End of Assignment Report
Cover Page and Specific Questions

Part A.

Author/Volunteer name: Richard Otto Wiegand

Assignment dates: March 7-21, 2005

Name of host(s): Two CRELs (Centro de Recoleccion y Enfriamiento de Leche): Rodriguez-Alvarado y Asociados, Jose Ernesto Munguia y Asociados

Assignment locations: Rio Chiquito and Cuyamel (Omoa, Cortes, Honduras)

Number of individuals directly participating in technical assistance or training:

Male: 20
Female: 5

Number of individuals that you anticipate may benefit from your assistance (for example, other employees of the enterprise or other family members):

Male: 60
Female: 20

Part B.

1. Objectives of assignment. Assistance requested by host.

The objectives were to improve milk quality for CREL members from the cow to the milk collection center through improved milking techniques, mastitis prevention and treatment, milk handling and milk testing.

2. Activities and assistance part assignment? Who was involved? Topics addressed?

CREL dairy producers were the specific contacts involved. Some employees and family members as well as non-members of the CRELs were also involved. In addition to milk quality, topics addressed included milk yield, nutrition, genetics, pasture management and financial management (See attached general report). Milk quality is one aspect of the total picture of milk production, which was observed to be limited both in quality and quantity by several constraints.

3. Improvements with respect to the objectives and expected results?

Improvements will not be immediate. Although CREL farmers indicated that they agreed with several of the recommendations made, there was no deadline or commitment. Farmers appeared to have abandoned use of the CMT (California Mastitis Test), a very useful and simple detection device for mastitis, after previously donated reagents were depleted. Some farmers indicated that they had used teat dips and washing soaps that were also no longer used. One farmer was not using a milking machine that he said had worked well, but spare parts were expensive or not available. There was a consistent and minimal practice of milking employed among members that reflected a lack of milk quality incentives at the CREL level. Milk quality was just good enough so that little milk was rejected. There were no graduated pay incentives at the CREL based on somatic cell, bacteria, fat, protein or volume. There was no antibiotic testing at the CREL. Milk volume was just enough to allow poorer farmers to survive. Nonetheless, there was a definite frustration with the current way of doing things and a willingness by farmers to make more money.

4. New knowledge transferred, skills obtained by the host, and new attitudes observed.

Farmers learned about milking techniques, milk quality testing, milk recording, various cooperative services that could be provided, cattle breeds, pasture forage management, grasses and legumes, rotational grazing, soil testing, financial indicators, nutrition, calf rearing and animal health. Future potential environmental issues were discussed with a

few farmers. It was CREL members who introduced the author to non-CREL neighbors to observe different dairy management practices.

5. Future impacts.

Six months from now one would expect some of the farmers to have changed milking techniques, improve breeding and health care, change pasture rotations and forage species, and keep tract of production and financial figures. Some members may very well ask for more services to be provided by the CRELs. The CRELs may improve their services, price and marketing approach. It was obvious to farmers that continuing their methods would not allow them to stay competitive in the long run.

6. Effects of assignment personally and professionally.

The assignment provided an excellent chance to brush up on milk quality as well as combine other skills related to dairy farming. It was fun to do the project alone because it improved the author's rusty Spanish skills.

7. Conclusions and recommendations for follow-up activities to build on your assignment.

A cooperative expert to work on improving milk measurement and other services through the CREL would be highly recommended, as well as a pasture/rotational grazing expert from the area or region. Milk quality will continue to be difficult to control or improve if nothing is measured and payment incentives are not in place. Individual farmers will surely step up to improve milking practices and mastitis prevention because it makes sense in other areas, especially to prevent udder damage and improve total milk production and cow longevity.

<u>Part C</u>. In the form of a personal letter to your host, please summarize your short- and long-term recommendations.

See attached letter and recommendations at end of the general report.

Part D. List of the names of people contacted during the assignment.

Itinerary of Trip and Persons Contacted

Mon. 7 March – Travel to Honduras, bus from Tegucigalpa to San Pedro de Sula
2 - Paola Duran and associate – Winrock, Tegucigalpa
1 - Hector Hernandez – Winrock, San Pedro

Tues. 8 March AM – Travel to Cuyamel area with Hector Hernandez and Jose Chacon, meeting with CRELs, begin stay with Ricardo Alvarado
4 - members and employees at first CREL, introduction
10 - members and employees at second CREL, introduction, brief meeting
6 - Ricardo Alvarado and family

Tues. 8 March PM – Visit to Ricardo Alvarado farm
4 – owner and employees

Weds. 9 March AM – Visit to Elia Galdames farm
4 – owner and employees

Weds. 9 March PM – Visit to Alfredo Ayala farm
3 – owner and employees

Thurs. 10 March AM – Visit to Hugo Galdames farm
10 – owner and employees

Thurs. 10 March PM – Visit to Danilo Andino farm
4 – owner and family

Fri. 11 March – Trip to Guatemala with Hugo Galdames
4 – owner and employees, business partner

Sat. 12 March AM – Visit to Cecilio Bromfield farm
6 - owner, employees and family

Sat. 12 March PM – Trip San Pedro Ag Fair with Hugo Galdames
12 – owner, employees, business associates

Sun. 13 Mar AM – Visit to Joseline _____ farm
5 – owner, employees, family

Sun. 13 March AM – Visit to Cnel. J. Colindres (non-member, 40 Holsteins, milking parlor)
2 – employees

Sun. 13 March PM – Interview with two farmers, Antonio Rodriguez and Bruno Rodriguez
2 – owners

Mon. 14 March AM – Visit to Maricelo _____ farm
3 – owner, employees

Mon. 14 March PM – Meeting at Ricardo Alvarado farm
4 – owner, neighbors

Tues 15 March AM – Visit to Oscar Munguia farm
5 – owner, employees, neighbors

Tues 15 March AM – Visit to Jose Ernesto Munguia farm
4 – owner, employees

Weds 16 March AM – Visit to Elmundo Mendes farm (non-member)
4 - owner, family, employee

Weds 16 March AM – Visit to _____farm (non-member, 40 Brown Swiss, forage harvester)

3 - owner, family, employee
Weds 16 March PM – Visit to Omoa Castle with Jose Munguia
Thurs. 17 March PM – Presentation to farmers at primary school
8 – owners, wife, son
Fri. 18 March AM – Visit to Antolin Moldonado farm
3 – owner, employees
Sat. 19 March AM – Visit to _____farm (non-member, new pasture type)
1 – owner
Sat. 19 March AM – Travel to San Pedro de Sula
Sun. 20 March – Travel to Copan
Mon. 21 March AM – Travel to Tegucigalpa
Mon. 21 March PM – Meeting with Hector and Paola at Winrock
Fri. 25 March – in El Salvador, worked on report

Milk Quality and Related Issues

Richard Otto Wiegand
Winrock International

San Pedro de Sula, Honduras
March 20, 2005

Brief Summary

Sixteen small dairy farms were visited in Rio Chiquito and Cuyamel in the Omoa/Puerto Cortes on the north coast of Honduras from March 8-20, 2005. The focus of the project was milk quality. Other management issues related to total milk production, nutrition and profitability were covered as well. Farm visits took place during either the morning or afternoon milking. Detailed notes were taken on almost all farms. A slide presentation using Power Point highlighting observations and recommendations was given to farmers on the second to last day of the visits. A number of handouts from milk quality programs in the US in English and Spanish were left with farmers or the local project hosts. A final report was prepared that included the slide presentation and two financial spreadsheets covering 11 of the producers who were CREL members.

CRELs

CRELs (Centro de Recoleccion y Enfriamiento de Leche) are groups of small dairy farmers who organize for the purpose of collecting, cooling and shipping milk. Two CRELs were represented in the project area, one in Cuyamel named *Jose Ernesto Munguia and Associates* with five members (socios), and one in Rio Chiquito named *Rodriguez-Alvarado and Associates* with about 28 members. Each CREL operated a milk collection center with a large milk cooler, equipment to wash cans and equipment to filter and test milk. Milk was brought to the center by farmers in cans on the backs of pickup trucks after every milking. Milk from the center was picked daily by a bulk tank truck and taken to the processing plant in San Pedro de Sula.

Characteristics of CREL Member Dairy Farms

CREL farmers typically kept 20-30 dairy cows and an equal number of youngstock. Farmers pastured their cows on 20-40 manzanas (1 manzana = 0.8 hectare or 2.0 acres). All farmers used hand milking, although one owned a milking machine which was no longer working. All farmers hired 1-2 permanent employees to milk the cows. They also hired

temporary employees to clean pastures of weeds or maintain fencing. It appeared from discussions that few if any milkers were destined to someday own their own cows or dairy farms. All farmers used calves in the milking process for both stimulation of letdown and stripping out. Some milkers washed their hands between cows. Male calves were sold after the lactation was finished, while female calves were weaned and raised. Most cows were Brahman and Brown Swiss crosses. All farmers believed that Brahman genetics was needed for heat-tolerance, resistance to parasites and mastitis, better meat character and overall survivability. Cows often lived to be 10 years old. Average milk production was 2-5 liters per cow per day. The average price received for milk from the CRELs was 5.00-5.60 Lempiras per liter. This is equivalent to about US $13-14 per hundred pounds, an average price for US farmers. Farmers usually owned one bull that was sold or traded for another every 2-3 years. All farms had concrete holding or milking areas with metal roofs over the milking areas. Farmers reported a range of a few cases of mastitis every year to every cow having a case every year. No farmers used dry cow treatments to prevent mastitis. All farmers were familiar with the California Mastitis Test (CMT), although none were using it at present. All farmers claimed that milk production went down during the rainy seasons, although the temperature was cooler, and that cases of mastitis increased.

All farmers used a system of pasture rotation. Common pasture species included Stargrass, Alicia and Brachiaria. Almost all farmers fed some concentrates, salt and molasses to calves and cows. Half of the farmers fed a salt-mineral mix. About half of farmers owned a stationary forage chopper (picadora). This machine was used to chop cut-and-carry species of forage that grew tall and were not grazed. All cows were treated for worms and other parasites. With the exception of one CREL member farmer, the majority of farm income was from milk and sale of dairy animals. Almost all farmers owned a pickup truck and one or more horses used on the farm. Some farmers did not own the land they farmed, but most of the time it was still in the family. All were concerned about transition of the farm to the next generation. No farmers appeared to use veterinarians, nutritionists or extension services. All farmers kept a small supply of veterinary drugs. The one or two farmers who owned a computer did not appear to use it for any farm management purposes. All farmers complained about low milk prices, high costs, and lack of government, extension or lender support.

Characteristics of Non-Member Dairy Farms

There was an opportunity to visit four non-member farms in the area that were in several ways more progressive. The intention was to see what possibilities might exist for improvement, or at least to see alternative systems and technologies.

One farmer owned 30 largely-purebred Holsteins. He was an absentee owner, but the farm manager was present. The cows were out on pasture during the visit, so they were not seen. The farm featured a modern, swing-over milking parlor, large bulk tank, and daily use of the California Mastitis Test and teat dip. There was a large Holstein crossbred bull named Bill Clinton. The manager stated that average milk production was 20-21 liters per

cow. Considerably more concentrate was fed than on other farms, although the amount was not clear.

A second farm featured about 30 cows of a mix of Holstein and other crosses, a bulk tank, a stanchion milking area, teat dip, increased use of concentrates, fence line feeding, and some tractors and wagons. The farmer kept a large liquid tank (former diesel semi-truck tank) from which he sold molasses to other farmers. The average milk production was 7-8 (?) liters per day.

A third farmer owned 40 purebred Brown Swiss cows with stanchions, bulk tank, portable milking machine, bunk feeding, and a farm computer used for keeping records. He used a tractor-pulled forage harvestor with wagons to bring feed to his cows as well as using pasture. The harvestor was manufactured in Honduras. The average production was 10-11 liters per day. He purchased some dry baled hay for calves. The farmer was a retired mathematics instructor and spoke English. His bull was named George.

All three farmers raised calves with nipple bottles and concentrate in raised-platform pens separate from cows. One used milk replacer. All three used artificial insemination on part or all of the herd. All shipped milk directly to the plant in San Pedro and received over 6 Lempiras per liter.

A fourth farmer was visited to see improved species of pasture. No information about his milk production was discussed.

Milk Handling and Reception on CREL Farms

Milk on the farm was poured into 40-liter (?) cans and filtered using purchased cloth filters. Cans were kept in a corner of the milking area during milking, capped and then hauled to the center at ambient temperature. The process from first cow milked to reception at the center could take 2-3 hours, inviting additional bacterial growth in the milk. The climate of the area is hot, humid or rainy, often reaching 30+ degrees C during the day. Milk was not cooled in any way on the farm. Some farmers milked only in the morning, usually from 5-8 AM. Farmers who milked in the afternoon would do it from 3-6 PM. Most milk was delivered to the center immediately after those milking times. Employees of the centers appeared to live nearby and could be summoned to receive milk at any time.

Milk at the center was tested for added water using a floating probe and for bacteria using a reagent (acidez) method. Milk was filtered again by pouring it into another container and then poured into the bulk tank. Milk was either accepted or rejected based on these two tests, plus visual observation or smell. A few farmers reported rejection of milk on a few occasions. The acidez test is apparently a gross measure of all bacteria that includes environmental contaminants and mastitis. The bulk tank was cooled with an electrically-operated compressor to 3-5 degrees C. Electricity provided by the utility could sometimes be shut off for periods during the afternoon.

The only testing of milk for fat, somatic cell and antibiotics was done at the processing plant on the bulk milk sample from the CREL. The author did not see copies of these reports. No individual producer testing or individual cow testing was done. No testing was done to determine which type of mastitis may be present. Mastitis cases are treated with general antibiotics that do have withholding periods. No testing for protein in milk was done. The highest costs of mastitis in the US are loss of production due to udder damage, followed by reduced milk quality payments, followed by costs of treatment and discarded milk. At the CREL center, there was no additional payment to farmers based on components or milk quality at the farm level, therefore there were no real incentives to change components or prevent chronic cases of mastitis unless they resulted in rejection of the milk at the center. Farmers did recognize that mastitis damages a cow´s udder, often permanently, resulting in lower production. Some farmers culled cows for mastitis problems or low production, although at a level of 2-5 liters of milk per cow per day, it was perhaps difficult to recognize a damaged cow from an ordinary low-producing Brahman.

Original CREL members had to pay a fee to become members. It was understood that the CRELs were no longer accepting new members, but did take some non-member milk for about one Lempira less per liter. In general, the cost of operating the CREL was covered by the difference in milk price received from the plant and that paid to members.

Milking Procedure

The ideal milking procedure would include the following steps. Cow´s teats are washed and 2-3 squirts of milk are removed, preferably into a strip cup. Mastitis would be observed if there is an occurrence of clotted milk. A CMT could be used. A pre-milking teat dip can also be used at this step. The teats are dried with a towel, preferably paper. The cow is then milked starting within a minute of initial washing. A post-milking teat dip is applied after milking.

The reality in this part of Honduras is different, and probably practical and reasonable under the circumstances. Almost all milking is done with calves sucking cows. To stimulate milk letdown before milking, the calf was either tied to its mother´s front leg or was allowed to suck briefly. To finish milking, calves were allowed to suck a remaining liter or two from the cow. On quarter may be left un-milked for this purpose. The calf gets the pre-strip milk, which contains more bacteria from the teat ends. The calf also gets to strip out the cow. Farmers claim that the calf's saliva acts as a sealer or disinfectant for the teats. Most but not all farmers feel that using calves to strip out the cow prevents mastitis better than not using calves. The author was not familiar with any research that would support or deny these theories. Calves moving from cow to cow could certainly spread mastitis.

Almost all farmers milked on concrete, either in the outside holding area or under the roof. One farmer chose at times to milk on a nearby pasture in an attempt to keep cows cleaner. Some farmers sprayed water on their cows after milking to cool them off. All milking areas had some mud and manure. All milking areas had a watering tank for cows to drink. A few

farmers had watering tanks out in the pasture. Although all farmers claimed that the milkers washed their hands between cows, not all milkers were observed to do so. Most farmers claimed that milkers followed their instructions about milking technique. Most milkers washed teats before milking. Only one farmer was using any type of soap or disinfectant. No farmers were using teat dips, although some claimed to have used them in the past. One farmer used oxytocin injections for milk letdown in a cow whose calf had died. All farmers reported that keeping cows clean in the rainy season was a difficult task.

Breed of Cow

A major limiting factor in the amount of milk produced by the cow is the cow´s genetics. Farmers are convinced of the need to have a large amount of Brahman genetics in the herd for a variety of reasons, including resistance to heat, parasites, disease, mastitis, lack of water and nutrition, and general survivability. Farmers also like to have a good meat animal to sell at the end of a cow´s productive life. Evidence based on observations on the non-member farms suggests that pure or almost pure Holstein and Brown Swiss do adapt to local conditions and can give a lot of milk. The author has never met a Brahman that will produce a lot of milk. But he has seen plenty of European breeds or crosses living in the tropics that will produce more milk with a bit more feed and care. If a Brahman is worth 3,000 Lempiras more for her meat at the end of her life, just one kilo of milk more per day for two lactations (600 days) at 5.00 Lempiras per kilo will make up that difference. Other breeds of cow that were crossed in a few herds were Jersey, Gir and Shorthorn.

Pasture Management

Dairy cows on all farms were rotated from paddock (potrero) to paddock every 1-5 days, most farms every three days. Paddocks were changed during the day, not at night. Because of the heat, cows often did not eat much during the day. Forage, especially when high in fiber, tends to generate heat of digestion in the cow making her even hotter.

The climate was excellent for growth of grasses because of the abundant rain, humidity and intensive sun. Most pasture was green and tall. Tall is okay in some species, but when the grass has heads, there is less protein and carbohydrate (energy) and more fiber. No farmer knew much about the specifics of the various grasses except to say that some promoted milk (probably higher content of protein) and others promoted weight gain (higher energy). The species or types of grasses grown include Alicia, Tamer, Brachiaria, Bresanta and Decumbe (types of Brachiaria?), Guinea, Tanzania, Suasi, Pangola, Star, Corney (sp?), and Merkeror. Others are also used that are not listed. Species not grazed but cut and chopped included King Grass.

There were no legumes in the pasture mix. One farmer cut branches from a leguminous tree and fed them to his cows. Tree legumes such as Leucaena and Gliricidia do exist, but no one knew about them. Herbaceous legumes such as alfalfa or Desmodium either do

not grow or have not been tried. A few clovers do grow, but are grazed out or crowded out by taller grasses.

No farmer mentioned any specific techniques of pasture management during the visits. Yet all good rotational graziers elsewhere, whether in temperate or tropical zones, use carefully managed and studied systems of grazing management. Farmers will always tell you that you manage the grass first and that the cows will take care of themselves. A good pasture rotation can double grass yields. It was obvious that the pastures that were seen were both undergrazed, in the sense of not taking enough material off, and overgrazed, in the sense of leaving the cows in the paddock too long and thereby killing off selected species. A thumb rule for beef grazing is about 40,000 kilos of animal weight per hectare, move the animals every day and do not bring them back for a month. Animals should graze the paddock to look like a lawn. They should then be returned to that paddock only when the grass returns to about 20 cm in height, depending on species. A thumb rule for dairy cows may be 20,000 to 30,000 kilos of cow per manzana. More investigation is needed. Farmers only talked about single species in paddock. Yet most rotational graziers will use 2-3 grasses in a paddock with a legume.

If cows cannot keep up with pasture growth, that is, if there is more grass than cows to eat it, one should look for some other way to harvest the excess pasture. Farmers in temperate zones make dry hay or baylage. Since that is probably not practical in Cuyamel, farmers may want to run extra animals on unused pasture or run young stock or beef animals to clean up after cows. One farmer was indeed doing that, running animals for his neighbor for rent on some extra pasture. No farmers were using electric fencing, although all were familiar with its advantages.

Many farmers did fertilize with urea (nitrogen source). No soil samples were done. No forage analyses were done. An analysis laboratory does exist in San Pedro de Sula, but farmers said that samples cost too much. Although the university or technical college in San Pedro de Sula did have an agricultural program, farmers claimed to have no contact with those experts. No environmental regulations and few concerns regarding nutrient management were mentioned.

Dairy Cow Nutrition

Most farmers fed some concentrate containing soy, maize and other feeds to the better producing cows and to calves. The author tried to run a ration on Spartan Ration Balancer for one of the farmers using estimates for pasture quality. This ration set for cows producing four liters per day was short on protein, energy and several minerals. Half of the farmers visited fed salt, but no mineral. Higher producing cows will need more nutrients. A shortage of just one nutrient may limit milk production. A few farmers fed ground palm by-product. It is very likely that lack of water in pastures, especially during the day, is limiting feed intake and milk production. Most farmers brought their cows in for a drink during the day or rotated cows to be near water. Most farmers fed molasses with cut forage or concentrate. Molasses is a good energy source and contains some micro-minerals.

Animal Health

In general, Brahmans fared better and looked healthier. However, cows varied in their condition. Smaller cows may have been pushed away from concentrates by larger cows. A few young cows were bred and calved for the first time too early, thereby beginning to milk at a weight of about 250 kilos. Many calves were small and thin, lacking protein and/or proper de-worming. A growing calf or heifer needs a protein concentration of 17-20% in the diet. Mature pasture will only offer 8-12%. Farmers stated that cows were de-wormed once or twice a year, but the actual practice may have been less. The hot and humid environment promotes the spread of flies, maggots, worms and ticks.

Financial Management

Except for tax purposes, farmers did not keep financial records. Most had a good idea about what their income and expenses were, but had never added them up. Detailed information on finances was collected on 12 farms and averages were complied in two spreadsheets accompanying this report. The on-farm discussion to collect data usually took an hour or two, may have included breakfast, and gave the author and farmer a chance to ask a lot of questions about management and to make suggestions in a number of areas.

All farms except one were profitable, but net incomes were equivalent to about US $5,000 or less. Four farms had other farm enterprises. One farmer rented pasture for outside animals, one grew a small field of oranges, one grew some maize and one farmer was a large cattle importer and exporter for whom the dairy operation was just a sideline. The data from the cattle importer were not included. Operating costs ranged from about 40-60% for profitable farms. That compares to 70-80% on US dairy farms. The largest single costs were labor, purchase of animals, feed (pasture not included), truck and veterinary. About 70% of income was from milk. A few farmers had outside sources of income not related to agriculture. One farmer was a teacher. Fuel for the pickup was expensive as were any mechanical items made abroad. Costs of land and buildings were not included in the calculations as well as income and sales taxes, value of the owner´s time and household expenses. Averages were done on a per-farm, per-cow, per-liter and per-manzana basis.

Dairy farming appeared to be profitable with a lot of potential to improve. Farmers were often set in their ways, but were open to suggestions. Obviously, progress is always a step at a time. Suggestions for improvement must be made within the context of the situation.

Recommendations to CREL Members

Milk Quality

Use dry cow treatments.
Use the California Mastitis Test on a regular basis.
If possible, send farm milk samples for analysis of somatic cells and bacteria monthly or a few times per year.
If possible, send individual cow milk samples for analyses of somatic cells once or twice a year.
Use proper milking techniques including soap or disinfectant, washing, drying and teat dips.
Keep milk cool on the farm, for example by using a water bath for cans.
Treat mastitis cows or quarters.
Cull mastitis cows.

Nutrition and Pasture

Analyze pasture forages once or twice a year.
Use pasture and other feed analyses to balance a ration for cows and calves.
Analyze soils.
Add fertility to soils and plant legumes.
Feed a salt-mineral mix.
Plant improved forage species.
Control weeds, mainly with grazing techniques.
Feed more concentrates to cows and calves.
Keep cows near water in hotter weather.
Experiment with different pasture rotations.
Use electric fence if feasible to control paddock size.

Other

Use field days on farms to educate other farmers.
Attend courses, seminars and shows on agriculture.
Use artificial insemination to speed up the process of improving herd genetics.
Keep monthly individual cow milk production records.
Keep financial records and make management changes to increase profit.
Subscribe to a farm or dairy magazine.
Study your farm or the industry a half hour every day.
Exchange ideas with farm neighbors.
Move up to that next level of production.

Letter to CREL Members

20 March, 2005

Rodriguez-Alvarado y Asociados
Rio Chiquito

Jose Ernesto Munguia y Asociados
Cuyamel

The following lists contain my recommendations, both short and log-term, based on my visits to your CRELs:

Milk Quality

1. Use dry cow mastitis treatments.
2. Use the California Mastitis Test on a regular basis.
3. If possible, send farm milk samples for analysis of somatic cells and bacteria monthly or four times per year.
4. If possible, send individual cow milk samples for analyses of somatic cells once or twice a year.
5. Use proper milking techniques including soap or disinfectant, washing, drying and teat dips.
6. Keep milk cool on the farm, for example by using a water bath for cans.
7. Treat mastitis cows or quarters.
8. Cull chronic mastitis cows.

Nutrition and Pasture

1. Analyze pasture forages once or twice a year.
2. Use pasture and other feed analyses to balance a ration for cows and calves.
3. Analyze soils.
4. Add fertility to soils and plant legumes.
5. Feed a salt-mineral mix.
6. Plant improved forage species.
7. Control weeds, but mainly through grazing techniques.
8. Feed more concentrates to cows and calves.
9. Keep cows near water in hotter weather.
10. Experiment with different pasture rotations.
11. Use electric fence if feasible to control paddock size.

Other

1. Use field days on farms to educate other farmers.
2. Attend courses, seminars and shows on agriculture.
3. Use artificial insemination to speed up the process of improving herd genetics.
4. Keep monthly individual cow milk production records.
5. Keep financial records and make management changes to increase profit.
6. Subscribe to a farm or dairy magazine.
7. Study your farm or the industry a half hour every day.
8. Exchange ideas with farm neighbors.
9. Move up to that next level of production.

Make changes a step at a time. Don't overspend, but don't be afraid to invest either in improvements. Try to get more services provided directly or indirectly through the CREL, especially with regard to milk testing and animal health.

Thank you!

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