These are some of the main considerations that should be taken into account when designing and carrying out extension programs for farmers. As an educator it is necessary to take into account that each group of learners has different learning styles and preferences. These differences should challenge the educator to bring a wide variety of delivery methods into the program to enhance the learning experience of all learners.

**Organization and Development of Farmer Groups**

ISNAR (2002) categorizes farmer groups into three broad organizational types: local grassroots organizations, federations or networks and farmer associations. Local grassroots organizations are formally constituted groups with memberships drawn from a community or groups of communities where interactions are mostly face-to-face and within a horizontal organizational structure. For example, women and peasant groups have emerged in countries like Honduras with the collaboration of NGOs. Federations or networks are multi-tiered organizations composed of an apex body and base units. Examples of these are the National Federation of Labour in the Philippines, the General Agricultural Workers Union in Ghana, the National Federation of the Landowners and Agriculture Shareholders in Romania, the National Confederation of Agriculture Workers in Brazil (IUF, 1997) and the Federación Nacional de Agricultores y Ganaderos de Honduras (FENAGH). On the other hand, farmer organizations (FO) are vertically integrated organizations with a single governing board, usually with specialized committees and subunits. These are legally constituted entities that have an identifiable membership, a governing body and rules for decision-making.
Chamala and Shingi (1997) have categorized farmer organizations into two types: community-based, resource-orientated farmer organizations; and commodity-based, market-orientated farmer organizations. The characteristics of community-based, resource-orientated farmer organizations include that they are generally small, have well defined geographical areas, are predominantly concerned about inputs and the client group is highly diversified in terms of crops and commodities. On the other hand, market-orientated farmer organizations specialize in a single commodity and opt for value added products that have expanded markets. These organizations are generally small and operate in a competitive environment and the rate of success is generally determined by their capacity to arrange for major investments and a continuous flow of raw materials. Success stories about these type of organizations have been documented in India with dairy FOs such as Anand Milk (Chamala and Shingi, 1997) and the Camara Nacional de Productores de Leche of Costa Rica (Cámara Nacional de Productores de Leche, 2004).

Research suggests that farmer groups are key to the development of the agriculture and livestock sector. FOs generally represent farmer’s demands and interests and provide support services for technology adoption and develop members’ capacities to use technology (ISNAR, 2002). Since FOs are community-based, and better placed to understand the social, economic and technical needs of farmers, they are ideal organizations for extension to work with. However, many FOs lack capacity, information, new technology, finances and resources (SACRED-AFRICA, 2003). Therefore, it is important to strengthen FOs so that they can exert an effective demand for
agriculture-related services and become active partners in the process of technology change.

Addressing the issue of small farmer group associations is both important and timely according to FAO (1999). It is timely because with the privatization of markets and downsizing of public sector programs, many farmer groups are struggling for survival as government subsidies are reduced and markets reformed. Many of the largest government systems have neglected the opportunity to organize groups, empower their clientele and press for equity (Axinn et al. 1997). Furthermore, studies have revealed that belonging to a farmer association or other organized groups contributes to the adoption of sustainable agriculture practices as is the case in Rondônia, Brazil in a study conducted by Caviglia-Harris (2001). The participation of farmers in groups often increases communication between farmers and as a result encourages a sense of peer pressure among members.

**Leadership Development**

One of the great challenges leadership development specialists face is how to best facilitate the development of community leaders, given the social and economic challenges faced by these communities. According to Stedman (2004), Bass (1990, p.78) defined leadership as

\[ \ldots \text{the focus of group processes, as a matter of personality, as a matter of inducing} \]
\[ \ldots \text{compliance, as the exercise of influence, as particular behaviors, as a form of persuasion,} \]
\[ \ldots \text{as a power relation, as an instrument to achieve goals, as an effect of interaction, as a} \]
\[ \ldots \text{differentiated role, as initiation of structure, and as many combinations of these.} \]

Burns (1978) defined leadership as the process of mobilizing, by persons with certain motives and values, various economic, political, and other resources, in a context of competition and conflict, in order to realize goals independently or mutually held by
both leaders and followers. As it can be inferred, leadership includes many variables, the leader him/herself, the followers, the situation, the task, the relationships and more.

Many authors have discussed the differences between leadership and management. Kotter (1990) argues the functions of management are to provide order and consistency and in contrast, leadership is to produce change and movement. On the other hand, Northouse (2001) has stated that the functions of leadership and management are similar, but a difference exists. Historically, Northouse identifies leadership from the early studies of Aristotle, whereas the study of management begun in the early 1900s as a response to the industrialization of society.

According to Apps (1993), emerging ways of thinking in extension will lead organizations to have a new view of competition, examine the differences between efficient and effective, question specialization, broadly define knowledge to include multiple perspectives, and realize that change isn’t constant. Change itself is changing. It is increasingly unpredictable and as a result, next to impossible to prepare for. As a result Apps believes that leaders in extension need to: know what they believe and value, live with paradox, be risk takers, study the context, inspire, empower, build bridges among people and among ideas, challenge the process, embrace ambiguity, serendipity, encourage artistry, appreciate humor, collaborate and above all be guided by quality.

Rivera (2003) considers that poor leadership is a serious problem in extension. He believes that organizations work the way they do because of the way people work in these organizations, and often enough the way they work is a reflection of their leadership. He states that to be truly effective, leadership involves leaders at all levels in order to bring about development. Barbuto & Etling (2002) consider that leadership
development is a process, not an event. Furthermore, it is a process that requires a long-term initiative, typically lasting between six and eighteen months. They believe that for leadership development to occur there must be a variety of developmental experiences and also the ability and opportunity to learn from these experiences. In addition, they state individuals who have gained experiences, but haven’t learned from them (or learning without practical experiences) will not experience any substantive leadership development. The key elements of leadership development experiences include assessment, challenge and support. Consequently, these experiences must be carefully planned to incorporate each of these three components. Finally, they conclude that effective programs are those grounded in solid leadership theory and research.

In contrast, Sandmann & Vandenberg (1995) believe that leadership development is not a commodity to deliver or a how-to manual or an iteration of current practice. It is, rather, a perspective, a set of ideas, a way of thinking based on the architecture underlying multiple variations of community action leadership development. Community action leadership development is leadership development for community organizations and it aims to develop individual’s abilities to build both a group community spirit and its capacity to engage in effective action. Organizational development is the increase of a group’s capacity to engage in concerted and effective action to achieve group goals. Finally, Sandmann and Vandenberg consider that leadership development is the growth of individual’s capacities to facilitate community development and organizational development.

Leadership development programs have been launched in several countries. The New Zealand Young Farmers Leadership Development Program sponsored by the
Ministry of Agriculture in March 2004 is an example of such initiatives. The program was initiated by young farmers to increase the number of young people becoming involved in rural community and industry leadership roles. The primary objective of this program was to develop young members so they may participate more effectively in organizations related with the agricultural sector throughout their lives.

**Conclusion**

This literature review chapter was comprised of the following: extension in the development of the agricultural and livestock sector, factors that affect extension performance, approaches to extension services, delivery of livestock services, importance and types of needs assessments, education in rural areas, principles of adult education, overview of delivery methods, organization and development of farmer groups and leadership within farmer groups. Literature documents that there are potential reasons to assume that the quality and availability of extension services to dairy farmers in Honduras, and this plays a major role in the productivity of the sector. Our study seeks to identify farmers educational needs, based on the subject areas highlighted in this literature review. The next chapter focuses on methods and procedures utilized in our study.
CHAPTER 3  
METHODOLOGY

Chapter 1 provided a description of the situation of milk production in Honduras, the factors affecting it and of the extension services available to dairy farmers in Honduras. Chapter 1 also identified the need of the study, purpose of the study, objectives of the study, the limitations and significance.

Chapter 2 presented relevant literature to the areas covered in our study. Included was a discussion of the following topic areas: 1) extension in the development of the agricultural and livestock sector, 2) factors that affect the performance of extension, 3) approaches to extension services, 4) delivery of livestock services, 5) importance and types of needs assessments, 6) education in rural areas, 7) principles of adult education, 8) overview of delivery methods, 9) organization and development of farmer groups and 10) leadership within farmer groups.

This chapter explains the methods used to accomplish the objectives of the study. The main purpose of our study was to determine the perceptions of three groups of dairy farmers (New CREL members, Old CREL members and large farmers) on extension’s educational delivery in the northern coast of Honduras. For our study, milk collection centers known as CRELs were categorized into New and Old CREL. New CRELs were either in the process of starting operations or had recently started operating at the time of our study while Old CRELs had started operations in the years 2000 and 2001. Large farmers were not affiliated to CRELs but where considered leaders in the same geographical areas where CRELs were located. The five objectives for the study were to:
1) Determine the perceptions of three groups of dairy farmers about extension services, 2) Determine educational delivery methods used in extension programs offered to dairy farmers in Honduras, 3) Determine preferred educational delivery methods for dairy farmers in Honduras, 4) Determine felt and ascribed educational needs for dairy farmers in the north coast of Honduras and 5) Determine perceptions of dairy farmers on open market policies, and its effects on the dairy industry in relation to educational needs.

This chapter will describe the methods and procedures used to accomplish the objectives of the study as it relates to 1) research design, 2) sample selection, 3) procedure, 4) instrumentation, 5) data collection, and 6) data analysis.

**Research Design**

This is an exploratory descriptive study of dairy farmers in the North Coast of Honduras. An extensive review of secondary sources included reports from the Ministry of Agriculture of Honduras, the Directorate of Agricultural Science and Technology (DICTA), the Inter-American Institute for Cooperation in Agriculture (IICA), LSU Ag Center, the Central American Federation for the Dairy Sector (FECALAC), the IV National Agriculture Census of Honduras, the Instituto Nacional de Estadística (INE). Additionally, interviews with key people of the dairy industry were used to determine the research design.

The study made use of three different structured interview guides to collect the necessary information to accomplish the objectives of the study. The first structured interview guide was designed for large farmers, New CREL and Old CREL farmers. CREL is the acronym for milk collection and cooling centers in Spanish. The second structured interview guide was for leaders of the most important farmer associations located in the same geographical areas where the study was conducted. The third
instrument was designed to collect information from input suppliers and extension providers working in the same geographical area of the study.

The researcher accomplished objectives 1 through 5 by using a mixed methodology, descriptive statistics and content analysis from the responses gathered in the structured interview guides. The advantages of using a mixed methodology or of a combination of qualitative and quantitative methodologies is beneficial to the research process. It enhances the quality of social assessment (World Bank, 2003b) and contributes to a deeper understanding of the situation being studied.

**Populations**

Three groups of farmers: a) 27 New CREL farmers, b) 14 Old CREL members, c) 10 large dairy farmers recognized as leaders by the industry, seven input suppliers and three representatives of the farmer associations comprised the samples of our study.

Our study took place in the region known as the Cuenca Lechera de Honduras that comprises four geographical regions. These are the Sula Valley (SV), Atlántida Region (AT), Yoro (YO) and Colón (CO). The first two geographical regions are where the first 13 CRELs where established in Honduras. While the newer CREL where established in the four geographical regions.

Large farmers were purposively selected based on the leadership they provided to the industry. To select CREL farmers, a total of 20 CRELs were chosen from a total of 63 organized at the time of the study. CRELs where randomly selected based on length of operation and location. CRELs defined as Old, had 2 years of operation while New CRELs where either in the process of formation or had recently started operating at the time of our study. Four CRELs from each region were originally selected (SV, AT, YO and CO) except for the Atlántida Region where four new and four old CRELs were
chosen. However, interviews were not conducted in the Cuyamel CREL (SV) due to difficulties with transportation. As a result, the Salitrán CREL located in AT was added to the study. A description of the location and length of operation of each CREL is presented in Table 3-1.

Table 3-1. Geographical location and length of operation of CRELs selected for the study.

<table>
<thead>
<tr>
<th>Group</th>
<th>Geographical location</th>
<th>Length of organization*</th>
<th>Location of the CREL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sula Valley</td>
<td>Old</td>
<td>El Zapote</td>
</tr>
<tr>
<td></td>
<td>Sula Valley</td>
<td>Old</td>
<td>San Buenaventura</td>
</tr>
<tr>
<td></td>
<td>Sula Valley</td>
<td>Old</td>
<td>Gualala</td>
</tr>
<tr>
<td></td>
<td>Sula Valley</td>
<td>Old</td>
<td>Cuyamel **</td>
</tr>
<tr>
<td>2</td>
<td>Atlántida</td>
<td>Old</td>
<td>Las Palmas</td>
</tr>
<tr>
<td></td>
<td>Atlántida</td>
<td>Old</td>
<td>La Unión</td>
</tr>
<tr>
<td></td>
<td>Atlántida</td>
<td>Old</td>
<td>Cefalú</td>
</tr>
<tr>
<td></td>
<td>Atlántida</td>
<td>Old</td>
<td>San Francisco</td>
</tr>
<tr>
<td>3</td>
<td>Atlántida</td>
<td>New</td>
<td>Km 17 Rd. to La Ceiba</td>
</tr>
<tr>
<td></td>
<td>Atlántida</td>
<td>New</td>
<td>Esparta</td>
</tr>
<tr>
<td></td>
<td>Atlántida</td>
<td>New</td>
<td>Ceibita Way</td>
</tr>
<tr>
<td></td>
<td>Atlántida</td>
<td>New</td>
<td>Salitrán***</td>
</tr>
<tr>
<td></td>
<td>Atlántida/Colón</td>
<td>New</td>
<td>Lis lis</td>
</tr>
<tr>
<td>4</td>
<td>Yoro</td>
<td>New</td>
<td>Juncal</td>
</tr>
<tr>
<td></td>
<td>Yoro</td>
<td>New</td>
<td>Coyoles Aldea</td>
</tr>
<tr>
<td></td>
<td>Yoro</td>
<td>New</td>
<td>Calpules Aldea</td>
</tr>
<tr>
<td></td>
<td>Yoro</td>
<td>New</td>
<td>Maloa</td>
</tr>
<tr>
<td>5</td>
<td>Colón</td>
<td>New</td>
<td>Corocito</td>
</tr>
<tr>
<td></td>
<td>Colón</td>
<td>New</td>
<td>La Esperanza</td>
</tr>
<tr>
<td></td>
<td>Colón</td>
<td>New</td>
<td>Feo</td>
</tr>
<tr>
<td></td>
<td>Colón</td>
<td>New</td>
<td>Bonito Oriental</td>
</tr>
<tr>
<td>Pilot test</td>
<td>Sula Valley</td>
<td>New</td>
<td>Bonanza</td>
</tr>
<tr>
<td></td>
<td>Sula Valley</td>
<td>Old</td>
<td>Taulabé</td>
</tr>
</tbody>
</table>

* Old CRELs had been operating since 2000 and 2001. New CRELs had either started operating in 2003 or were about to start operations at the time of the study.

** CREL not interviewed.

*** CREL added.

Furthermore, two farmers were randomly selected from each CREL except in one CREL in the Yoro region where three farmers were interviewed. Interviews were
conducted in CRELs or at individual farms, depending on farmer’s preferences. The average length of each interview was 30-45 minutes.

Input suppliers included one veterinarian, two managers of agribusiness firms, one salesman and two field agents from the Instituto Nacional de Formación Profesional (INFOP). INFOP is the largest nonformal education provider in Honduras. Regarding farmer associations, the vice-presidents from the Asociación de Ganaderos y Agricultores de Sula (AGAS) and the Sociedad de Agricultores y Ganaderos de Olanchito (SAGO) were interviewed as well as the president of the Asociación de Agricultores y Ganaderos de Atlántida (AGAA).

**Instrumentation**

In order to collect the necessary information to complete our study, the researcher developed an instrument for each group of participants: farmers, input suppliers and farmer organizations. The researcher developed these instruments after reviewing surveys from Holman et al. (2003) and the Macon County Survey on Improving Farm Income through the Production of Specialty Farm Products developed by faculty of the University of Illinois-Urbana Champaign.

The first structured interview guide developed collected data from the two groups of farmers in reference to their perceptions of extension services, preferences in regards to educational program delivery as well as their perceptions about globalization and its effects on the dairy industry of Honduras and finally a demographic section. The instrument included an additional question for CREL members in order to gain a deeper understanding of the changes that have occurred to farmers after they had joined CRELs (See Appendix A). This instrument had four sections. The first section included questions regarding availability of extension and other support services, availability of
training for farm workers and others in relation to milk production, preferences regarding program delivery, factors that affect participation in programs, sources and channels of information available, training priorities and a recount of positive and negative experiences regarding extension services. The second section inquired about farmers perceptions regarding farmer associations. Although this was not an objective in the study, the researcher considered it was important to document such perceptions due to the importance these organizations have as facilitators of most educational programs available and in the acquisition of funds for extension programs. The third section sought to determine farmer’s perceptions regarding globalization, and the implications this event can have at the farm, as well as the local and national level. In addition, farmers were asked if any changes had been made in their farms in preparation for such event. The fourth and last section of the structured interview guide collected data on educational level, gender, family involvement in farm activities, farm location and size, breeds in the herd and the use of best management practices such as the implementation of artificial insemination, feeding concentrate, milking facilities, use of improved grass varieties and checking for pregnancy.

The second structured interview guide targeted input suppliers. It was used to collect information about the type of services provided by suppliers, educational programs offered and the frequency of these, delivery methods used, felt and ascribed needs of farmers as seen by providers, limitations and barriers to education for farmers and providers, opportunities for professional development and the educational level of providers (See Appendix B).
The third instrument was designed for farmer associations to determine the educational opportunities provided and sponsored by these associations, farmers preferences in the delivery of programs as seen by these organizations, felt and ascribed needs of farmers as seen by farmer associations, farmer’s involvement with the associations, the role of farmer associations in the development of the dairy sector, organizational structure within the associations, employee profiles and opportunities for professional development for them, partnerships with extension and other organizations related with the dairy industry and finally their contributions to increase farmers understanding of the Central American Free Trade Agreement known as CAFTA (See Appendix C).

Face and content validity and reliability of the instruments were important considerations for the researchers to make in determining the credibility of the study. The scientific validity evidence is based on content, which can be gathered by having competent professionals who are familiar with the process of the survey examine the items to judge whether they are appropriate for measuring what they are supposed to measure (Ary et al. 2002). For this purpose, a panel of two experts from the Department of Agricultural Education and Communication and two experts from the Animal Science Department at the University of Florida and Zamorano, Panamerican School of Agriculture in Honduras reviewed the three structured interview guides for face and content validity. Validity is defined as the extent to which an instrument measures what it claims to measure. Consequently, face validity refers to an instrument or document appearing valid for its intended purpose (Ary et al. 2002). Prior to the study, a pilot test
was conducted with the structured interview guide with four farmers in two CRELs in order to determine face validity.

Our study is unique because there is limited information available to the dairy industry of Honduras and the Honduran Government about the characteristics, needs and perceptions of dairy farmers. Our study is considered pertinent by the experts involved, and will not only establish baseline data, but will provide with a better understanding of the participants’ educational needs.

Data Collection Procedures

A review of our study by the Institutional Review Board (IRB) preceded any data collection. The IRB-02, located at the University of Florida, reviews non-medical research proposals for ethical soundness. The IRB approved the research proposal and assigned an IRB protocol number (2003-U-536) for our study. The researcher presented each participant with a translated version of the informed consent letter prior to each interview. The informed consent described the study, the researcher, and any potential risks associated with participating in the study. Additionally, participants were provided the approximate amount of time that participation in the study would require and they were informed there was no compensation for their participation. Participants opted to voluntarily participate in the study and confirmation of their acceptance of the terms in the informed consent was signing the form before the interview started. After formal approval for the IRB, data collection began. Data collection occurred during the months of June, July and August 2003. Interviews lasted from 25 to 40 minutes. Formal review of data occurred during October through April 2004.

The researcher and an additional trained professional conducted the interviews to farmers. Training for the additional professional included a detailed explanation of the
purpose and objective of the study, a thorough review of the structured interview guide for farmers and a description of the guidelines to be used during the interview. The researcher administered all of the interviews to input suppliers and farmer association representatives. Of the total population targeted for the study, 96% of the original population was interviewed due to the fact that it was not possible to interview members from one CREL in the Sula Valley Region.

**Data Analysis**

The researcher assigned individual study identification numbers to each interview guide. This was to maintain respondent anonymity. Raw quantitative data from the structured interview guides was entered into a Microsoft Excel spreadsheet. In addition, data for each farmer was carefully revised for mistakes that could have occurred while entering the data. A separate spreadsheet was created for each group of farmers. Data was then analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows Release 11.5.0 (SPSS®, 2002). Descriptive statistics were determined for each variable.

For the qualitative data sets, content analysis was used to determine trends and patterns in the data and draw conclusions. Content or document analysis is a research method applied to written or visual materials for the purpose of identifying specified characteristics of the material. Furthermore, content analysis focuses on analyzing and interpreting recorded material within its own content (Ary et al. 2002). In our study, the answers to open-ended questions in the structured interview guides were classified according to categories established from a preliminary review of the data. Additional categories were added if needed. Data was then organized and conclusions were drawn.
Research objectives 1, 2 and 3 were analyzed by relying solely on the quantitative data set. Frequencies and means were determined for this purpose. The first objective was to determine farmer’s perceptions about extension services. Farmers’ structured interview responses only were taken into account to answer objective 1. Objective 2 was to determine the educational delivery methods used in extension programs offered to dairy farmers and objective three was to determine farmers preferred delivery methods. Farmer’s responses as well as input suppliers and farmer organization responses were taken into account to answer these two objectives.

Objectives 4 and 5 were answered by analyzing qualitative data and quantitative data sets. Frequencies and means where determined for numerical data and content analysis was used for qualitative data. The fourth objective consisted of determining felt and ascribed needs for dairy farmers in the north coast of Honduras. Structured interview guides from farmers, input suppliers and farmer association’s representatives were used to answer this objective.

The fifth objective was to determine farmer’s perceptions regarding globalization and its effects on the dairy industry in relation to educational needs. To answer objective 5, quantitative data from responses from the farmer and the farmer association structured interview guides were used to determine farmers perceptions. In addition, open-ended questions in this section were analyzed in order to assess farmers understanding of the CAFTA.

**Summary**

This chapter described our study in terms of the research design, the population of the study, the instrumentation, and data analysis procedures. In summary, this is a descriptive study of the perceptions of three groups of dairy farmers in the north coast of
Honduras about extension services, delivery methods, and of globalization and its effects on the dairy industry in relation to educational needs. The populations under study included two groups of farmers, input suppliers and farmer association’s representatives. A mixed methodology was used. Accordingly, structured interview guides were designed for each group of participants (farmers, input suppliers and farmer associations representatives). The results of our study were obtained by determining descriptive statistics such as frequencies and means on the quantitative data sets and by determining trends and patterns via content analysis for qualitative data.

Chapter 4 will report the results of the study. Findings for each objective as well as the demographics of New CREL, Old CREL and large farmers will be provided.
CHAPTER 4
RESULTS

The results of the study are presented according to the objectives identified in Chapter 1: These were to

- Determine the perceptions of three groups of dairy farmers about extension services.
- Determine educational delivery methods used in extension programs offered to dairy farmers in Honduras.
- Determine preferred educational delivery methods for dairy farmers in Honduras.
- Determine felt and ascribed educational needs for dairy farmers in the north coast of Honduras.
- Determine perceptions of dairy farmers on open market policies and its effects on the dairy industry in relation to educational needs.

Demographics

Background Information

New CREL farmers were members of CRELs that were either in the process of formation or had recently started operations while Old CREL farmers were part of centers that had been operating for approximately 2 years. Large farmers had no affiliation to CRELs but were considered leaders in the same geographical areas where the CRELs are located.

Selected demographic characteristics were identified for the three groups of farmers studied (New CRELs, Old CRELs and large farmers). These included gender, educational level, number of years involved in milk production and general farm management information. Results indicated that 96.3%, 92.9% of New and Old CREL members, respectively and 90% of the large farmers were male (Table 4-1). In addition, Table 4-2 reveals that 40.7% (n=11) of New CREL farmer’s highest level of education is...
in the category of 4th to 6th grade, while 50% of Old CREL farmers (n=7) is in the 7th to 11th grade range. In contrast, 60% (n=6) of the large farmer group has a college degree. Independent of educational level, 14.8% (n=4) of New CREL farmers and 14.3% (n=2) of Old CREL farmers reported they are not literate. Table 4-3 shows that of the three groups there is a large number of farmers who have been part of the industry for the last 10 to 20 years.

Table 4-1. Distribution of New CREL, Old CREL and Large Farmers by Gender (n=41)

<table>
<thead>
<tr>
<th>Gender</th>
<th>New CREL farmers</th>
<th>Old CREL farmers</th>
<th>Large farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Male</td>
<td>26</td>
<td>96.3</td>
<td>13</td>
</tr>
<tr>
<td>Female</td>
<td>1</td>
<td>3.7</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.0</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 4-2. Educational Background of New CREL, Old CREL and Large Farmers

<table>
<thead>
<tr>
<th>Education level</th>
<th>New CREL farmers</th>
<th>Old CREL farmers</th>
<th>Large farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>New CREL farmers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>2</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td>1st – 3rd grade</td>
<td>5</td>
<td>18.5</td>
<td></td>
</tr>
<tr>
<td>4th – 6th grade</td>
<td>11</td>
<td>40.7</td>
<td></td>
</tr>
<tr>
<td>7 – 11th grade</td>
<td>4</td>
<td>14.8</td>
<td></td>
</tr>
<tr>
<td>College Incomplete</td>
<td>2</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td>College</td>
<td>3</td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Old CREL farmers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st – 3rd grade</td>
<td>3</td>
<td>21.4</td>
<td></td>
</tr>
<tr>
<td>4th – 6th grade</td>
<td>2</td>
<td>14.3</td>
<td></td>
</tr>
<tr>
<td>7 – 11th grade</td>
<td>7</td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td>College Incomplete</td>
<td>1</td>
<td>7.1</td>
<td></td>
</tr>
<tr>
<td>College</td>
<td>1</td>
<td>7.1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Large farmers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-11th grade</td>
<td>1</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>College Incomplete</td>
<td>1</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>College</td>
<td>6</td>
<td>60.0</td>
<td></td>
</tr>
<tr>
<td>Master’s</td>
<td>2</td>
<td>20.0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Table 4-3. Years Involved in Milk Production of New CREL, Old CREL and Large Farmers.

<table>
<thead>
<tr>
<th>Length</th>
<th>New CREL farmers</th>
<th>Old CREL farmers</th>
<th>Large farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>0-10 years</td>
<td>5</td>
<td>18.5</td>
<td>4</td>
</tr>
<tr>
<td>10-20 years</td>
<td>15</td>
<td>55.6</td>
<td>4</td>
</tr>
<tr>
<td>20-30 years</td>
<td>4</td>
<td>14.8</td>
<td>3</td>
</tr>
<tr>
<td>More than 30 years</td>
<td>3</td>
<td>11.1</td>
<td>3</td>
</tr>
<tr>
<td>Totals</td>
<td>27</td>
<td>100.0</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 4-4. Distribution of Family Members Working Part or Full-Time on the Farm

<table>
<thead>
<tr>
<th></th>
<th>Spouse</th>
<th></th>
<th>Sons</th>
<th></th>
<th>Daughters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>New CREL farms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work on the farm</td>
<td>10</td>
<td>37.0</td>
<td>10</td>
<td>37.0</td>
<td>2</td>
</tr>
<tr>
<td>Do not work on farm</td>
<td>17</td>
<td>63.0</td>
<td>16</td>
<td>59.3</td>
<td>24</td>
</tr>
<tr>
<td>Not applicable*</td>
<td>--</td>
<td>--</td>
<td>1</td>
<td>3.7</td>
<td>1</td>
</tr>
<tr>
<td>Totals</td>
<td>27</td>
<td>100.0</td>
<td>27</td>
<td>100.0</td>
<td>27</td>
</tr>
<tr>
<td>Old CREL farms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work on the farm</td>
<td>8</td>
<td>57.1</td>
<td>8</td>
<td>57.1</td>
<td>3</td>
</tr>
<tr>
<td>Do not work on farm</td>
<td>6</td>
<td>42.9</td>
<td>6</td>
<td>42.9</td>
<td>11</td>
</tr>
<tr>
<td>Not applicable*</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Totals</td>
<td>14</td>
<td>100.0</td>
<td>14</td>
<td>100.0</td>
<td>14</td>
</tr>
<tr>
<td>Large farms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work on the farm</td>
<td>5</td>
<td>50.0</td>
<td>4</td>
<td>40.0</td>
<td>--</td>
</tr>
<tr>
<td>Do not work on farm</td>
<td>5</td>
<td>50.0</td>
<td>6</td>
<td>60.0</td>
<td>10</td>
</tr>
<tr>
<td>Not applicable*</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Totals</td>
<td>10</td>
<td>100.0</td>
<td>10</td>
<td>100.0</td>
<td>10</td>
</tr>
</tbody>
</table>

* Farmer did not have sons or daughters.

In relation to work force, 85.2% of New CREL farmers, 64.3% of Old CREL farmers and 70% of large farmers work solely on their farms. In addition 37% of spouses and sons, and 7.4% of daughters of New CREL farmers work part or full-time on the farm (Table 4-4) while a slightly higher participation of family members was reported in Old CREL farms.

Table 4-5 indicates that New CREL farms had on average 4.03 permanent workers (SD=2.38), Old CREL farmers employed 3.42 workers (SD=1.86) and large farmers had
on average 7.5 permanent workers (SD=4.55). Additionally, the education level of farm workers in New and Old CREL and large farms is presented in Table 4-6.

Table 4-5. Distribution of Permanent Workers per Farm in New CREL, Old CREL and Large Farms.

<table>
<thead>
<tr>
<th>Number of workers</th>
<th>New CREL</th>
<th>Old CREL</th>
<th>Large farms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>0-2</td>
<td>10</td>
<td>37.0</td>
<td>4</td>
</tr>
<tr>
<td>3-5</td>
<td>8</td>
<td>29.6</td>
<td>9</td>
</tr>
<tr>
<td>6-8</td>
<td>8</td>
<td>29.6</td>
<td>1</td>
</tr>
<tr>
<td>9-12</td>
<td>1</td>
<td>3.8</td>
<td>--</td>
</tr>
<tr>
<td>13 or more</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Totals</td>
<td>109</td>
<td>100.0</td>
<td>48</td>
</tr>
<tr>
<td>M</td>
<td>4.03</td>
<td></td>
<td>3.42</td>
</tr>
<tr>
<td>SD</td>
<td>2.38</td>
<td></td>
<td>1.86</td>
</tr>
</tbody>
</table>

Table 4-6. Educational Background of Farm Workers

<table>
<thead>
<tr>
<th>Education level of farm workers</th>
<th>New CREL</th>
<th>Old CREL</th>
<th>Large farm</th>
</tr>
</thead>
<tbody>
<tr>
<td>No formal education</td>
<td>21</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>1st – 3rd grade</td>
<td>42</td>
<td>7</td>
<td>33</td>
</tr>
<tr>
<td>4th – 6th grade</td>
<td>38</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>7 – 11th grade</td>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>107</td>
<td>48</td>
<td>70</td>
</tr>
</tbody>
</table>

Farm Characteristics

Farm characteristics of New CREL, Old CREL and large farms are presented in Table 4-7. All large farms (n=10) have access to tap water, electricity and have adequate facilities (milking parlor). On the other hand, 25.9% of New CREL farms do not have
any type of facilities to milk cows and 37% do not have access to tap water. In contrast, 92.9% of Old CREL farms have access to tap water and approximately 85.8% of farms have at least a corral with roof and concrete floors to use for milking cows. The number of farms operating under dual-purpose systems is high, 96.3% (n=26) of new CREL and 78.6% (n=11) of Old CREL, whereas it was only 20% (n=2) of large farms.

<table>
<thead>
<tr>
<th>Table 4-7. Characteristics of New CREL, Old CREL and Large Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Access to tap water</td>
</tr>
<tr>
<td>Access to electrical power</td>
</tr>
<tr>
<td>Road access 5 miles or less</td>
</tr>
<tr>
<td>Milking facilities</td>
</tr>
<tr>
<td>Open field</td>
</tr>
<tr>
<td>Corral with roof</td>
</tr>
<tr>
<td>Corral with roof and concrete floor</td>
</tr>
<tr>
<td>Milking parlor</td>
</tr>
<tr>
<td>Totals</td>
</tr>
</tbody>
</table>

Table 4-8. Average Pasture Area (acres) on New CREL, Old CREL and Large Farms

<table>
<thead>
<tr>
<th>Pasture Group</th>
<th>Pasture Acres</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>New CREL</td>
<td>130.0</td>
<td>145.6</td>
</tr>
<tr>
<td>Old CREL</td>
<td>145.0</td>
<td>188.0</td>
</tr>
<tr>
<td>Large farmers</td>
<td>252.6</td>
<td>226.1</td>
</tr>
</tbody>
</table>

On average, pasture area is very similar between New and Old CREL farms (Table 4-8) as well as the number of cows in milk for the peak season of New and Old CREL farms is 29.3 and 32.2, respectively. However, milk production among Old CREL farms is 42% and 35.9% higher on average for the peak and low season respectively than in New CREL farms (Table 4-9).
Table 4-9. Average Daily Milk Production and Number of Cows in Milk per Farm

<table>
<thead>
<tr>
<th>Group</th>
<th>Daily Milk Production</th>
<th>Cows in Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>(lb)</td>
</tr>
<tr>
<td>New CREL</td>
<td>26</td>
<td>381.9</td>
</tr>
<tr>
<td>SD</td>
<td>39.2</td>
<td>39.6</td>
</tr>
<tr>
<td>Old CREL</td>
<td>14</td>
<td>659.8</td>
</tr>
<tr>
<td>SD</td>
<td>156.0</td>
<td>114.6</td>
</tr>
<tr>
<td>Large farms</td>
<td>9</td>
<td>2633.8</td>
</tr>
<tr>
<td>SD</td>
<td>1992.1</td>
<td>1936.6</td>
</tr>
</tbody>
</table>

Table 4-10. Composition of Breeds Among New CREL, Old CREL and Large Farms

<table>
<thead>
<tr>
<th>Breeds</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>New CREL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown Swiss x Brahman</td>
<td>22</td>
<td>52.4</td>
</tr>
<tr>
<td>Holstein x Brahman</td>
<td>18</td>
<td>42.8</td>
</tr>
<tr>
<td>Brown Swiss</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>Gyr x Brahman</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>100.0</td>
</tr>
<tr>
<td>Old CREL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holstein x Brahman</td>
<td>12</td>
<td>41.4</td>
</tr>
<tr>
<td>Holstein</td>
<td>6</td>
<td>20.7</td>
</tr>
<tr>
<td>Brown Swiss x Brahman</td>
<td>5</td>
<td>17.2</td>
</tr>
<tr>
<td>Brown Swiss</td>
<td>4</td>
<td>13.9</td>
</tr>
<tr>
<td>Jersey</td>
<td>1</td>
<td>3.4</td>
</tr>
<tr>
<td>Gyr x Brahman</td>
<td>1</td>
<td>3.4</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>100.0</td>
</tr>
<tr>
<td>Large farm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holstein</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td>Holstein x Brahman</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td>Brown Swiss x Holstein</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td>Brown Swiss</td>
<td>3</td>
<td>15.0</td>
</tr>
<tr>
<td>Brown Swiss x Brahman</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td>Jersey</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100.0</td>
</tr>
</tbody>
</table>

In addition, Table 4-9 indicates that milk production as well as the number of cows in milk within large farms changes decreases slightly from one season to the other. The composition of the breeds for each group is presented in Table 4-10. The crosses Holstein x Brahman and Brown Swiss x Brahman are the most prevalent in New and Old
CREL farms. Although the Holstein x Brahman is also common in large farms there is also preference for Brown Swiss x Holstein and Holstein animals.

Table 4-11. Frequency and Percentage of Adoption of Management Practices in New CREL, Old CREL and Large Farms

<table>
<thead>
<tr>
<th>Area</th>
<th>Practice</th>
<th>Chi-square</th>
<th>New CREL n</th>
<th>New CREL %</th>
<th>Old CREL n</th>
<th>Old CREL %</th>
<th>Large farms n</th>
<th>Large farms %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasture Management</td>
<td>Use of improved grass varieties</td>
<td>5.39*</td>
<td>18</td>
<td>66.6%</td>
<td>12</td>
<td>85.7%</td>
<td>10</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>Fertilization</td>
<td>6.43*</td>
<td>16</td>
<td>59.3%</td>
<td>11</td>
<td>78.5%</td>
<td>10</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>Feed concentrate</td>
<td>7.65</td>
<td>16</td>
<td>59.3%</td>
<td>12</td>
<td>85.7%</td>
<td>10</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>Feed cows by production level</td>
<td>14.5*</td>
<td>8</td>
<td>29.6%</td>
<td>7</td>
<td>50.0%</td>
<td>10</td>
<td>100.0%</td>
</tr>
<tr>
<td>Feeding and Nutrition</td>
<td>Artificial Insemination</td>
<td>9.41**</td>
<td>1</td>
<td>3.7%</td>
<td>2</td>
<td>14.3%</td>
<td>6</td>
<td>60.0%</td>
</tr>
<tr>
<td></td>
<td>Check heat</td>
<td>9.44*</td>
<td>7</td>
<td>25.9%</td>
<td>4</td>
<td>28.6%</td>
<td>8</td>
<td>80.0%</td>
</tr>
<tr>
<td></td>
<td>Check for pregnancy</td>
<td>24.5***</td>
<td>4</td>
<td>14.8%</td>
<td>3</td>
<td>21.4%</td>
<td>10</td>
<td>100.0%</td>
</tr>
<tr>
<td>Reproductive Management</td>
<td>Keep records</td>
<td>6.43*</td>
<td>16</td>
<td>60.3%</td>
<td>11</td>
<td>78.6%</td>
<td>10</td>
<td>100.0%</td>
</tr>
<tr>
<td>Record type:</td>
<td>Production</td>
<td>9</td>
<td>10</td>
<td>71.4%</td>
<td>10</td>
<td>100.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health</td>
<td>0</td>
<td>2</td>
<td>14.3%</td>
<td>8</td>
<td>80.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reproduction</td>
<td>13</td>
<td>10</td>
<td>71.4%</td>
<td>10</td>
<td>100.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accounting</td>
<td>8</td>
<td>6</td>
<td>42.9%</td>
<td>8</td>
<td>80.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inventory</td>
<td>3</td>
<td>0</td>
<td>0.0%</td>
<td>5</td>
<td>50.0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant .05  
** Significant .01  
*** Significant .001

Adoption of management practices known to increase milk production is lowest in New CREL farms followed by Old CREL farms (Table 4-11). In contrast, all large farms had implemented most of the management practices outlined within the structured interview guides.

**Objective 1**

The first research objective was to determine the perceptions of each group of farmers about extension services. To determine farmers perceptions it was first necessary
to determine the availability of extension services. The findings revealed that only 18.5% of New CREL farmers, 42.9% of Old CREL farmers and 60% of large farmers had participated in extension programs offered by DICTA. Farmers explained that DICTA had not offered programs on a permanent basis in the regions covered by our study in a long period of time. Qualitative data showed that 60% of large farmers believe DICTA is not capable of offering quality programs to them in the near future. In addition, a significant number of New CREL farmers reported negative experiences with DICTA mainly due to inexperience of field agents and lack of follow-up on programs. Despite these facts, a large percentage of farmers in the three groups reported they had participated in extension programs in the past sponsored either by public or private organizations (Table 4-12).

Table 4-12. Frequency and Percentage of Farmers Who Have Participated in Public and/or Private Extension Programs

<table>
<thead>
<tr>
<th>Farmer Group</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>New CREL farmers</td>
<td>26</td>
<td>96.3</td>
</tr>
<tr>
<td>Old CREL farmers</td>
<td>12</td>
<td>85.7</td>
</tr>
<tr>
<td>Large Farmers</td>
<td>10</td>
<td>100.0</td>
</tr>
</tbody>
</table>

New CREL, Old CREL and large farmers described extension services (either private or public) as short-term and sporadic. Farmers stated that extension programs have usually concentrated on specific areas i.e. pasture management, vaccination programs or artificial insemination. According to farmers, extension has not taken a holistic approach and so it has been hard to improve farm productivity if other aspects of milk production are left untouched. However, the major critique of farmers to extension programs was that they do not conduct follow-up activities. Consequently, only a small percentage of farmers in the three groups of farmers seek extension agents for information and advice (Table 4-13).
Table 4-13. Top Three Sources of Information used by New CREL, Old CREL and Large farmers.

<table>
<thead>
<tr>
<th>Source of Information</th>
<th>New CREL Farmers</th>
<th></th>
<th>Old CREL farmers</th>
<th></th>
<th>Large Farmers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Veterinarian</td>
<td>7</td>
<td>19.4</td>
<td>7</td>
<td>26.9</td>
<td>7</td>
<td>33.0</td>
</tr>
<tr>
<td>Salesmen</td>
<td>6</td>
<td>16.7</td>
<td>4</td>
<td>15.4</td>
<td>3</td>
<td>14.3</td>
</tr>
<tr>
<td>Consultant</td>
<td>1</td>
<td>2.8</td>
<td>--</td>
<td>--</td>
<td>2</td>
<td>9.5</td>
</tr>
<tr>
<td>Other farmers</td>
<td>10</td>
<td>27.8</td>
<td>10</td>
<td>38.5</td>
<td>3</td>
<td>14.3</td>
</tr>
<tr>
<td>Extension agent</td>
<td>3</td>
<td>8.3</td>
<td>3</td>
<td>11.5</td>
<td>2</td>
<td>9.5</td>
</tr>
<tr>
<td>Rely on own experience</td>
<td>9</td>
<td>25.0</td>
<td>2</td>
<td>7.7</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>Magazines and Books</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>3</td>
<td>14.3</td>
</tr>
<tr>
<td>Totals</td>
<td>36</td>
<td>100.0</td>
<td>26</td>
<td>100.0</td>
<td>21</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Most New CREL (27.8%) and Old CREL (38.5%) farmers rely on other farmers for information and advice while 25% of New CREL farmers rely solely on their own experiences. Large farmers seek veterinarians (33%), salesmen (14.3%), other farmers (14.3%) and books and magazines from other countries (14.3%) for information and advice. In addition, farmers indicated that despite the lack of permanent extension services, sporadically there are educational programs and training offered by input suppliers and agricultural universities sponsored by farmer associations in which they receive new information.

According to farmers, a large number of input suppliers such as concentrate and veterinary supply companies and farmer associations offer support services. In addition, there are short-term extension programs such as the ones conducted by NGOs such as Land O’Lakes and Zamorano, Panamerican School of Agriculture. INFOP, the largest nonformal education provider in the country had recently conducted training for some of the CRELs in the Atlántida Region. Consulting companies from other countries are slowly starting to emerge in the areas where the study was conducted; however, few
farmers mentioned having received information about the services they offer. Otherwise, it was reported that there are only three well-known veterinarians in the Atlántida, Yoro and Aguan Valley Regions.

Table 4-16, shows that 50% of Old CREL and large farmers consider that support services in general are doing an excellent job, and only 14.3% and 20% respectively believe support services are bad. In addition, 51.5% of New CREL farmers, 56.3% of Old CREL farmers and 10% of large farmers believe they do not need additional services (Table 4-15). According to researcher observations and interviews with input suppliers, most of the services identified by farmers in Table 4-15 are either not offered or were very weak. As it can be inferred from Table 4-14 mostly farmers, sons and workers attend educational programs; female participation is minimal. Farmers from the three groups cited lack of time, bad timing for programs and no interest in the topic as the top reasons for not attending programs.

Table 4-14. Farmers Perceptions of the Quality of Support Services

<table>
<thead>
<tr>
<th>Group</th>
<th>Rating</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>New CREL farmers</td>
<td>Excellent</td>
<td>8</td>
<td>29.6</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>17</td>
<td>63.0</td>
</tr>
<tr>
<td></td>
<td>Bad</td>
<td>1</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>No experiences</td>
<td>1</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>27</td>
<td>100.0</td>
</tr>
<tr>
<td>Old CREL farmers</td>
<td>Excellent</td>
<td>7</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>3</td>
<td>21.4</td>
</tr>
<tr>
<td></td>
<td>Bad</td>
<td>2</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td>No experiences</td>
<td>2</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>14</td>
<td>100.0</td>
</tr>
<tr>
<td>Large farmers</td>
<td>Excellent</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td>Bad</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td></td>
<td>No experiences</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>10</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Content analysis of qualitative data showed that New and Old CREL farmers attend most educational opportunities available while large farmers were more selective of the programs they decide to attend. In this regard, the researcher observed that Old CREL farmers seek educational programs more actively than New CREL farmers.

Table 4-15. Additional Support Services Needed According to Farmers

<table>
<thead>
<tr>
<th>Needs by group</th>
<th>Number of times identified</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>New CREL farmers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical assistance on permanent basis</td>
<td>10</td>
<td>10</td>
<td>30.3</td>
</tr>
<tr>
<td>Consulting services</td>
<td>2</td>
<td>2</td>
<td>6.1</td>
</tr>
<tr>
<td>Artificial insemination</td>
<td>2</td>
<td>2</td>
<td>6.1</td>
</tr>
<tr>
<td>Laboratory for feed and pasture analysis</td>
<td>1</td>
<td>1</td>
<td>3.0</td>
</tr>
<tr>
<td>Research</td>
<td>1</td>
<td>1</td>
<td>3.0</td>
</tr>
<tr>
<td>No additional services needed</td>
<td>17</td>
<td>17</td>
<td>51.5</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td>Old CREL farmers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical assistance on a permanent basis</td>
<td>7</td>
<td>7</td>
<td>43.9</td>
</tr>
<tr>
<td>No additional services needed</td>
<td>9</td>
<td>9</td>
<td>56.1</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td>Large Farmers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consulting services</td>
<td>3</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Technical assistance on a permanent basis</td>
<td>3</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Adaptive on farm research</td>
<td>2</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td>Laboratory for feed and pasture analysis</td>
<td>1</td>
<td>1</td>
<td>10.0</td>
</tr>
<tr>
<td>No additional services needed</td>
<td>1</td>
<td>1</td>
<td>10.0</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td></td>
<td>100.0</td>
</tr>
</tbody>
</table>

Old CREL farmers select representatives to attend educational programs especially when these are offered in other cities and later share the findings with the rest of the members in the CREL. Old CREL farmers also stated they try to attract experts, extension programs and other individuals who can bring educational programs to the CREL. In all Old CRELs except one, farmers expressed the value of extension. In this sense, New CRELs were less organized than Old CRELs most likely due to the short time
that had passed since they started operating and the limited attention and support services
they had received at the time of our study.

Table 4-16. Distribution of the Frequency and Percentage of Attendees to Extension
Programs

<table>
<thead>
<tr>
<th>Farmer group</th>
<th>New CREL</th>
<th>Old CREL</th>
<th>Large Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Farmer alone</td>
<td>13</td>
<td>39.4</td>
<td>10</td>
</tr>
<tr>
<td>Spouse</td>
<td>4</td>
<td>12.1</td>
<td>0</td>
</tr>
<tr>
<td>Son</td>
<td>8</td>
<td>24.2</td>
<td>3</td>
</tr>
<tr>
<td>Workers</td>
<td>8</td>
<td>24.3</td>
<td>2</td>
</tr>
<tr>
<td>Totals</td>
<td>33</td>
<td>100.0</td>
<td>15</td>
</tr>
</tbody>
</table>

An important part of the human capital in rural areas is farm workers. As indicated
in Table 4-15 farm workers are exposed to less training than farmers despite that fact that
they do a large part of the work in the farm. Only 44% of New CREL farmers, 7.1% of
Old CREL farmers and 30% of large farmers stated they send their workers to the few
training programs available. In this regard, the reasons cited for lack of assistance
include lack of time and bad scheduling of programs. In addition, 26.3%, 33.3% and
14.3% of New CREL, Old CREL and large farmers respectively find the level and/or
delivery used in such programs inadequate for the educational level of most workers, and
therefore farmers feel it is not a good use of time to send workers to training programs.
Moreover contradictory reasons for not sending farm workers to programs include the
fact that 10.5% of New CREL farmers and 13.3% of Old CREL farmers believe that
increasing knowledge and skills of farm workers leads to: workers knowing more than
the farmer and workers moving to another farm where they get paid better salaries. It can
be concluded that not all farmers see training for farm workers as a positive event. On
the other hand, an external factor such as the high turnover rate of farm employees cited by large farmers is another important factor that hinders training.

Table 4-17. Percentage of Farms That Send Farm Workers to Training Programs and Reasons for the Lack of Attendance at Programs in New CREL, Old CREL and Large Farms

<table>
<thead>
<tr>
<th>Group</th>
<th>Farms</th>
<th>%</th>
<th>Reasons for lack of attendance</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>New CREL</td>
<td>12</td>
<td>44.4</td>
<td>Lack of time</td>
<td>31.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inadequate training</td>
<td>26.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bad schedules</td>
<td>15.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not needed</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lack of transportation</td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>100.0</td>
</tr>
<tr>
<td>Old CREL</td>
<td>1</td>
<td>7.1</td>
<td>Lack of time</td>
<td>46.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inadequate training</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Workers leave after training</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other</td>
<td>6.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>100.0</td>
</tr>
<tr>
<td>Large Farms</td>
<td>3</td>
<td>30.0</td>
<td>Bad schedules</td>
<td>28.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lack of time</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Workers leave after training</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inadequate training</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>High turnover rate</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Despite the apparent satisfaction of farmers with current services provided, Table 4-14 shows that 81.5% (n=22) and 92.9% (n=13) of New CREL farmers and Old CREL farmers expressed that they are willing to consider paying for technical assistance as a CREL. Accordingly, 90% (n=9) of large farmers also stated they would consider paying for consulting or technical assistance services that would lead to significant increases in productivity.

**Objective 2**

Objective 2 of the study was to determine the educational delivery methods used in extension programs offered to dairy farmers. The interviews with input suppliers,
extension agents from INFOP, farmer associations and farmers were used to answer this objective.

Table 4-18. Educational Delivery Methods Used by Providers

<table>
<thead>
<tr>
<th>Method</th>
<th>Input suppliers and farmer associations (n=9)</th>
<th>New CREL farmers (n=27)</th>
<th>Old CREL farmers (n=14)</th>
<th>Large farmers (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Meetings</td>
<td>9</td>
<td>100.0</td>
<td>22</td>
<td>81.4</td>
</tr>
<tr>
<td>Method demonstrations</td>
<td>7</td>
<td>77.7</td>
<td>15</td>
<td>55.5</td>
</tr>
<tr>
<td>Field days</td>
<td>9</td>
<td>100.0</td>
<td>20</td>
<td>74.0</td>
</tr>
<tr>
<td>Farm visits</td>
<td>5</td>
<td>50.0</td>
<td>12</td>
<td>44.4</td>
</tr>
<tr>
<td>1 &amp; 2 day seminars</td>
<td>5</td>
<td>66.6</td>
<td>10</td>
<td>37.0</td>
</tr>
<tr>
<td>Written media (pamphlets, booklets, magazines)</td>
<td>6</td>
<td>50.0</td>
<td>10</td>
<td>37.0</td>
</tr>
<tr>
<td>Mass media</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>One-on-one contact</td>
<td>4</td>
<td>66.6</td>
<td>9</td>
<td>33.3</td>
</tr>
</tbody>
</table>

Table 4-18 shows that method demonstrations, meetings and field days are the most commonly used delivery methods among the three groups of farmers. To a lesser extent, input suppliers offer 1 or 2 day seminars and extension agents mostly conduct group visits to farms. In addition, model farms had been used in the past to demonstrate technologies. Limited availability of written media such as pamphlets, booklets and magazines was reported. In addition, the usage of mass media providing information regarding milk production was not reported. Finally, one-on-one contacts from service providers and extension programs were more common with large farmers (100%) than with New CREL (33.3%) and Old CREL (57.1%) farmers according to providers.

**Objective 3**

This objective was to determine preferred educational delivery methods of dairy farmers. The results for objective 3 are shown in Table 4-19.
Table 4-19. Farmers Preferences Regarding Educational Delivery Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>New CREL farmers (n=27)</th>
<th>Old CREL farmers (n=14)</th>
<th>Large farmers (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Hands-on, experiential only</td>
<td>n</td>
<td>55.0</td>
<td>6</td>
</tr>
<tr>
<td>Mix of hands-on and theoretical training</td>
<td>7</td>
<td>26.0</td>
<td>8</td>
</tr>
<tr>
<td>Didn’t know</td>
<td>5</td>
<td>19.0</td>
<td>0</td>
</tr>
<tr>
<td>Meetings</td>
<td>22</td>
<td>81.4</td>
<td>11</td>
</tr>
<tr>
<td>Method demonstrations</td>
<td>15</td>
<td>55.5</td>
<td>10</td>
</tr>
<tr>
<td>Field days</td>
<td>20</td>
<td>74.0</td>
<td>9</td>
</tr>
<tr>
<td>Farm visits</td>
<td>12</td>
<td>44.4</td>
<td>7</td>
</tr>
<tr>
<td>1 &amp; 2 day seminars</td>
<td>10</td>
<td>37.0</td>
<td>6</td>
</tr>
<tr>
<td>Written media (pamphlets, booklets, magazines)</td>
<td>10</td>
<td>37.0</td>
<td>10</td>
</tr>
<tr>
<td>Mass media</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>One-on-one contact</td>
<td>9</td>
<td>33.3</td>
<td>8</td>
</tr>
</tbody>
</table>

Farmer preferences were as follows: 55% (n=15) of New CREL farmers preferred delivery methods that used applicable, hands-on and experiential learning. In contrast 57.1% (n=8) of Old CREL farmers, and 80% (n=8) of large farmers believed a mix of practical and theoretical methods would be more adequate for programs targeted for dairy farmers. In addition, the use of reinforcement methods such as brochures, booklets and pamphlets in educational programs was mentioned by a large number of farmers. The most popular hands-on delivery methods are farm visits, field days and process demonstrations. In addition, short seminars (1 to 2 hours in length) are the most accepted method for delivery of theoretical content. Farmers noted that regardless of the method, presenters should provide some form of reinforcement method of the content covered during the program, and they should speak slowly and allot enough time for a question and answer section. Most New and Old CREL farmers expressed these are extremely important factors for them.
Objective 4

This objective in our study is to determine felt and ascribed needs of farmers. Interviews with farmers, farmer association’s representatives and input suppliers were used to answer this objective.

Felt Needs

A technical assistance program in general terms was seen by most New CREL farmers as a very important service they needed; although 40% (n=11) of the farmers in this group were not able to prioritize their educational needs. On the other hand, 70% (n=10) of Old CREL farmers expressed not only the need for technical assistance programs but were specific about their educational needs. Still a total of 28% (n=4) farmers in this group were not able to determine educational needs. The qualitative data analysis revealed that in contrast to New CREL farmers, Old CREL farmers expressed their educational needs from a group perspective rather than an individualistic perspective. Furthermore, Old CREL farmers stated they needed to strengthen CRELs. Old CREL Farmers considered that marketing options could contribute to this goal. Nonetheless, in this sense Old CREL farmers ignored ways extension or technical assistance programs could contribute to this objective. Large farmers were more explicit and detailed about the subject matter areas that should be covered by educational programs as well as for their needs and those of dairy farmers in general. Large farmers believe they need services provided by qualified individuals on a permanent basis. Nonetheless they see a lack of trained individuals to conduct such services in the country, especially field agents. Large farmers complained that field agents are usually very young with limited field experience and expertise, and low salaries.
Furthermore, this group offered detailed explanations on the importance and need of establishing not only extension services for farmers but also of starting training schools or programs targeted for farm workers and herdsmen. In this regard, 30% of large farmers expressed the need to educate farm owners about the importance of developing and maintaining good relations with farm employees. Large farmers cited that farm workers are usually under paid, receive no incentives and have few benefits as farm workers. Other major issues included the need of educational programs that teach how to manage finances and credits wisely. According to farmer associations and large farmers themselves, a high percentage of dairy farmers are high in debt as a result of bad management of loans acquired in the past. Finally all large farmers expressed the need for youth programs. They stated that there is lack of pride and incentives for farmer’s children of continuing in the industry and consequently of future leaders.

Table 4-20 lists subject matter areas that should be targeted by extension programs according to farmers. The ranking identified: pasture management, feeding and nutrition and improving milk quality as the top three priorities. This finding is not surprising since feeding and nutrition costs are the highest portion of the expenses in dairy farms in Honduras (Merino & Avila, 2000). The lack of information in regards to feeding programs for cattle added to extreme environmental conditions make the implementation of feeding programs a real challenge for most farmers in Honduras. Additionally, milk quality has become a major issue especially for New and Old CREL farmers who place milk into a single storage and cooling tank unit.
<table>
<thead>
<tr>
<th>Technical Areas</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New CREL farmers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Feeding and nutrition</td>
<td>9</td>
<td>14.8</td>
</tr>
<tr>
<td>1. Improving milk quality</td>
<td>9</td>
<td>14.8</td>
</tr>
<tr>
<td>2. Pasture management</td>
<td>7</td>
<td>11.5</td>
</tr>
<tr>
<td>3. Farm management</td>
<td>6</td>
<td>9.8</td>
</tr>
<tr>
<td>4. Animal Reproduction &amp; Artificial Insemination</td>
<td>4</td>
<td>6.6</td>
</tr>
<tr>
<td>4. Marketing</td>
<td>4</td>
<td>6.6</td>
</tr>
<tr>
<td>5. Improving genetics</td>
<td>3</td>
<td>4.9</td>
</tr>
<tr>
<td>6. Milking procedures</td>
<td>2</td>
<td>3.3</td>
</tr>
<tr>
<td>6. Vaccination and deworming</td>
<td>2</td>
<td>3.3</td>
</tr>
<tr>
<td>7. Record keeping</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>7. Forage conservation</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>7. Forming strategic alliances</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>7. Use of electrical fences</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td><em>Considered all important</em></td>
<td>11</td>
<td>18.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>61</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Old CREL farmers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Pasture management</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>2. Feeding and nutrition</td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td>2. Improving milk quality</td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td>3. Farm management</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>4. Forage Conservation</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>4. Raising replacement heifers</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>5. Reproduction and A.I.</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>5. Improving genetics</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>5. Milking procedures</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>5. Record keeping</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>5. Animal health</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>5. Use of electric fencing</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td><em>Considered all important</em></td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>30</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Large farmers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Pasture management</td>
<td>5</td>
<td>21.7</td>
</tr>
<tr>
<td>2. Feeding and nutrition</td>
<td>3</td>
<td>13.0</td>
</tr>
<tr>
<td>2. Improving milk quality</td>
<td>3</td>
<td>13.0</td>
</tr>
<tr>
<td>3. Animal reproduction and A.I.</td>
<td>2</td>
<td>8.7</td>
</tr>
<tr>
<td>3. Farm management</td>
<td>2</td>
<td>8.7</td>
</tr>
<tr>
<td>3. Use of electrical fencing</td>
<td>2</td>
<td>8.7</td>
</tr>
<tr>
<td>3. Record keeping</td>
<td>2</td>
<td>8.7</td>
</tr>
<tr>
<td>4. Milking procedures</td>
<td>1</td>
<td>4.3</td>
</tr>
<tr>
<td>4. Animal Health</td>
<td>1</td>
<td>4.3</td>
</tr>
<tr>
<td><em>Considered all important</em></td>
<td>2</td>
<td>8.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>23</td>
<td>100.0</td>
</tr>
</tbody>
</table>
CREL farmers (both new and old) in the past rarely were concerned with milk quality problems since most processing plants were less strict in that regard, and artisanal cheese makers often ignored milk quality. On the other hand, large farmers are faced with increasing competition from the growing number of CRELs, and so they are starting to be more careful about milk quality.

**Ascribed needs**

Honduran farmers in general are very reluctant to join farmer groups mainly due to negative experiences in the past. Therefore, the fact that dairy farmers have joined CRELs and have placed all their milk into one cooling tank is in itself an achievement among farmer populations. According to Old CREL farmers, CRELs offer economic and social benefits to its members that as individual farmers they would not have. Nonetheless, it was found that most CREL members have low education levels and very little formal training that could lead to successful management of CRELs in the long term. Consequently, it is imperative to strengthen the organizational capacities of CRELs in the short term in order to improve CREL chances for success in the future. In this regard, the provision of educational programs that enhance financial and resource management, accountability procedures and provide leadership skills are essential.

Farmer associations are important components of the dairy industry in Honduras. Table 4-21 shows farmers perceptions regarding the benefits offered by farmer associations. According to the review of secondary data, and interviews with farmer associations and large farmers, it is acknowledged that farmer associations play an important role in the development of the industry because they are the only organizations that represent farmer’s interest at the local and national levels. Strengthening farmer organizations in the short-term can benefit farmers in the long-term as they are directly
benefited or affected by the performance of these organizations. Educational training that seeks to improve organizational and leadership capabilities of board members and that seeks to train future leaders is important.

Table 4-21. Frequency and Percentage of Farmers Belonging to Farmer Associations and Perceived Benefits of Membership by Farmers

<table>
<thead>
<tr>
<th>Group</th>
<th>Members n</th>
<th>%</th>
<th>Farmer Associations</th>
<th>Perceived benefits by farmers n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>New CREL</td>
<td>21</td>
<td>77.8</td>
<td>Representation in the sector</td>
<td>7</td>
<td>26.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Attend workshops</td>
<td>6</td>
<td>23.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Commercialization of products</td>
<td>3</td>
<td>11.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Receive new information</td>
<td>2</td>
<td>7.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Share experiences</td>
<td>1</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No benefits</td>
<td>7</td>
<td>26.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td>26</td>
<td>100.0</td>
</tr>
<tr>
<td>Old CREL</td>
<td>11</td>
<td>78.6</td>
<td>Representation in the sector</td>
<td>6</td>
<td>24.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Commercialization of products</td>
<td>4</td>
<td>16.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Share experiences with others</td>
<td>3</td>
<td>12.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Buy farm supplies at lower prices</td>
<td>3</td>
<td>12.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Receive new information</td>
<td>2</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Attend workshops</td>
<td>2</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Farmer insurance</td>
<td>1</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No benefits</td>
<td>4</td>
<td>16.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td>25</td>
<td>100.0</td>
</tr>
<tr>
<td>Large Farms</td>
<td>10</td>
<td>100.0</td>
<td>Representation in the sector</td>
<td>7</td>
<td>31.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Commercialize products</td>
<td>4</td>
<td>18.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Receive new information</td>
<td>3</td>
<td>13.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Farmer Insurance</td>
<td>3</td>
<td>13.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Share experiences with others</td>
<td>2</td>
<td>9.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Training for workers</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Buy farm products at lower prices</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No benefits</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td>22</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Objective 5**

This objective of the study was to determine perceptions of dairy farmers on open market policies, and its effects on the dairy industry in relation to educational needs. A total of 85.2% (n=23) of New CREL farmers, 71.4% (n=10) of Old CREL farmers and 100% (n=10) of large farmers reported they were aware that the Central American Free
Trade Agreement was being negotiated at the time of our study (Table 4-22). However, the qualitative data analysis showed that only 48%, 50% and 80% New CREL, Old CREL and large farmers respectively understood that CAFTA is a commercial agreement that could affect marketing patterns of dairy products in the country.

All farmers expressed that the only source of information regarding CAFTA were the newspapers. In this regard, the three farmer associations representatives interviewed confirmed that they had not offered any official information or programs to inform members of the implications of CAFTA. Furthermore, as is the case of the Asociación de Agricultores y Ganaderos de Atlántida (AGAA), farmer organizations are responsible for actively seeking funding for extension programs and other services for farmers. For example, the Honduran Dairy Enterprise Initiative managed by Land O’Lakes, that introduced the concept of CRELs in the North Coast of Honduras in the year 2000 came to the area in response to the needs expressed by board members of AGAA to officials of the United States Agency for International Development (USAID) in late 1998. Nonetheless, 28% of New CREL farmers and 16% of Old CREL farmers see no benefits in belonging to farmer organizations (Table 4-22). Most of the New CREL farmers joined the farmer associations in their area only after learning that it was a requisite for joining a CREL. Among the reasons cited by New CREL farmers for such negative views was the lack of leadership, lack of communication of board members with farmers and poor customer service. All large farmers reported being highly worried and concerned about the implications of the treaty, even when two of the large farmers had participated in the negotiations of the treaty, they explain there was a lack of understanding of the CAFTAs implications for the Honduran dairy industry. Large
farmers reported that due to the lack of competitiveness of the industry in general the results of negotiations would most likely affect Honduran farmers in a negative sense. In contrast, almost 30% (n=6) of New CREL farmers and 20% (n=3) of Old CREL farmers believed CAFTA would not affect their farms.

Table 4-22. Farmers Understanding and Perceptions of the Central American Free Trade Agreement (CAFTA)

<table>
<thead>
<tr>
<th>Farmers perceptions</th>
<th>New CREL</th>
<th></th>
<th>Old CREL</th>
<th></th>
<th>Large farmers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Knows about CAFTA</td>
<td>23</td>
<td>85.2</td>
<td>10</td>
<td>71.4</td>
<td>10</td>
<td>100.0</td>
</tr>
<tr>
<td>Believe CAFTA can negatively impact his/her farm.</td>
<td>19</td>
<td>70.4</td>
<td>11</td>
<td>78.6</td>
<td>10</td>
<td>100.0</td>
</tr>
<tr>
<td>Believe CAFTA can negatively impact Honduran Dairy Industry</td>
<td>21</td>
<td>77.8</td>
<td>11</td>
<td>78.6</td>
<td>10</td>
<td>100.0</td>
</tr>
<tr>
<td>Have made changes in his/her farm in preparation for CAFTA</td>
<td>13</td>
<td>48.1</td>
<td>8</td>
<td>57.1</td>
<td>8</td>
<td>80.0</td>
</tr>
</tbody>
</table>

Summary

This chapter presented the findings of the study. Findings were organized and presented by the following objectives: 1) Determine the perceptions of three groups of dairy farmers about extension services, 2) Determine educational delivery methods used in extension programs offered to dairy farmers in Honduras, 3) Determine preferred educational delivery methods for dairy farmers in Honduras, 4) Determine felt and ascribed educational needs for dairy farmers in the north coast of Honduras and 5) Determine perceptions of dairy farmers on open market policies and its effects on the dairy industry in relation to educational needs. Chapter 5 will present a more detailed discussion of these findings, as well as implications for the findings for the groups studied, farmer associations and extension providers.
CHAPTER 5
DISCUSSION OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

This chapter presents the conclusions, implications and recommendations drawn from the findings of our study. Additionally, it provides suggestions for further research that can contribute to the development of the Honduran dairy industry.

One key implication of our study is that participants in our study, like many poor and small farmers in developing countries, had not been exposed to extension on a permanent basis, and therefore it was hard for many participants to envision the benefits extension offers. Consequently, it can be inferred that there is a need for permanent and reliable extension services for dairy farmers in the north coast of Honduras. In this regard, the need to address relevant issues affecting the dairy sector and the use of appropriate delivery methods is important. In addition, training related to educational program delivery would also be beneficial for current providers of nonformal education programs. Furthermore, the Central American Free Trade Agreement (CAFTA) has contributed to change dairy farmers attitudes toward the need for extension and support services.

Discussion of Key Findings

Objective 1

Objective 1 was to determine the perceptions of New CREL, Old CREL and large farmers about extension services.

Results of our study indicated that each group of farmers had different experiences with extension. The quality of extension services was variable according to farmers, and
so their perceptions were different. New CREL farmers had been exposed to few formal extension programs, have less access to support services and had not been exposed to services in other countries. In contrast, large farmers had seen extension and support services available to the dairy industry in countries like the U.S. and Costa Rica.

New CREL farmers were, on average, less-educated, had slightly smaller farms, and almost the same number of cows. Nevertheless, they produced 38% less milk on average than Old CREL farmers. The adoption of best management practices (BMPs) known to increase milk production was lowest for this group. In addition, New CREL farmers faced to a greater extent a lack of a stable market, lower milk prices, lack of training, and limited institutional support from the Honduran government and farmer associations. In terms of the provision of extension services, New CREL farmers represent a challenging group to work with due to the many constraints they faced.

On the other hand, limited exposure to extension services was characteristic of New CREL farmers; only 18.5% of farmers had participated in formal extension programs sponsored by DICTA. Furthermore, support services, sources of information, and access to research based information is almost non-existent for New CREL farmers. The fact that 27.8% of farmers rely solely upon other farmers for advice and 25% rely on their own experience rather than seek advice from someone else reflects the clear disadvantages that small and medium size dairy farmers face in Honduras.

Therefore, not surprisingly, New CREL farmers’ perceptions of extension were shaped by the limited access to such services. New CREL farmers saw extension as short-term technical interventions and were unable to envision the wide range of activities and benefits extension could offer to them as individual farmers or as a CREL.
Furthermore, the contradictory nature of New CREL farmers responses was intriguing -- 51.5% expressed that they did not need additional support services only 29.6% rated support services as excellent, and yet 81.5% of farmers were willing to consider paying for extension services as a CREL. This leads one to conclude that New CREL farmers recognize their overall need to improve productivity and milk quality, but have not participated in extension programs that promote such changes. In many ways, New CREL farmers represent a segment of the farmer population, who, although having some exposure to nonformal education programs, have not experienced potential long-term benefits.

In contrast, Old CREL farmers openly sought opportunities to participate in extension programs, because they experienced its benefits in recent years. This group, unlike New CREL farmers, had a significant amount of attention and training from NGOs when the Old CREL group started operations in 2000 and 2001, despite having had limited exposure to extension services. In addition, Old CREL farmers had access to a stable milk market year-round and better milk prices since its early stages. As a result, access to better milk prices plus timely technical assistance has changed Old CREL farmer’s perceptions of extension and the need for continuing education.

In this regard, NGOs that initially worked with Old CRELs encouraged farmers to improve milking facilities and start changes at the farm level. Most Old CREL farmers started milking cows twice a day because milk from the second milking could be stored in the CREL cooling tank, and this practice has lead to higher milk production per cow. Research has shown that this change alone can represent an increase of up to 40% in milk production per cow (Velez et al. 2002). Consequently, Old CREL farmers started having
more interaction with support services after the initial attention from NGOs vanished because their financial situation changed dramatically.

One factor that has contributed to Old CREL farmer interest in extension is the peer pressure existing among Old CREL members to maintain acceptable milk quality. According to Old CREL members, before CRELs were formed little interaction existed even among neighboring farmers. Once the CRELs started, CREL members started sharing technical problems and seeking answers as a group. For example, Old CREL farmers reported that they report to the group every time they attend an educational program in another city or town.

The dynamics of most Old CRELs observed by the researcher facilitate the exchange of information, experimentation, and reinvention of BMPs for farmers in their own settings. Consequently, there is more rapid diffusion of innovations recommended among its members once CREL farmers see that recommended BMPs yields positive results. Accordingly, because of this first-hand experience Old CREL farmers are more open to expert advice and extension services.

The dynamics of New and Old CREL farmers have strong similarities with the pure application of farmer-to-farmer extension described by Scarborough et al. (1997). This pure farmer-to-farmer application is often found in areas where government services are almost non-existent or recommended technologies have been inappropriate; such is the case of dairy farmers in the north coast of Honduras. Moreover, this statement is based on several facts. New CRELs have risen as a movement more than as a group. Despite the fact that it took a longer time to organize Old CRELs, New CRELs were formed from the initiative of farmers alone, thus farmers are leading and sustaining
CRELs. Finally, Old CRELs have been formed and guided by very similar principles to the ones described by Bunch (1982), including starting small, building slowly, and developing a multiplier effect. This has contributed to the good performance and trust among CREL farmers.

Nonetheless, farmer-to-farmer linkages in New CRELs were weak at the time of our study and this was most likely due to the short time elapsed since their formation. On the other hand, Old CREL farmer’s high level of communication and solidarity, which are characteristics of farmer-to-farmer extension, were notorious and could be crucial for the sustainability of CRELs. An implication of farmer-to-farmer networks for current and future extension providers is that these can dramatically aid in the diffusion of knowledge and technology to other farmers.

The third group of farmers in our study was large farmers. Large farmers had more economic resources, a higher level of education on average, larger herds and consequently higher milk production throughout the year than New and Old CREL farmers. In addition, most large farmers had been exposed to extension and consulting services available to dairy farmers in other countries like Costa Rica and the United States. Moreover, large farmers reported having access to more sources of information than CREL farmers due to their leadership capacities and privileged status in the industry.

Half of the large farmers are satisfied with the current support services available. But most of them believe current extension services, especially public sector extension, is not meeting their needs nor is it meeting most commercial farmers needs. Large farmers estimate that this situation will not change in the near future due to the bureaucracy and lack of expertise that characterizes public sector extension. In addition, the short-term
nature of the other extension programs affects the long-term impact of most programs. Most participants in our study complained of the lack of permanent services. Short-term programs have made it difficult for extension personnel to establish rapport and trust with the farmer clientele. In addition, after programs finish, farmers are left without experts or technicians to answer questions or to contribute to solve problems. Furthermore, large farmers believe the provision of extension services for the Honduran dairy industry is complicated by 1) lack of trained professionals in the country to work in extension related positions, 2) lack of access to credit in order to implement changes at the farm level, 3) cultural traits of farmers and farm workers who are reluctant to change, and 4) lack of participation of members in general in educational programs and farmer associations.

Even though our study seeks to determine farmer’s perceptions in regards to educational delivery of extension programs, these findings are of interest because these are factors that need to be addressed by extension (public and private), farmer associations, and the dairy industry together. Doing so will help to ensure that educational programs can have the greatest desired impact at the farm level.

**Objectives 2 and 3**

Objective 2 of the study was to determine the educational delivery methods used in extension programs offered to dairy farmers, and objective 3 was to determine the preferred delivery methods of dairy farmers.

The most common delivery methods used by extension providers in Honduras included mostly experiential methods, like method demonstrations, farm tours, field days, and workshops. Reinforcement methods used were limited to seminars and meetings, while the use of integrative methods such as pamphlets, posters, and newsletters was
minimal. Additionally, farmers reported that most programs used only a single delivery method.

In this regard, Richardson et al. (1996) stated that a delivery system should include methods, whenever possible that (1) provide desired experiential opportunities for the learner, (2) reinforce the topic for the learner, and (3) provide opportunities for the learner to integrate new information with existing knowledge and skills. Based on the above, important implications for extension and nonformal education providers include a more extensive use of delivery methods. In addition, the education level of the target audience and preferences should also be considered to avoid frustration and lack of accomplishment of objectives of educational programs. New CREL farmers have a low education level in general and limited exposure to formal and nonformal programs: 8% had no formal education, and for 20% of farmers, the highest grade attained was in the 1st to 3rd grade range, with 40% in the 4th to 6th grade range. Consequently, to provide meaningful opportunities, educational programs for New CREL farmers should be hands-on and should not be based on curricula that require high levels of literacy. Process and result demonstrations and farm visits are considered adequate delivery methods for New CREL farmers. The use of posters with large pictures or simple diagrams is a good alternative of integrative methods for New CREL farmers. Furthermore, the use of radio to transmit educational programs could be a good option to reach farmers and farm workers in remote areas.

An interesting point in relation to the delivery of educational programs is that many large farmers expressed that they have seen a higher degree of interest from farmers when the programs were conducted on a farm. Accordingly, Knowles (1990)
stated that learning for adults is facilitated when they are taught in a familiar setting. This allows newly introduced concepts to be applied to familiar settings, and as a result, facilitates participants to envision the benefits or advantages of implementing such behaviors. Not surprisingly, 55% of New CREL farmers reported preferring the use of applicable, hands-on, and experiential learning.

On the other hand, most Old CREL and large farmers prefer a mix of practical and theoretical methods. Old CREL and large farmers on average had higher education levels than New CREL farmers. However, Old CREL farmers’ reasons for preferring a mix of hands-on experiential learning with foundational theory lies in the fact that they feel it is important to participate in all types of programs regardless of the quality of the provider or the information offered because of the lack of opportunities available in general to them. In contrast, large farmers expressed they need to understand principles behind BMPs so that they can apply it in their farms more effectively.

Implications for extension in this regard include the use of a wider variety of delivery methods especially for large farmers. In addition, the level of expertise of agents working with large farmers has to be greater, because large farmers expectations are greater. Further, the development and inclusion of integrative methods such as booklets, pamphlets and posters should be considered for all educational programs regardless of the group of farmers they serve, because these are practically the only references that farmers have access to.

**Objective 4**

This objective was to determine felt and ascribed needs of farmers.

The findings of our study suggest that New CREL, Old CREL and large farmers realized their need for technical assistance services on a permanent basis. However, the
level of exposure to extension services limited their perspective of the benefits extension services could offer. The lack of exposure to DICTA’s services (18.5% of New CREL and 42.9% of Old CREL farmers respectively) are consistent with the assertions of Rivera et al. (1991) who has stated that in developing regions of the world only one out of every five farmers has access to extension resources. This finding leads one to think that DICTA may have placed more emphasis on assisting large farmers than small and less privileged farmers in the past. In this regard, Nagel (1997) has argued that extension often neglects the poorer strata and favors innovative larger farmers. The lack of equity in the provision of extension services has also been reported by Wilson (1991) in Ecuador.

According to New CREL, Old CREL and large farmers, technical areas that need to be addressed by extension and educational programs are the same for all farmers. These include (1) feeding and ruminant nutrition, (2) pasture management, and (3) improving milk quality. In addition, 90% of large farmers expressed there is a need for additional support services. According to large farmers these should include: consulting services, adaptive research, and a feed and pasture analysis laboratory.

The findings of our study suggest there is a need to establish or strengthen existing organizations. An office or organization could coordinate and guide the efforts to develop the dairy industry in Honduras. The New CREL facilities that had been built with support from the National Office of Sustained Rural Development (DINADERS) at the time of our study could not start operating because New CREL farmers had never negotiated contracts with processing plants. This demonstrates the lack of planning in the design and implementation of programs for small and less advantaged farmers.
Based on the above, it is important to strengthen the organizational capacity and develop leadership skills among New and Old CREL farmers. Such skills will contribute to CREL sustainability in the future. Aggressive training programs should be introduced in New and Old CRELs to enhance financial resource management and accountability. Leading CRELs into the future will require vision, expertise, commitment, and true leadership as the times that lie ahead are expected to be difficult.

The need to develop leadership skills among youth is another important aspect that needs to be addressed by extension. Youth programs in New Zealand and the United States have contributed to developing future leaders of the industry and instilling pride in children about belonging to the sector from early childhood. The participation of youth in the Honduran dairy industry is minimal according to the findings of our study. The introduction of youth programs especially to CRELs can be very beneficial for the industry. The involvement of children from a young age can contribute to the introduction of BMPs to farms, the development of leaders since a young age and consequently the evolution of a new mindset among future generations of farmers.

In addition, the need to train farm workers is a major issue that could lead to positive results in the industry. The development of training programs applicable to farm workers’ educational level is crucial. Farmers reported that most programs are not appropriate for farm workers. Guidelines for the delivery of educational programs aimed at farm workers should have immediate utility, show performance improvement, and maximize the use of available resources. As a result, farm owners would be encouraged to send farm workers to training programs. Due to the low education level of farm workers, it is important to conduct training programs in a climate that is collaborative,
respectful, mutual, and informal. The implementation of programs that are developmentally paced, hands-on, that allow farm workers to test learning, and that focus on issues directly concerning them will contribute to increased interest to attend such programs. This will help change many of the negative perceptions farm owners have in regards to training for farm workers.

**Objective 5**

Objective 5 of our study was to determine dairy farmers’ perceptions on open market policies and its effects on the dairy industry in relation to educational needs. Reports from the Ministry of Agriculture in Honduras and the literature review suggest that the Central American Free Trade Agreement (CAFTA), the most recent free trade agreement signed by the Honduran Government with six other countries, is an event that can negatively impact the dairy industry due to the lack of competitiveness of the sector.

At the time of our study, New CREL, Old CREL and large farmers had not been informed officially of the implications that CAFTA could have for the industry. Farmer association representatives declared they did not have any official information about the treaty that could be shared with members. Overall this denoted a lack of understanding regarding the real implications that CAFTA may present for New CREL, Old CREL, and large farmers. Furthermore, this demonstrated the lack of communication between the Honduran Government, farmer associations, and farmers. The only source of information that farmers mentioned about CAFTA was newspapers. Consequently, the quality of information available to farmers about such an important event is limited, potentially biased and not research based. In general, information available to producers is not applicable and relevant to their education level and needs.
The overall lack of understanding about CAFTA denotes that educational programs for dairy farmers should not be limited to technical and organizational aspects of milk production. It is important to educate dairy farmers about the opportunities and threats that CAFTA and other events represent.

Finally, despite the lack of understanding of the possible implications that CAFTA may have for the industry, awareness alone has been enough to cause many study participants to seek changing rudimentary milk production systems into more efficient production units. Many farmers are now more open to educational programs and are eager to implement changes at the farm level due to the threat that CAFTA represents to this farm businesses.

**Conclusions**

Strengthening the ability of the dairy industry in Honduras to compete domestically and in export markets is an important premise for the economic sustainability of dairy farms. In this sense, CRELs represent a breakthrough opportunity to strengthen small and medium size dairy operations in the north coast of Honduras. However, the lack of extension, adequate support services, and lack of guidance for CREL members could undermine farmer’s efforts to change rudimentary production systems for more efficient systems. The results of our study demonstrate there is need to strengthen technical, organizational, and leadership skills in New and Old CRELs and farmer associations. Furthermore, large farmers need extension services, but require a higher degree of specialization from providers. In addition, the introduction of youth programs and training for farm workers would be highly beneficial to the industry. Moreover, there is need to create awareness among current educational programs providers of the importance of selecting educational delivery formats and teaching methods to provide
learning opportunities that produce the desired learning outcomes (Birkenholz, 1999). Finally, despite the negative effects that are expected from CAFTA, this event is leading dairy farmers, who were reluctant to implement changes on their farms, to actively seek extension and educational opportunities. Consequently, the dairy industry of Honduras is experiencing the need for quality extension services that are capable of bringing farmers to new levels of productivity and sustainability.

**Recommendations**

Based upon the findings and the conclusions of our study, recommendations are provided for current extension providers, farmer associations and CRELs.

- CRELs represent a breakthrough opportunity for extension services to positively impact the dairy industry of Honduras. Farmers are organized and committed to making CRELs successful. Furthermore, New and Old CREL farmers have positive perceptions of extension services. The provision of extension services can be greatly facilitated by these conditions. CRELs are an excellent channel for delivering extension education programs.

- There is need to provide unbiased, research based and applicable information to farmers. Few current sources of information have such characteristics. An extensive use of research-based information from research centers located in the tropics can contribute to this purpose.

- The current environment provides the grounds for private extension to contribute to the development of the dairy industry. The provision of extension services that positively impact productivity and milk quality is important. Positive results from such interventions can contribute to the competitiveness of the sector.

- As found in our study and in other secondary research, it is clear that the use of existing farmer-to-farmer networks in New and Old CRELs can contribute to more rapid diffusion of innovations and increase farmers participation.

- The strengthening of farmer-to-farmer linkages by extension providers can contribute to the sustainability of CRELs especially if extension programs continue to be short-term interventions.

- It is important to consider that CREL farmers can also diffuse positive and negative experiences with extension providers. Therefore, content and delivery methods should be carefully selected so that the desired educational objectives are accomplished.
• Results of our study indicate that farmer associations need to expand educational programs offerings. Farmer associations should focus on providing information regarding issues that are not addressed by other providers.

• If there is value in extension and educational programs there should be a more concentrated effort from farmer associations to promote educational opportunities and quality programs.

• Farmer associations need to have a more active role in seeking funding for long-term extension programs.

**Future Research Needed**

Additional research needed to develop CRELs and the Honduran dairy industry should include

• Development of CRELs into rural enterprises.

• The effective use of farmer-to-farmer networks existing in New and Old CRELs to diffuse innovations and new knowledge.

• Adaptive research in feeding and nutrition, milk quality and pasture management.

• Factors that can contribute to strengthening farmer associations.

• Development of leadership programs for the dairy industry.

• Establishment of youth programs and the development of curricula for such purposes.

**Summary**

Chapter 5 provided the discussion of the findings and their relation to other studies and recommendations drawn from the conclusions of the study. The remainder of the document includes the appendices and the structured interview guides for farmers, input suppliers, and farmer associations.
APPENDIX A
STRUCTURED INTERVIEW GUIDE FOR FARMERS

University of Florida
Department of Agricultural Education and Communication
Structured Interview Guide for Dairy Farmers
Elena M. Toro

Name ____________________
Location __________________
CREL ____________________
Date ____________________

Section 1. Experiences with technical assistance and other educational programs

1. How many years have you been in the milk production business?
   a. _________ 0-10 years
   b. ________ 10-20 years
   c. _________ 20-30 years
   d. _________ More than 40 years

2. See attached chart.

3. In your experience how do you rate extension field agents you have been in contact with?
   a. _________ Excellent
   b. _________ Good
   c. _________ Bad
   d. _________ No experiences with extension

4. Are there extension, technical assistance programs or educational opportunities in regards to milk production available on a regular basis?
   a. Yes ________
   b. No _________

4.1 Who attends educational programs in the farm besides from you?
   a. Herdsmen ________
   b. Son _________
   c. Daughter _________
   d. Spouse _________
   e. Other farm worker ________
   f. I go alone _________
5. If you don’t attend what are the reasons?
   a. Schedule
   b. Lack of time
   c. Topics are not interesting to me
   d. I don’t understand the content
   e. I don’t like the people offering the program
   f. I have had bad experiences in the past
   g. There is no relationship between my problems and the technologies presented
   h. I don’t have a means of transportation
   i. I did not receive an invitation or notice on time
   j. Agents lack expertise and experience

6. Are there technical assistance or educational programs available on a regular basis for farm workers?
   a. Yes
   b. No

7. If your farm workers don’t attend what are the reasons?
   a. Lack of time
   b. I don’t give them permission
   c. Negative experiences in the past
   d. Schedules and places are not convenient
   e. Transportation is not available
   f. Content is too complex for workers to understand
   g. I don’t agree with the delivery methods used

8. Do you encourage your workers to attend workshops and training programs relating to dairy?
   a. Yes
   b. No

9. Who do you talk or consult with when you need advise about managing your herd?
   a. Veterinarian
   b. Salesmen
   c. Magazine
   d. Other farmers
   e. Consultant
   f. Agents from DICTA
   g. Private extension agents
   h. Farmer association agent
   i. Internet

10. Where do you buy supplies for your farm?
11. How often do you go to the supply store? ___________ per month
   Do they offer you educational pieces or pamphlets? Yes____ No____
   Are you satisfied with their services? __________
   Would you like to have access to other type of services? Yes____ No____

12. What do you feel should be the 3 top priorities of extension programs in regards to training for dairy farmers?

<table>
<thead>
<tr>
<th>Topic</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Improved forages</td>
<td></td>
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<tr>
<td>b. Feeding and nutrition</td>
<td></td>
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<tr>
<td>c. Reproduction</td>
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<tr>
<td>d. Dairy herd management</td>
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<tr>
<td>e. Harvesting and storage</td>
<td></td>
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<tr>
<td>f. Raising replacements</td>
<td></td>
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<tr>
<td>g. Vaccinations and deworming</td>
<td></td>
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<tr>
<td>h. Milk quality</td>
<td></td>
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<tr>
<td>i. Milking procedures</td>
<td></td>
</tr>
<tr>
<td>j. Electrical fencing and rotational grazing</td>
<td></td>
</tr>
<tr>
<td>k. Keeping and using farm records</td>
<td></td>
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<tr>
<td>l. Marketing options</td>
<td></td>
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<tr>
<td>m. Strategic alliances</td>
<td></td>
</tr>
<tr>
<td>n. Marketing and milk prices</td>
<td></td>
</tr>
</tbody>
</table>

Section 2. Farmer Organizations

13. Are you a member of the farmer association?
   a. __________ Yes
   b. __________ No

14. If not, why not? ____________________________________________________

15. What benefits do you have as a member of farmer organizations?
   a. Buy agricultural supplies at lower prices ______
   b. Commercialization of products ______
   c. Representation in the sector ______
   d. Access to new information on a regular basis ______
   e. Participation in conferences and seminars ______
   f. Opportunities to share experiences with others ______
   g. Training for farm workers ______
   h. Insurance ______
   i. No benefits ______
   j. ______

16. Do you know of any programs that DICTA has in this region regarding milk production?
   a. Yes ______
   b. No ______
16a. If yes, have you participated on them?
   a. Yes ______
   b. No ______

17. Would you be willing to pay for consulting services or any other type of professional services that could improve the productivity of your herd?
   a. Yes ______
   b. No ______

18. If you are willing to pay for services, how much would you pay per cow?
   a. ________________________

Section 3. Globalization and its effects

19. Do you know what the term globalization or open markets means?
   a. Yes ______
   b. No ______

20. What does the term globalization mean or imply to you?
   a. __________________________________________________________
      __________________________________________________________

21. Do you think globalization will affect your farm?
   a. Yes ______
   b. No ______
   c. Doesn’t know _____

22. Do you think globalization will affect the dairy industry of Honduras?
   a. Yes ______
   b. No ______
   c. Doesn’t Know_____

23. Have you made changes in your farm to prepare for possible effects of globalization?
   a. Yes ______
   b. No ______
   c. Doesn’t know _____

Section 4. Demographics

24. On average how many employees work permanently on the farm?
   a. 0 __________
   b. 1-3 __________
   c. 4-6 __________
   d. 7 __________
25. What is the average education level of your employees?
   a. No school
   b. 1st - 3rd grade
   c. 4th – 6th grade
   d. Some High School
   e. High School

26. How many of them read and write fluently?

27. What is the highest level of education you completed?
   a. No school
   b. 1st - 3rd grade
   c. 4th – 6th grade
   d. Some High School
   e. High School
   f. Some college
   g. College
   h. Graduate School

28. Do you know how to read and write fluently?
   a. Yes
   b. No

29. Does your spouse work on the farm?
   a. Yes
   b. No

30. Does your daughter(s) work in the farm?
   a. Yes
   b. No

31. Does your son(s) work in the farm?
   a. Yes
   b. No

32. Are records kept in your farm?
   a. Yes
   b. No

33. Who is responsible for keeping them?

34. If yes what type?
   a. Production
   b. Health
   c. Reproduction
d. Accounting
   e. Inventory

35. Do you have off farm employment?
   a. Yes
   b. No

36. How many hours weekly do you spend working in matters related to the dairy farm?
   a. ________________

37. What other agricultural and livestock activities are you involved in?
   a. __________________
   b. __________________
   c. __________________

38. How much land area do you have under the following categories:
   a. Pastures ________ mz
   b. Crops ________ mz
   c. Forest ________ mz
   d. Other ________ ________ mz
   e. No arable land ________ mz

Farm Information

39. What production system do you use?
   a. Dual purpose
   b. Pure breed

40. How many cows do you milk on average during the peak season? __________

41. What is your average milk production during the peak season __________ liters

42. How many cows do you milk on average during the low season? __________

43. What is your average milk production during the low season __________ liters

44. What breeds/crosses do you have in your herd?
   a. Holstein
   b. Jersey
   c. Brown Swiss
   d. Holstein x Brahman
   e. Brown Swiss x Brahman
   f. Gyr x Brahman
   g. Santa Gertrudis
   h. Other

45. Has your milk been rejected because of quality problems?
a. Yes ____________
b. No ____________

46. Where do you milk your cows?
   a. Open corral, no concrete __________
   b. Roofed area in corral __________
   c. Roofed area with concrete floors __________
   d. Modern milking parlor __________

Note for IRB: (1 manzana = 7000 m²)

47. Can you recall the following information regarding improved varieties of grasses in your farm
   a. Number of manzanas (mz) _______ mz
   b. How many of these manzanas did you fertilize last year _______ mz
   c. On average how much fertilizer did you applied per mz last year _______ kg/mz
   d. How many mz with improved pastures are under irrigation? _______ mz

48. Can you recall the following information regarding native grasses in your farm
   a. Number of manzanas (mz) _______ mz
   b. How many of these manzanas did you fertilize last year? _______ mz
   c. On average how much fertilizer did you applied per mz last year _______ kg/mz
   d. How many mz with improved pastures are under irrigation? _______ mz

Animal Nutrition and feeding

49. Do you separate your cows into different groups for feeding management?
   a. Yes _______
   b. No _______

50. Do you feed concentrates to cows?
   a. Yes _______
   b. No _______

50a. How do you determine how much concentrate to feed your cows?
   a. By milk production _______
   b. By protein content in the concentrate _______
   c. Recommendations from veterinary _______
d. Recommendations from sales person ______
e. Educated guess ______

Animal Health and Reproduction

51. To get your cows pregnant you use…
   a. Bull ______
   b. AI ______
   c. Both ______

52. What method is used for heat detection?
   a. Visual ______
   b. Steer ______

53. Do you do pregnancy checking?
   a. Yes ______
   b. No ______

54. What are the most common diseases found in production cows?
   a. Digestive upsets ______
   b. Problems with parasites ______
   c. Problems with reproduction ______
   d. Problems with mastitis ______
   e. Feet and legs ______
   f. Other problems ______

55. What are the most common diseases found in calves?
   a. Problems with parasites ______________________
   b. Problems with diarrheas ______________________
   c. Others ______________________

Additional Information

56. Road access to your farm is ….
   a. 0–5 km ______
   b. 5-10 km ______
   c. More than 10 km ______

57. Do you have access to electricity?
   a. Yes ______
   b. No ______

58. Do you have access to tap water?
   a. Yes ______
   b. No ______
59. What changes have you and fellow CREL members experienced after joining the CREL?
   a. ________________________________________
   b. ________________________________________
   c. __________________________________________

60. Is there any additional information that you would like to share with us?
   a. ___________________________________________________________________
      ___________________________________________________________________
      ___________________________________________________________________
      ___________________________________________________________________

61. Where is your farm located?
   a. Town ______________
   b. State ______________

In name of the team conducting this research project we want to thank you for your time and patience to fill in this survey.
2. Can you recall the following information about extension programs in which you have participated.

<table>
<thead>
<tr>
<th>Program name</th>
<th>Delivery methods used (See list below)</th>
<th>Delivery methods preferred</th>
<th>Topics covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
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<tr>
<td>B1</td>
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<tr>
<td>C1</td>
<td></td>
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</tbody>
</table>

Delivery methods
a. Personal visits          k. Videos
b. Classroom instruction/ Lectures  
c. Demonstrations (Method or result)  
d. On-farm test  
e. Seminars  
f. Field days  
g. Tours to other farms  
h. Newspaper  
i. Magazines  
j. Booklets

End of Interview
APPENDIX B
STRUCTURED INTERVIEW GUIDE FOR INPUT SUPPLIERS

University of Florida
Department of Agricultural Education and Communication
Structured Interview Guide for Input Suppliers
Elena M. Toro

Name ______________________
Company ______________________
Date ______________________

1. How many dairy farmers do you work with?
a. _______________

2. What types of services/programs do you offer dairymen?
a. Consulting ___________
b. Sales ___________
c. Training ___________
d. Other ___________

3. How frequent are your contacts with dairymen?
a. Daily ___________
b. Weekly ___________
c. Monthly ___________
d. Yearly ___________

4. What is the educational level of farmers you work with?
a. No school ___________
b. 3rd Grade ___________
c. 6th grade ___________
d. High School ___________
e. Some college ___________
f. College ___________

5. What methods do you use to bring new knowledge to dairymen?
a. Process demonstrations ___________
b. Result Demonstrations ___________
c. Classroom instruction ___________
d. Workshops ___________
e. Seminars/conferences ___________
f. Field Days ___________
g. One on one ___________
6. Which methods work best with dairy farmers?
   a. Process demonstrations
   b. Result Demonstrations
   c. Classroom instruction
   d. Workshops
   e. Seminars/conferences
   f. Field Days
   g. One on one
   h. Visits to other farms
   i. Other

7. Which methods have not worked with dairy farmers?
   a. Process demonstrations
   b. Result Demonstrations
   c. Classroom instruction
   d. Workshops
   e. Seminars/conferences
   f. Field Days
   g. One on one
   h. Visits to other farms
   i. Other

8. What educational needs have farmers expressed to you?
   a. ______________________________
   b. ______________________________
   c. ______________________________
   d. ______________________________

9. What unexpressed educational needs do farmers have?
   a. ______________________________
   b. ______________________________
   c. ______________________________
   d. ______________________________

10. What limitations or barriers to participation do farmers face when seeking educational programs?
    a. ______________________________
    b. ______________________________
    c. ______________________________
11. What limitations do you have when conducting programs or transferring new knowledge to dairymen?
   a. _______________________________
   b. _______________________________
   c. _______________________________

12. Please indicate your educational level.
   a. High School  ____________
   b. Some college  ____________
   c. College  ____________
   d. Masters  ____________
   e. Ph.D.  ____________
   f. Veterinarian  ____________

13. Indicate your years of experience working in milk production.
   a. 1 year or less  ____________
   b. 3 years or less  ____________
   c. 5 years or less  ____________
   d. 10 years or less  ____________
   e. 15 years or less  ____________
   f. More than 15 years  ____________

14. What activities do you carry out for professional development and how often?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Frequency (Times during a year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>b.</td>
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<tr>
<td>c.</td>
<td>d.</td>
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<td>e.</td>
<td>f.</td>
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<td>g.</td>
<td>h.</td>
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<td>i.</td>
<td>j.</td>
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End of the Interview

Thank you for your participation in this study!
APPENDIX C
STRUCTURED INTERVIEW FOR FARMER ASSOCIATIONS REPRESENTATIVES

University of Florida
Department of Agricultural Education and Communication
Structured Interview Guide for Farmer Associations Representatives
Elena M. Toro

Name ______________________
Date ______________________

1. Name of the Association
   a. AGAS ______
   b. AGAA ______
   c. AGAO ______
   d. FENAGH ______
   e. Others ______

2. Number of members who are dairy farmers
   a. _________________

3. What services does the Association provide to members who are dairy farmers?
   a. Technical Assistance Programs ______
   b. Other educational opportunities ______
   c. Training for personnel ______
   d. Sale of Ag products ______
   e. AI ______
   f. Other ___________________________

4. How many educational programs did the association offered last year to dairy farmers?
   a. _____________________________

5. What other opportunities do dairy farmers have to interact and learn about new technologies in the Association?
   a. _____________________________
   b. _____________________________
   c. _____________________________

6. What methods are most commonly used to deliver programs?
   a. Process demonstrations ______
   b. Result Demonstrations ______
c. Classroom instruction
   d. Workshops
   e. Seminars/conferences
   f. Field Days
   g. One on one
   h. Farm visits
   i. Other

7. Which methods work best with dairy farmers?
   a. Process demonstrations
   b. Result Demonstrations
   c. Classroom instruction
   d. Workshops
   e. Seminars/conferences
   f. Field Days
   g. One on one
   h. Farm visits
   i. Other

8. Which methods have not worked with dairy farmers?
   a. Process demonstrations
   b. Result Demonstrations
   c. Classroom instruction
   d. Workshops
   e. Seminars/conferences
   f. Field Days
   g. One on one
   h. Farm visits
   i. Other

9. What educational needs have farmers expressed to you?
   a. ______________________________
   b. ______________________________
   c. ______________________________
   d. ______________________________

10. Do you feel there are needs farmers have not expressed?
    a. ______________________________
    b. ______________________________
    c. ______________________________
    d. ______________________________
11. How would you rate the attendance of dairymen to programs the association offers?
   a. Excellent  ________
   b. Very good   ________
   c. Good        ________
   d. Poor        ________
   e. Very poor   ________

12. If attendance is not excellent name 3 top reasons for low attendance.
   a. _______________________________
   b. _______________________________
   c. _______________________________

13. How can farmer’s participation in educational programs be improved?
   a. _______________________________
   b. _______________________________
   c. _______________________________

14. What motivates farmers to attend educational programs?
   a. _______________________________
   b. _______________________________
   c. _______________________________

15. What are the 3 top reasons why dairymen do not implement what they learn in technical interventions?
   a. _______________________________
   b. _______________________________
   c. _______________________________

16. How many individuals with the following academic titles are hired by the Association to work with dairymen?
   a. Agronomer  ________
   b. Ingeniero Agrónomo  ________
   c. Veterinarian  ________
   d. Masters  ________

17. Does the association provide opportunities for professional development to its employees?
   a. Yes  ________
   b. No   ________

18. Do you network with other extension programs and NGOs?
   a. Yes  ________
   b. No   ________
19. If the answer is yes, who are these organizations?
   a. _____________________________
   b. _____________________________
   c. _____________________________

20. Do you work closely with SENASA?
   a. Yes  _________
   b. No   _________

21. If yes, how do dairymen benefit from this relation?
   a. _______________________
   b. _______________________
   c. _______________________

22. Do you work closely with DICTA?
   a. Yes  _________
   b. No   _________

23. If yes, how do dairymen benefit from this relation?
   a. _______________________
   b. _______________________
   c. _______________________

24. If no, why don’t you work with DICTA and SENASA?
   a. _________________________________________________
   b. _________________________________________________

25. Do you work with commercial suppliers?
   a. Yes  __________
   b. No   __________

26. If yes, how do dairymen benefit from this relation?
   a. _______________________
   b. _______________________

27. What is the Association doing to help farmers face CAFTA?
   a. _________________________________________________
   b. _________________________________________________
   c. _________________________________________________

End of the Interview
Thank you for your participation
LIST OF REFERENCES


Rivera, W.M., Qamar, M.K., & Van Crowder, L. (2001). Agricultural and rural extension worldwide: Options for institutional reform in the developing countries. Rome, Italy: FAO


BIOGRAPHICAL SKETCH

Elena María Toro Alfaro was born in Tegucigalpa, Honduras, in September 1977. Elena attended Escuela Internacional Sampedrana in San Pedro Sula, Honduras, where she graduated from the Bachiller en Ciencias y Letras and High School programs in June 1995.

Elena attended Zamorano, Panamerican School of Agriculture (Zamorano, Honduras) beginning in the spring of 1996. She completed her Ingeniero Agrónomo degree with an orientation in Animal Science in December 1999. During the winter of 2000, Elena participated in an internship in the ruminant nutrition laboratory at Cornell University. By the summer of 2000, Elena started working as a research assistant in the Milk Production and Processing Project, one of the programs that seek to revitalize the rural economies affected by hurricane Mitch in the north coast of Honduras, funded by USAID and Zamorano. There she developed curricula for dairy farmers, coordinated program activities, and worked closely with Zamorano students on research projects. Furthermore, she served as resident assistant for the Bolivar student residence. In 2001, she was named administrative coordinator for the project. Her emphasis was coordinating field activities, handling fund allocation and budget preparation, and serving as a liaison to members of the dairy industry of Honduras.

In August 2002, Elena entered the masters program in the department of Agricultural Education and Communication at the University of Florida, with an emphasis in international extension. Elena was awarded a Graduate Research
Assistantship from the Space Agriculture in the Classroom grant, a partnership among NASA, USDA, and the University of Florida. During her graduate studies, she also worked closely with the Association of International Agriculture and Extension Education (AIAEE). In April 2004, Elena received the honor of being named Outstanding Graduate Student of the Department of Agricultural Education and Communication.