

REVIEW OF DURAME DAIRY/DRAUGHT DEVELOPMENT (4-D)  
PROJECT

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## EXECUTIVE SUMMARY

The Durame Dairy/Draught Development Project is a three-year project proposed jointly by ADRA Ethiopia and ADRA Norway for funding by NORAD and CRDA, the Christian Relief and Development Association. The total budget allocated for the project is Birr 339,197. Noragric, as advisor to NORAD, had recommended that the project be reviewed in order to establish the biological, technical, socio-economic and institutional capacity to introduce and sustain dairy/draught purpose cattle in the traditional intensive smallholder mixed farming system in Durame, Kededa Gamela Wereda in Kembata, Hadiya and Timbaro Zone. The review took place 9-20 August 1997. In the review, the objectives of the project and the institutional as well as the technical considerations made in the project document were examined against the field situation and context of the project.

The overall objective of the project, which was to improve food security in the project area, was found to be realistic and consistent with national and regional policies. The immediate objective of introducing dairy/draught cows (Friesian crosses) was challenged. The team felt that there was no previous experience with high grade dairy cows used for traction in the project area and therefore this component of the objective be deferred until field observation is made on the the adaptation and adoption behaviour of the farmers in this regard. Otherwise the introduction of high grade cows under good feeding system and management is a viable option. The productivity of the local cows is known to be very low.

The development of dairy production in these smallholder mixed production systems is a logical step in the intensification of agricultural activities. The zero grazing option is valid and sustainable from the technical, economic and environmental point of view. The farmers are highly motivated; the farming system is conducive; the conditions for forage production are favourable and on the whole the environmental stress for improved dairy production is minimal.

Hence, considering the viability of the project, it is recommended that the project be implemented with the necessary adjustments proposed in this report. The important points that the project needs to pay attention to are the following:

- the need to carry out a baseline survey to document the natural resource base of the participating farmers, including their attitude towards cow traction.
- on-farm artificial insemination service (which already exists in the wereda) be chosen with care as the method for enabling crossbreeding of Friesian bulls and indigenous cows. Alternatively, the indigenous cows can be bred to a crossbred high grade Friesian bull which should be maintained at the ADRA demonstration farm.
- maize intercropped with lablab, a legume fodder, is compatible with the cropping system. Similar intercropping with sorghum/lablab, wheat/clover and oats/ vetch can be introduced to the Durame area.

- routine vaccinations for the most common diseases such as anthrax, pasteurization, calf paratyphoid, contagious abortion and others that may exist in the area should be administered prior to the introduction of the cows.
- milk collection and cooling centres be established as soon as surplus milk warrants it.
- the processing and marketing of milk is an area which will require collaborative research and development. Collaboration with ACA and ILRI is highly recommended.
- The credit system proposed in the project is the basic minimum required to cover the initial investment in dairy cows, establishment of fodder crops, basic infrastructure and other related facilities.
- Some sort of insurance scheme should be introduced to safeguard beneficiaries from total loss.

Finally, the team would like to mention a few of the critical problems. Concerned institutions, especially at Zonal and Wereda levels, were not properly consulted for possible provision of technical assistance as well as political and administrator support. ADRA-Ethiopia has a big task of correcting the situation. The crossbred (75% exotic inheritance) cows described in the project proposal are not readily available. Specific options are proposed in this report regarding the introduction crossbred cows.

## INTRODUCTION

The Durame Dairy/Draught Development (4-D) Project (Ethiopia) is a three-year project proposed jointly by ADRA-Ethiopia and ADRA-Norway for financing by NORAD. Subsequently, in the spring of 1997, the project was approved for funding by NORAD and CRDA-Ethiopia. Additional funding was also to be provided by ADRA-Ethiopia and the beneficiary farmers participating in the project. The total budget of the project is Birr 339,197.

Noragric, as advisors to NORAD, had made technical comments which had to be cleared at an initial stage of implementation. The technical comments focussed on aspects of zero grazing, the feasibility of introducing improved fodder resources as well as the viability of some of the technical, institutional and economic assumptions made to introduce and sustain dairy/draught purpose cattle, in the traditional intensive small-holder mixed farming system.

In view of the above, and the proposed budgetary assumptions considered in designing the project, the need for additional expert assessment was recommended. Thus, during 9-20 August 1997, a review mission to ADRA-Ethiopia, CRDA-Ethiopia, as well as potential and actual regional, zonal and district level research and extension and the beneficiary farmers was carried out by Dr Aregay Waktola (Mission Leader), Dr Ola Syrstad and Dr Berhane Kiflewahid.

The major objectives of the review, drawn from the Terms of Reference (Annex 1), were:

1. To discuss the biological, technical and institutional capacity to support project implementation.
2. To assess the policy, socio-economic, environmental concerns and sustainability of the project.
3. To consult with ADRA-Ethiopia, CRDA-Ethiopia, Awassa College of Agriculture, Regional and Woreda Agriculture Offices, ILRI, IAR and other relevant organizations who may collaborate in project implementation.

The methods used in conducting the review included a review of literature and project document, observation of household conditions and farmers' fields as well as the general environmental situation in the project area, and discussions with farmers, development workers and researchers involved in studies on crossbred dairy cows meant for dual purposes, i.e. milk production and traction. The discussions held with the concerned scientists at ILRI and IAR were very constructive and helped the team to consider some essential adjustments in the design of the project.

The report of the expert mission is presented as per the guidelines for the project review, which was drafted by the Mission Leader and agreed upon by the consultants, as well as the methodology outlined in the Terms of Reference. The result from the review will hopefully be used to ensure the biological, technical and economic as well as environmental viability of starting the small holder Dairy/draught cattle project as an integral part of rural development in

Durame, Kedida Gamela District, Kambatta Zone of the Southern Peoples Administrative Region.

The description of the project area, including the land size, physical and natural land resource base, population structure and distribution as well as the agricultural production system, is outlined in the project document submitted by ADRA-Ethiopia and ADRA-Norway. The project document presents a fair assessment of the agroecological situation in the project area. The target population lives in the higher altitudes of the zone where land quality and the natural resources endowment are poor, although other environmental factors like rainfall, temperature, disease factors and socio-cultural conditions are rather good for dairy production.

Evidence of soil erosion and land degradation is wide-spread, although the situation on the farms looks better because of the prevailing farming systems in the area. Farmers practice intensive cultivation with inter-cropping of annual and perennial crops. Zero grazing is not a new concept to the farmers. Because of the absence of fallow and/or grazing land, farmers have no choice but to keep cattle within the house, stall feeding them with crop residues and other available feed resources made available through a cut and carry system. Farmers generally keep cattle and sheep but not goats.

ADRA Ethiopia, using funds provided by the International Institute for Rural Reconstruction (IIRR) and the Food Industry Crusade Against Hunger (FICAH), has introduced what is called Bio-Intensive Gardening (B.I.G). The core philosophy of B.I.G. is to obtain the maximum produce from a minimum land area using locally available low cost inputs, and to diversify crops. It is claimed to be the opposite of conventional gardening which uses high inputs of fertilizers and pesticides (1). Along with this there is a water harvesting scheme with which farmers are assisted to construct water reservoir/basins of some 100,000 liters capacity. This scheme started a year ago. At the time of the visit, several of the prospective beneficiaries had constructed such reservoirs mainly for irrigation purposes, and this obviously can serve a useful complement to the implementation and development of the the 4-D project.

On the whole, food security is the greatest challenge in Kambatta, Alaba and Timbaro Zone as in many parts of the Southern Nations, Nationalities Regional State (SNNRS). The farmers are hard-working and keen to adopt new technologies that would improve their lot. They clearly understand that dairy development is one of their options for the improvement of their livelihood. They seemed to be convinced about the superiority of crossbred cows for milk production. This is perhaps the impact of the former Welayita Agricultural Development Unit (WADU) which used to promote and distribute crossbred heifers in the region. There are private owners in Durame who have shown the potential of the improved cows, and the beneficiaries are well aware of the successes. Thus, for all practical purposes, the Durame farmers seem to be well prepared to adopt the proposed crossbred heifers.

The most important concept proposed in the project is the technical and social sustainability of introducing the dairy/draught cow under a zero grazing system into an already existing intensive mixed small-holder production system. The criteria for selecting farmers eligible for the dairy/draught cow loan scheme, as well as the institutional requirements to sustain the project such as extension and training, veterinary services, bull services, artificial insemination and the technical and management packages, are outlined in the project document. The team has assessed the situation and made comments and recommendations in the following sections of the report.

## COMMENTS ON THE KEY ELEMENTS OF THE PROJECT.

### 1. The Goal

The overall objective of the project is to improve food security in the project area. This is the dominating concern of the country at all levels. It is likely that the 4-D project can contribute to food security by pursuing the proposed objectives (with some modification) and a proper implementation strategy.

### 2. The Purpose/Immediate Objective

The immediate objectives of the project are stated in various ways in different parts of the proposal. For the purposes of this analysis, these objectives may be restated as follows:

1. to promote intensive dairy farming among small farmers, through the establishment of zero grazing, extension services, and a revolving dairy cow scheme
2. to introduce improved cross bred cows into the Durame agricultural system for dairy production as well as for draught power.
3. to establish a small dairy farm under ADRA as a demonstration center to disseminate various aspects of intensive small-scale dairy farming.
4. to provide bull servicing in order to improve the genetic potential of indigenous cows for interested dairy farmers in the neighboring communities.

It is necessary to comment on the tenability of the objectives. In objective 1, establishment of zero grazing and extension services is rather a misnomer. Zero grazing is a traditional practice in the area. Extension service is provided by the Wereda Agricultural Office although it may not be directed particularly to dairy development in Durame. In fact, this part of the objective may infuriate the officials and therefore must be reformulated. Likewise, it is proper to state, "establishing a revolving cow scheme" as a separate objective. Therefore we suggest that objective 1 be broken into two and stated as follows:

- to promote intensive dairy production among small farmers through improved zero grazing practices and good management
- to establish a dairy cow (in-calf heifer) revolving scheme through provision of loans which must be paid according to pre-set terms

Similarly, objective 2 requires reconsideration. It is obvious that the whole project concept was based on IAR/ILRI research findings regarding the feasibility of crossbred cows for

draught and dairy production (see Annex 1). The team is not very certain how conclusive the study is as regards the adoption behavior of the farmers in Holleta. An anthropological study made by ILRI suggests the willingness of farmers to use cows as draught animals, but not with strong commitments (9, 10). It is likely that the farmers are more keen about the potential for increased milk production and the value of the calves than the benefit from cow traction. Hence, the team recommends that an intermediary step be taken to investigate the response of farmers in Durame before a full fledged push towards cow traction is made. In other words, higher priority should be given to improved dairy production than to cow traction. A subsidiary objective may be included to investigate the feasibility of introducing cow traction in Durame. Objectives 3 and 4 are all right as they are.

### **3. The Expected Outputs/Results**

The outputs are well defined in a verifiable manner and can lead to the achievement of the immediate objectives of the project with the proviso that the expectation from cow traction is deferred. Given the level of poverty of the target population it may sound easy to influence the use of cows for traction. This may prove incorrect. It is better to be realistic at this stage and move cautiously towards cow traction. The justification for improved dairy production is strong enough. Thus, at least during the first two years, the concentration of the project should be on improving milk production which is feasible within the resources available, including the experience and enthusiasm of the farmers.

### **4. The Activities**

The main activities involved in the implementation of the project may be itemized as follows:

1. Training of 30 groups (180 farmers)
2. Extension Service
3. Selection of beneficiaries
4. Introduction of technical and management package
5. Loan disbursement
6. Loan repayment
7. Establishment and operation of a demonstration farm
8. Bull servicing
9. Project administration
10. Project monitoring and Evaluation

The proposal offers a fairly good description and analysis for most of the above activities. Nevertheless, activities that need further elaboration are training and extension. The topics identified for training are indeed relevant except that they have to be made more specific eventually. What the proposal fails to show is the organization of the training activities and which institutions and under what conditions would be involved. These consultations/discussions should have been made with such institutions at the time of project formulation. The team had raised the training issue with Awassa College of Agriculture (ACA) and ILRI. Both institutions have expressed interest to participate. But

formal arrangements should be made well ahead of time. This is also true in the case of the local institutions in Durame.

The other issue we would like to raise concerns the provision of extension and veterinary services. Both the zonal and wereda agricultural officers have bitterly complained about the failure of ADRA-Ethiopia to consult them about the project and the extent of their expected involvement. This is a genuine complaint. Generally, they seemed to like the project but warned that such neglect should not be repeated. Hence, ADRA-Ethiopia should take immediate steps to correct the situation. The exact capacity available in the area, and the cost at which it may be mobilized, is uncertain. The general impression is that the zone and the wereda are well staffed with extension workers, veterinarians, animal health assistants, etc. However, these may not be easily available to the project without prior planning. The contribution of the project staff must also be specified in the same manner.

As noted previously, the team would like to suggest that on-farm research activity be included not only to verify the findings of ILRI concerning cow traction, but also to run trials on improved forage crops and multipurpose trees.

## **5. The Inputs**

### Terminology

In the project document, the cows proposed to be used in the project are described as “hardy 75 : 25 (F2) crosses between Holstein-Friesian European breeds and local Zebu .” The 75 : 25 ratio is presumably the proportion of European (Holstein-Friesian) and Zebu inheritance, respectively. Strictly these crosses are not F2, a term which in the technical literature is used to denote offspring from mating between males and females of the first crossbred generation (F1). The animals referred to here should be termed backcrosses (or first backcrosses) to the European breed, as they (presumably) are produced by mating females from the first cross (Zebu females x Friesian male) back to another Friesian male.

Similarly the bull at the ADRA demonstration farm, denoted F3, is probably a second back-cross, carrying 7/8 (or 87.5%) European inheritance. Calves from mating between this bull and Zebu females would not be F3 calves, but closer to F1, as their sire is nearly a pure exotic. These calves would carry about 44% exotic inheritance. as compared to 50% in F1.

Holstein-Friesian is the term used for the American strain of the Friesian breed and should be used only for cattle of American origin. Even when this is the case, the first part (Holstein) should be left out, unless it is of importance to specify the origin.

### Proportion of exotic inheritance.

The description of cattle with 75% exotic inheritance as “hardy” might be challenged. In general the hardiness and the ability of the animals to cope with unfavorable conditions decrease rapidly as the proportion of exotic inheritance increases. There are many examples demonstrating that pure exotics and high grades suffer seriously from tropical

diseases and have high mortality rates in the tropics. In the Ethio-Swedish Integrated Rural Development Project (Livestock Farm, Assella) the average calving intervals increased from 437 to 621 days when the proportion of exotic (Friesian) inheritance increased from 1/2 to 7/8, and the calf mortality was nearly four times larger in the latter than in the former group. Present evidence suggests that 75% exotic inheritance should be the upper limit except under extremely favorable conditions. It should also be noticed that the research on cow traction carried out at ILCA and the present ILRI has been with half-bred cows (F1, 50% exotic inheritance).

The crossbred cows used in the project shall be distributed as in-calf heifers. They have presumably been mated with a pure exotic (or high grade) bull, and the resulting calves will have in the range of 80 to 90% exotic inheritance. The bull calves would be valuable for crossbreeding purposes, as their offspring with local females would be close to F1, and presumably very suitable for dairy/draught purposes. Acquisition of the most promising of these bull calves should be considered. When they reach breeding age, they could be made available for mating with the cows of farmers who have not received cows through the project.

#### Predicted performance.

In Annex 1 to the project proposal average milk yield per cow has been predicted at 3,050 kg in a 305 day lactation (taking into account the calving period). The meaning of the period in parenthesis is not clear, but the estimate of 3,050 kg per lactation seems very high and might not be realistic. In the Ethio-Swedish integrated Rural Development Project average lactation yields at the Livestock Farm, Assella, ranged from 2,032 kg for F1 to 2,714 kg for second backcrosses (7/8 exotic inheritance). Annual yields were about 1,700 kg for all genetic groups (3).

In Annex 2 of the proposal, the annual milk yield has been set to 2,000 kg. This corresponds to a lactation yield of 2,500 kg with a calving interval of 15 months, and should be considered quite satisfactory.

In studies conducted by ILRI, Holetta the average yield of an F<sub>1</sub> crossbred dairy/draught purpose cow was 1800 litres of milk over a lactation period of 270-300 days. The average for a non-traction (not working) cow was 2200 litres/lactation. 2% calf mortality and <5% abortions were recorded. As long as feeding was adequate, no reproductive problems were observed.

In the project proposal the cash flow analysis for one dairy cow was calculated, based on the sale of the entire milk produced (2000 litres/cow/year) to generate income. However, the assumption should be that at least 25% of the milk produced will be used for on-farm consumption in view of the large family size of the participating households.

#### Milk for calf feeding and home consumption.

There is some inconsistency in the estimates of the amount of milk used to feed the calf. In the budget it has been assumed that 400 liters of milk/annum are required for calf

feeding and home consumption. According to Annex 1 the calves require a liter of milk per day up to two months,, i.e. 60 liters altogether. This amount is not sufficient for adequate rearing of a crossbred calf. The 840 liters supposed to be required for calf rearing in the project proposal (p.11), appears, however, to be unnecessarily generous. With 4 liters per day for three months the amount will be about 360 kg.

The assumption that the entire milk produced could be sold and pay off the credit after deducting the milk requirements of only the calf is not viable. Since dairy products are highly nutritious and are the preferred foods of the farmers at least 25% of the milk produced should be left for household use.

#### Calf rearing.

It appears to be implicit in the project proposal that the calf rearing method envisaged is bucket feeding. In the tropics the experience with this method has often been disappointing. The traditional method of calf rearing in most tropical countries, and probably also in the project area, is partial sucking, i.e. the calf is allowed to suck part of their dam's milk. Most zebu cows and a large fraction of the crosses do not let down milk unless first stimulated by the sucking of the calf. Several studies have indicated that the volume of milk available for human consumption is not reduced by allowing the calf to initiate milk let-down by sucking and/or to suck residual milk.

#### Credit System

The credit system proposed in the project is the basic minimum required to cover the initial investment in livestock, establishment of fodder crops, basic infrastructure and other related facilities.

## MAIN FINDINGS AND CONCLUSIONS

### **1. Farming System and Location**

The targeted farmers are located in the higher altitude of Durame, Kedida Gamela district, Kambatta Zone, and practice intensive mixed crop/livestock farming. The major crops are maize, teff, wheat, beans, chickpeas, vegetables, coffee, ensete, and bananas. These are grown both as cash crops and for home consumption. Most farmers participate in a bio-intensive gardening project and have already built small dams for irrigation.

The team visited the project area together with the project director. We interviewed a number of farmers who were potential beneficiaries, and had the opportunity to look at their farms and facilities. The size of their farmland ranged from 0.5 to 2.5 ha, and was mostly used for vegetables and other food crops, but some of them were already in the process of growing forage. Most of the farmers, if not all, kept a few heads of indigenous cattle. All farms had small basins for collection of run-off water, which was used for irrigation and as drinking water for animals during the dry season. The farmers appeared enthusiastic and motivated, and were keen to get started. Our impression was that dairy production would be the first priority, and that traction power would be only second or

third priority. If the market for liquid milk should fail, the farmers were prepared to go into manufacturing of butter and cheese.

During the visit to the project area, we were also shown the site for the demonstration farm mentioned in the project proposal. The work with establishing the farm had not yet started, and the land looked more or less like a bush. One of the purposes of the demonstration farm is to keep a high grade Friesian bull for breeding of indigenous cows in the area. The same bull will probably be used for the females found in communities in and around the project area (unless AI is feasible).

The plan to utilize the same animals for traction power and milk production seems sound and is supported by both on-station and on-farm research. The type of animals used in this research (first crosses between indigenous zebu and exotic European type cattle, F1), appears, however, not easily obtained for the present project. Nor are animals of the cross referred to in the project proposal available (75% exotic and 25% indigenous inheritance). The animals which might be available are high grade (almost pure) Friesians. This breed is considered rather delicate and sensitive to the many kinds of stress prevailing in tropical countries. On the other hand it is the breed which produces the largest volume of milk when provided with good feeding and management.

Leguminous fodder crops (vetch, lablab etc.) and fodder trees such as leucaena and sesbania are planted to supplement the crop by-product-based cattle feeding system. Due to shortages in grazing areas, the farmers already practice zero grazing in feeding stalls built within the residential houses. At the time of the farm visits, the ground work for project implementation was completed. This includes the selection of the participating farmers, measurement of each farmer's crop and fodder area, and construction of small dams. The latter will be used for the dairy/draught cow as well as for vegetable gardening.

In the mixed farming community that has been identified for the project, farmers own an average of 1.2 ha of land (0.25-2.00 ha range). The community is located in the high-altitude region of the district. The 11 farmers will constitute the first group of project farmers and represent a total of 180 families (30 sub-groups of 6 families each) which can potentially benefit from the project, either through introduction of crossbred cows or by upgrading of their indigenous cows through artificial insemination or bull service. The major assumption is that the loan for purchasing the cows will be repaid back to ADRA-Ethiopia through the sale of calves and surplus milk.

## **2. Research on cow traction.**

In Debre Zeit (an ILRI station) Dr. Azage Tegegne briefed us on the research with dairy cows used as traction power in agriculture. We also had the opportunity to read a paper on cow traction in the ILRI Annual Report for 1995. In an on-farm test F1 cows used for work (36 days per year) produced on average 2620 kg of milk per lactation, as compared with 2980 kg for non-working cows. The average length of calving intervals was 525 and 495 days, respectively. For cows used for work, this corresponds to 1826 kg of milk per

annum. The results suggest that milk yield is reduced and calving interval prolonged when cows are used for work, but the effect is in no way dramatic.

### **3. Introduction of dairy/draught purpose cows**

In order to provide the technology needed to increase milk production and traction, the introduction of crossbred heifers (75% Friesian and in-calf to a Friesian bull) was proposed. Each of the initial 11 farmers, selected through the criteria outlined in the project document, would receive one animal. Another 5 in-calf heifers will be assembled at the ADRA farm for demonstration purposes. The ADRA farm will also keep a crossbred bull for servicing the demonstration crossbred cows and the farmers' crossbred and indigeneous cows.

The inputs necessary for the project are shown and analyzed in the PD. However, there are problems. According to the project proposal crossbred heifers (75% exotic inheritance) should be acquired from the Children's Amba Dairy Farm. We visited this farm and had the opportunity to see the dairy herd. The dairy manager explained that the cattle originated from a herd which has been in Ethiopia for several generations.

The animals had few, if any, visible zebu traces, and can for all practical purposes be considered almost pure Friesians. The performance of the herd in terms of milk yield was acceptable, and no particular disease or fertility problems were reported. The manager told us that they were reluctant to sell heifers, as they were in the process of renewing their own herd by replacing the old cows, but did not exclude sale of a limited number of pregnant heifers.

The other potential suppliers, Abernossa and Gobe cattle breeding ranches, are out of stock and will not be able to sell for another two or more years. Reportedly, they had been seriously looted of their stock and over 30 years of records during the transitional period. The ranches are now in the process of rehabilitation, and whatever they might be producing this year is committed to the Oromia Regional State.

The situation would have been saved if a proper assessment was made during the preparation of the project. There would have been possibilities at IAR and ILRI. Both institutions sold a number of heifers a few months ago. They could have been requested to save the required number for the project. Furthermore, the Government has banned the importation of crossbred animals because of diseases and the prospect of importing from Kenya is not there. ILRI has indicated that they had growing animals which could be bred for the purposes of the Project.

Therefore, the source and availability of the crossbred in-calf heifers for farmer distribution as well as demonstration purposes are evidently the major constraints in project implementation. During the discussions with ILRI, Debrezeit, staff it was indicated that the use of F1 crossbred cows for milk and traction slightly affects fertility and calving interval but had no effect on milk production. It was also recommended that dairy/draught cows be bred three months before the ploughing period.

A related issue is the availability of the 0.5 ha of land for planting and maintenance of fodder crops, indicated in the project document. The average size of holding of the first batch of applicants is 1.2 ha, as shown in Annex 2 of this report, and even for these farmers it will be difficult to set aside the proposed area for fodder crops. More worryingly, the average land holding in Kambatta is only 0.38 ha (unlike what was reported in the PD), and thus smaller than the proposed area for fodder crops. In a wider and more long-term perspective, an increase in the target population may therefore be incompatible with project objectives concerning fodder production.

As noted previously, the Team is not very certain as to the extent of the inputs (training, extension, veterinary service, etc.) from cooperating institutions. From the discussions the Team had with the concerned authorities, it looks promising. ADRA-Ethiopia should make formal requests and conclude contractual agreements with the respective institutions.

#### **4. Feeding System**

In spite of small land sizes the potential for producing leguminous fodder crops and trees and use of farm by-products to feed the introduced cows is evident. Farmers have already intensified the land use system by planting fodder crops in addition to leguminous trees such as Leucaena. Nearly all farmers feed farm by-products supplemented with purpose-grown fodder crops on a cut and carry basis in basic feeding and structures located within the main family building.

Therefore, zero grazing has already been practised due to the limited land size owned by each farmer as well as absence of communal land for grazing. Some fodder crops established in the visited farms include Vetch, Napier Grass, Siratro, Lablab, and Leucaena trees. Crop residues are widely available from the predominant crops such as maize, sorghum, teff, wheat, beans, chick pea, sugarcane, ensete and banana. The district's agricultural office based in Durame provides seeds, fertilizer and animal health services on credit basis. Each participating farmer has also established small dams for year-round household, animal and irrigation purposes. Therefore, it is evident that based on the planted leguminous crops and trees and the crop by-products widely available for feeding the proposed crossbred dairy/draught purpose cows, the zero grazing option is valid and sustainable from the technical, economic and environmental point of view. Furthermore, the development of dairy production in these smallholder mixed production systems is a logical step in the intensification of agricultural activities on an integrated and sustainable basis. For example, in Kenya 80% of milk produced is from smallholder dairies under a zero grazing system.

Experimental results at ILRI, Debrezeit (800 mm rainfall) have shown that maize intercropped with lablab legume fodder was compatible with the cropping system with only 8% reduction in grain yield. The mixed stover dry matter yield of intercropped maize and lablab was 14-20 tons/ha compared to 7-10 tons/ha maize stover and 12 tons/ha lablab when maize and lablab were planted as single crops. Similar work with sorghum/lablab, wheat/clover and oats/vetch intercropping demonstrated that results were very good and could be introduced to the Durame area.

## **5. Animal Health and Sanitation**

The Kedida and Gamela district, which is located in the higher altitudes, is a tsetse fly and tick-borne disease-free zone. Therefore, the introduced cows may not be susceptible to vector borne diseases such as trypanosomiasis, east coast fever, and heartwater. However, routine vaccinations for the most common diseases such as anthrax, pasturella, calf paratyphoid, contagious abortion and others that may exist in the area should be administered prior to the introduction of the cows.

Tick infestation could be controlled by using a knapsack sprayer and chemicals (acaricide) which can be shared among a group of participating farmers. Parasite control and deworming method should be based on the recommendations of the District Veterinary Department with dosing twice a year at the start and end of the rainy season. If routine vaccinations are administered and sanitary conditions maintained, the mortality rate of animals in the project area should be as low as the assumptions in the project.

However, some form of cow insurance should be arranged to protect farmers in case of mortality. The farmers have already recognized the need to establish community based insurance schemes.

## **6. Dairy farm structures**

Each participating farmer has built basic animal feeding and watering stalls, legume/grass hay storage facilities and calf pens within the existing residential house. As the project develops, new structures consisting of a milking shed, calf pen, feed storage racks, and feeding and watering troughs could be introduced in stages, outside the residential premises.

## **7. Extension and Training**

Dairying is labour-intensive. However, the demand can be met by efficient use of family members (average of 10 per household in the project area). Institutional support in the dissemination of the technical packages for production, processing and marketing is required at the beginning and throughout the project period.

The reviewers discussed issues concerning research, extension and training services with staff of ADRA-Ethiopia, ILRI-Debrezeit, IAR-Holetta, Awassa College of Agriculture-Awassa, the Southern Peoples Zonal Agriculture Office-Awassa, the Kedida Gamela District and the Kambatta zone agricultural extension office. They all agreed that extension support services and training should be an integral part of the project. There was commitment from all parties to collaborate in providing the technical, management and support services required for the success of the dairy industry. It was recommended that extension education should also address human health and sanitation standards.

## **Factors ensuring implementation and sustainability**

Sustainability has become a central issue in any development effort. Factors outside the control of the project which help to influence development should be adequately analyzed. Such analysis has not been made in the project document. There are six factors which are of particular importance to the implementation and sustainability of a project. These are 1) policy measures and priorities of the Government at all levels, 2) Environment, 3) Socio-cultural factors, 4) Institutional factors, 5) Economic and financial factors, and, 6) Technological factors (7, 8). The information given in the document on these developmental factors, especially on the institutional aspects, are rather sketchy. Following is our assessment of the situation concerning these issues based on our observation, discussion and review of available documents.

### **1. Policy support measures**

The national policy goal is to improve household food security through increasing the income of the smallholder. Discussions with regional zonal and district agricultural extension officers during the review demonstrated that the national macroeconomic and sectoral policies are conducive to dairy development. The current regional development programme also encourages smallholder dairy production.

There exists institutional support services which can provide inputs such as seeds, fertilizers, veterinary inputs and artificial breeding. Furthermore, the existence of these institutions will enhance processing, marketing and infrastructure which are essential for sustaining the dairy industry.

From the discussions the Team had with authorities at regional, zonal and wereda levels, we concluded that there is very good political support for the project. The project area is famine-prone, particularly due to population pressure and land degradation. The project activities represent some of the few development options that can contribute to food security. They are in line with the current regional plan and priorities. Still, the project staff need to project a good public-relations image to offset the prevailing misunderstanding and reservations held by the zonal and wereda officers. Development workers need to demonstrate deference to such authorities, without which little success can be expected. There is a lot left to be desired from ADRA-Ethiopia in this respect.

### **2. Environmental concerns**

The project will contribute directly and indirectly to the enhancement of the environment. Experiences under similar conditions in Kenya and India have demonstrated that smallholder dairy production with relatively low capital requirements and depending on family labour represents a more sustainable form of dairy development. In this approach, the use of the multipurpose cow (traction, milk and meat) in a smallholder mixed-crop livestock production system is viable. There is complementarity between crop and livestock production. The leguminous fodder crops and trees will improve soil fertility through nitrogen fixation and the cow manure can be composted for use in the bio-intensive-gardening scheme which has already

been established in the project area. Furthermore, the nucleus for a dairy/vegetable producer and marketing cooperative has been initiated through farmer groups that have already been formed in the area. This point is made clear in the application to NORAD (item 3.4, p.5) but not in the project proposal. Existing practices of farmers and socio-cultural orientation are also supportive of the wise use and management of natural resources.

### **3. Socio-cultural and gender issues**

Zero grazing is not a new concept to the farmers in Kembata. They have been practicing it for years out of necessity. Dairy products are part of the local diet and highly regarded culturally and therefore the Team expects no insurmountable cultural obstacles in this respect. The main uncertainty concerns the use of cows for traction.

Dairy production is essentially the work of women in Kembata. The project is bound to benefit them. The introduction of improved forage crops and the availability of a water reservoir would tend to reduce womens' burden, and make their efforts more productive.

### **4. Institutional setup and participation**

#### **4.1. ADRA-Ethiopia**

The main responsibility for project implementation rests on ADRA Ethiopia at the headquarters level. The structure and organization of work at this level look adequate. This can be discerned from Annex 5. At the project level, the technical capacity of the field staff may be satisfactory but the Team is not certain about the coordination of project activities with those of local institutions. The Field Manager is a graduate from Awassa College of Agriculture with a 12+2 diploma. He has acquired experience in animal husbandry, especially dairy production. Although he is based in Awassa he has not made any contact with the college in connection with the Project. The field worker in Duramme is a 12+2 holder from Jimma Agricultural College. Between the two there is adequate technical capacity to provide extension-type technical services to the participating farmers. But they need professional support from cooperating scientific institutions. The Headquarters staff should also monitor closely the activities of the field staff.

#### **4.2. The Regional, Zonal and Wereda Agricultural Offices**

The Team had visited the Bureau of Agriculture in Awassa and had discussions with the Animal Production Extension Officer and the Forage Production Officer. Both were very knowledgeable about the livestock situation and shared their experiences with the Team. They emphasized the importance of bull servicing without undermining the usefulness of AI. They supported the dairy development idea for Durame and assured the Team that it would have significant effects in many ways. Nevertheless, they were not quite certain about the adoption of cow traction in the Kambata area or elsewhere in the region. As far as milk production is concerned, there is assurance that there would be no problem and that the demand for milk and milk products is very high in the Durame area.

The visit to the zonal and wereda offices in Durame was not as pleasant as that in Awassa. First the Team met the Zonal Agricultural Officer and the Zonal Animal Production Officer. Initially, both were indignant about our visit because prior appointment was not

made and because of their frustration with ADRA-Ethiopia for failing to inform them about the project. They stated that ADRA had been knowingly or unknowingly ignoring the agricultural office which in their view was a violation of normal procedures. After a few exchanges of words with the ADRA staff, perhaps out of courtesy to the Team, they changed the tone of the discussion and expressed their willingness to cooperate so long as it served the interests of the poor farmers in Durame. They briefed the Team on the general situation of farmers in Kambata and endorsed the project objectives.

The blame for ADRA's handling of the project sharpened when the Team met the Kedida Gamela Wereda Agricultural Officer. But the officer became more thoughtful and told the ADRA staff that his office was always prepared to cooperate. His comments were understandable. The Officer also shared with the Team his success with dairying. His case is presented as Annex 5 to illustrate the practicality of dairy farming in Durame. From this visit the Team learnt that, (a) AI was established in the Wereda some four years ago, (b) there is a relatively strong veterinary service with two vet doctors, two animal health assistants, two technicians and an unspecified number of vaccinators, and (c) extension service for general agriculture. This gave the Team the impression that the available institutional and technical infrastructure is adequate to meet the development needs of the 4-D Project if only proper collaboration mechanisms can be forged between the wereda and the project.

#### 4.3. Awassa College of Agriculture

Awassa College of Agriculture (ACA) is very well known to AUN/Noragric as well as NORAD. It just celebrated its 20th Anniversary. Through NUFU and NORAD significant Norwegian assistance has been provided for capacity building and to support long term collaboration between the College and AUN/Noragric. This collaboration has been going on for nearly 10 years with encouraging results and is expected to continue. It was surprising to the Team that no mention was made in the PD about the possible collaboration between ACA and the Project.

A department of the college that can obviously provide support to the Project is the Department of Animal Production and Range Management. This department is well staffed and equipped to provide essential services and guidance. The teaching areas include range management, animal nutrition, animal health and disease control, animal breeding and dairy production and management among others. Furthermore, the Department offers short-term training courses (1 week to 2 months) in small-scale milk production and processing, small-scale poultry production and management, and animal feed production, conservation and utilization.

The College is also known for its research activities. The following are examples of ongoing research projects of interest to the 4-D Project:

1. Dairy development and assessment of technologies in the mixed farming Arsi highland
2. Studies of the microbial population of raw milk produced around Awassa
3. Constraints of dairy production and handling in Southern Ethiopia
4. Studies in Bovine Mastitis of cattle in Sidamo Region

5. Survey of intestinal parasites of cattle in Sidamo Region
6. Selection of fast growing multi purpose tree species and management technologies for the different ecological zones of Southern Ethiopia (2).

Some of these studies are supported by NUFU and some by the Ethiopian Government. The fact of the matter is that the college has already valuable information that can be used in the implementation of the project and for the long term sustainability of dairy farming in Durame. In a discussion the Team had in the college, it is confirmed that there is interest on the part of the college to collaborate with the 4-D Project. This is a very important commitment that the project has to embrace if success in achieving the objectives is to be ensured.

#### 4.4. The International Livestock Research Institute (ILRI)

ILRI is a recent creation (1994) by the Technical Advisory Committee (TAC) of the Consultative Group on International Agricultural Research (CGIAR). The institute was established by bringing together the programs of the former International Livestock Center (ILCA, in Addis Ababa Ethiopia), and the International Laboratory for Research on Animal Diseases (ILRAD, in Nairobi, Kenya). In other words ILRI is founded on two decades of experiences derived by these two research institutions (6).

Today, ILRI has assumed a global mandate to improve: (a) animal performance through technological research and conservation of animal genetic diversity in developing regions, (b) the sustainable productivity of major livestock and crop-livestock systems, (c) the technical and economic performance of the livestock sector, and, (d) the development, transfer and utilization of research-based technology by national programs and their client farmers.

As described in the PD, the scientific and technical basis of the 4-D Project is the findings from the on-station and on-farm trials made jointly by the Ethiopian Institute of Agriculture (IAR) and ILRI in Holleta some 60 km west of Addis Ababa. The collaborative work of these two institutions has reportedly demonstrated the technical feasibility of using crossbred cows for milk production and draught power assuming adequate feed resources and proper management. The researchers expect even better performance in Durame where the farming system is intensive with mixed crops and the motivation of the farmers is very high for the reasons mentioned previously. They are very keen to test the various aspects of the technology, including feed resources, in Durame, in collaboration with Awassa College of Agriculture if funds could be made available.

The Team has also discussed the possibility of acquiring crossbred heifers from ILRI. The authorities of ILRI at the Debre Zeit Station have indicated that there might be an adequate number of growing animals that could be bred for the purposes of the Project. This has to be negotiated by ADRA-Ethiopia in due course if this option is considered.

#### 4.5. Christian Relief and Development Association (CRDA)

CRDA is a national non-profit organization of churches and voluntary agencies engaged in relief, rehabilitation and development in Ethiopia. It was founded in 1973 in response to the famine that occurred in Northern Ethiopia (mainly in Wollo) at the time. In 1994, CRDA had 95 members and associate members. ADRA-Ethiopia is a member.

The aim of the Association is to help members work together and to share resources so that their work can be more effective and sustainable. CRDA supplements members' resources with financial and material assistance secured from donors and provide vital services such as training, information and transport. The present contribution to the 4-D Project was from Dan Church Aid Development Fund. Grants are available to members up to a maximum of Birr 200,000 (4).

CRDA monitors the implementation of projects it supports. There are guidelines for reports, accounting systems and controls. Accountability is a key principle behind CRDA funding. Monitoring is the responsibility of project officers under the Program Department.

To sum up this section, the Team is of the opinion that the institutions that are described above can make a significant contribution to ensure that project objectives are met.

#### 5. Economic and financial viability

The Team believes that there is no problem of marketing of milk and dairy products in the Durame area. Improved dairy processing techniques can be introduced with the assistance of ACA to avoid wastage and/or reduced prices, especially when production exceeds the demand for milk. Moreover, when the time comes, marketing cooperatives can be formed out of the target groups to extend the market to cover cities like Shashemene and Awassa.

The financial analysis reflected in the PD (pp. 15-16) is sensible except perhaps for some needed corrections as regards the technical assumptions, e.g. limited land for forage production, milk yield etc. The Team has observed that some farmers cannot allocate 0.5 ha. of land for forage production. Similarly, the projected annual milk production is also on the high side, especially during the initial years. In any case, the project can still be profitable to the participating farmers.

The Team was especially concerned about mortality of cows, which can destroy the affected families. This was discussed at all levels, especially with farmers. It was found that farmers were not interested in institutional insurance mechanisms. Instead they preferred dependence on existing traditional associations to protect farmers from total loss in the event of death of cows. This is true in other parts of the country as well (5).

From all indications, the repayment scheme described in the PD seems workable. Farmers have several sources of cash income (coffee, enset etc.) to pay the loans, and group pressure would be heavy to minimise the number of defaulters under normal circumstances.

## 6. Technological appropriateness

The proposed technology is appropriate for improvement in dairy production. The productivity of local cows is very low. The yields from the crossbred and high grade cows can be much higher. On the other hand, the Team is uncertain as to the commitment of farmers to use cows as draught animals. Interviews with farmers have shown willingness, but the Team's impression is that it would take some demonstration and training of both cows and farmers to make the idea work. The technology also needs some testing under Durame conditions.

Therefore the immediate objective of the Project should be to improve dairy production. The social and economic conditions are in place to realize this objective. Cow traction can be introduced later during the project period. In the meantime, the need for traction can be met, even under measures to reduce the rearing of male calves. The land holdings are so small that they don't warrant the keeping of oxen by individual farmers. Furthermore, hoe cultivation is part of the farming system. This can be emphasized while the introduction of cow traction is in progress.

## RECOMMENDATIONS

### **The objectives of the project**

It is recommended that the immediate objectives be restated as follows:

1. To promote intensive dairy production among small farmers in Durame through improved zero grazing practices and good management.
2. To establish a dairy cow revolving fund through provision of in-calf dairy heifers on a loan basis, which must be paid according to pre-set terms and conditions.
3. To establish a small dairy farm under ADRA as a demonstration and training center to disseminate information on various aspects of intensive small-scale dairy farming.
4. To provide bull servicing in order to improve the dairy potential of indigenous cows for interested farmers in the neighbouring communities.
5. To conduct on-farm testing of dairy/draught in smallholder farming conditions and verify a number of technologies generated from ILRI's research, such as introduction of multipurpose trees and integration of forage production into the farming system. Awassa College of Agriculture and ILRI are interested in collaborating with the project in areas such as training, research, and related activities. We recommend that additional fund be sought to facilitate the collaboration so that project activities are complemented with professional and scientific investigations and services.

### **Baseline survey**

A socio-economic survey to document the natural resource base of the participating farmers and their attitudes to introduction of dairy/draught cows to the existing farming system should be undertaken prior to introducing the technical package. The survey could also assist in highlighting some of the constraints likely to influence the success of the project and the socio-cultural issues that might impede the use of cows for traction.

### **Farmer selection criteria**

The criteria used for selecting the farmers who will be eligible for the loan scheme is outlined in the project proposal. In addition to the already proposed criteria farmers should also be willing to harvest and store crop residues and other farm by-products, plant fodder trees as live fences to supplement the purposely grown grass and leguminous crop based diets. They could also use the by-products of vegetable gardening which they are already producing through the Bio-Intensive Gardening Project. In spite of the small land size (average 1.2 ha); the climate, agro-ecological zone and market conditions for fresh milk and milk products are conducive to dairy farm development. Furthermore, the development of milk production for sale creates a more stable source of income and cash, compared to other farm activities; crop production under the smallholder systems is used primarily for subsistence.

During the discussions with ILRI Debrezeit staff it was indicated that the use of F1 crossbred cows for milk and traction slightly affects fertility and calving interval, but had no effect on milk production. It was also recommended that dairy/draught cows be bred about three months before the plowing period.

In view of the above, and the willingness and preparedness of the farmers to participate in the project, it was recommended that on-farm artificial insemination service (which already exists in the district) be chosen as the method for enabling crossbreeding of Friesian bulls with indigenous cows (Arsi breed) or Boran cows purchased through the loan scheme. Alternatively, the indigenous cows should be bred to a high grade Friesian bull which can be maintained at the proposed ADRA-managed demonstration farm (or by one of the farmers on a contractual basis). To achieve these objectives, the farmers will be expected to record the incidence of first heat, so that the next cycle could be predicted and arrangements for AI or bull service could be made. Furthermore, these cows have to be prevented from having access to local bulls.

### **Processing and Marketing**

Milk collection and cooling centres could be established as soon as surplus milk production warrants it. In the interim, the informal milk marketing system could be the channel for the sale of milk as long as human health and sanitary standards are maintained through registration and inspection of the farms. Both farmers and extension agents confirmed that milk marketing problems do not exist in the project area. The processing and marketing of milk is an area which will require collaborative research and development. The technology for milk and by-product processing developed in the study could be replicated elsewhere. Staff of the Awassa College of Agriculture have shown interest in the study.

### **Options relating to the introduction of crossbred cows**

Considering the findings and conclusions of the review, the project should be implemented with the suggested modifications. The project has four options to consider which are not necessarily mutually exclusive. These options are:

1. Purchase of pregnant F1 heifers as proposed if available. This is the safest means of introducing dairy production into small holder farming systems. However it is a difficult task at this time when the demand for crossbred animals has gone up and the supply is not there to our knowledge unless some arrangements are made with private suppliers.
2. Purchase of young growing crossbred F1 heifers: There may be a possibility of purchasing young growing crossbred heifers from ILRI. These animals can be grown and bred within a period of six to eight months. This period of time will allow the project to undergo and execute other phases of the operation such as construction of shelters for animals, training and other related activities. However, there is a need for a contractual agreement with ILRI for the proposed provision.
3. Introduction of better performing indigenous cows: This should focus on the Boran cattle of Borana Zone in Southern Ethiopia. The cows are larger framed than the Arsi and the highland zebu, and can be used as a dam breed for crossbreeding with Friesian semen or serviced by a high grade Friesian bull, to produce F1 crossbred calves.
4. Purchase of high grade Friesian heifers from Childrens' Amba Farm. As per our recommendation, traction should be given a low priority. Therefore, this option is recommended, particularly because it gives the fastest start for improving milk production. Male calves could be sold out while still young, or could be grown and retained, especially the first calves born by the heifers distributed to farmers. This should occur after weaning, and at a price according to weight of the calf. About 8 to 9 litres of milk is required to produce 1 kg of live weight gain in the calf, and the value of this milk indicates what would be a reasonable price per kg live weight. Early weaning of calves, (say, 3 months) is recommended, in order to avoid unnecessary delay in conception. The value of the calf could be part of the repayment of the loan. The male calves could be useful for breeding to indigenous cows, while the females can be used for expansion of the project.

The experience with the first batch of heifers distributed to farmers should determine the subsequent breeding policy. If the high grade Friesians turn out to be too sensitive or otherwise not suitable for the purpose, then it might be necessary to acquire an indigenous bull in order to introduce more local inheritance. Only time can show if this is required.

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## Annex 1

### **Terms of reference for the Durame Dairy/Draught Development Project**

#### **1. Background**

In September 1996 ADRA-Norway in co-operation with ADRA-Ethiopia submitted a proposal to NORAD for SSE-funding of a three year project from 1997-1999. The project "Durame Dairy/Draught Development project" was approved by NORAD in Spring 1997. Noragric had as an advisor to NORAD given some comments (see comments in attachment 1) on the technical aspects of the project and it was agreed with ADRA-Norway that these comments should be discussed with the project staff at an initial stage of the project.

It is on this background that a review is suggested and that a team of experts will discuss the project's technical set-up and assist in giving competent advice to benefit the start-up of the activities.

#### **2. Objective of the Review**

The main purpose of the review is to assess the criterias for the chosen project design and assist in adjusting some of the technical aspects of the project activities so that Noragric's concerns regarding environmental, economic, institutional and technical sustainability are taken into concern in the project.

As such the main emphasis should be to review should be made of the implementation strategies and the capacity and competence of ADRA-Ethiopia and its partner, the Woreda Department of Livestock Development as well as the direct beneficiaries. Including strategies and plans for future operations and maintenance after project phase-out (three-years) to ensure sustainability of the activities.

A review and adjustment of some of the technical and economic assumptions made in the document should be undertaken.

### **3. Important issues to be covered in the review**

Noragric's main comments to the initial application have been summarised in English in the attached annex. According to these the main issues that should be covered are :

- \* Farming systems in the area and the potential adaptability of the new technologies of the project
- \* Cross-bred cows (F2) as traction animals with emphasis on technical and socio-cultural factors
- \* Forage/Pasture production and options for Zero-grazing in the project area
- \* The economic and technical assumptions for the production and profitability needs to be reassessed
- \* Veterinary Services/Bull servicing
- \* Extension and Training
- \* Credit system
- \* Participation and criteria for selection of participants
- \* Sustainability issues

### **4. Scope and Methods**

The review will largely depend on qualitative and secondary data. The team will use the following methods :

- \* Review of relevant documents and literature
- \* Field visits in the project area
- \* Discussions with ADRA field staff and beneficiaries
- \* The team would also consult :
  - ADRA/Norway; ADRA-Ethiopia
  - Bureau of Agriculture at Awassa and also the Zonal and Woreda Offices
  - Awassa College of Agriculture
  - CRDA (Christian Relief and Development Association)
  - International Livestock Research Centre (ILRI) and Institute of Agricultural Research (IAR) if feasible
  - Other relevant NGOs operating in the project area

## **5. Review team**

### **Aragay Waktola (mission leader)**

Responsible for the institutional set-up, credit system and organisation of project. Beneficiary participation, extension and training. Main responsible for sustainability issues

### **Berhane Kiflewahid (Animal husbandry)**

Responsible for the assessment of forage and pasture practices. Zero-grazing techniques and environmental impact Sustainability issues.

### **Ola Syrstad (Animal breeding)**

Responsible for the assessment of the bull-servicing and breed improvement programme. Sustainability issues.

## **6. Timetable and reporting**

The field visit will be calculated to be around 5 days excluding travel. Time for preparation and reporting will be 2 weeks for the mission leader, and one week for the two other mission members.

The field visit will take place in early August 1997, a debriefing meetings should be held with the project staff before departure..

A short report following the standard SSE-Programme Report format should be submitted to Noragric no later than mid-September 1997.

## **Noragric's comments on the application and project proposal to the "Durame Dairy/Draught Development Project"**

Noragric considers the project concept to be interesting but would like to point to some of the technical assumptions needs review and adjustments.

### Zero-grazing

Zero-grazing is the concept to be introduced to the project. A minimum requirement for participating in the project is that the household has 0.5 ha for zero-grazing purposes.

There should be a review of the natural resource base and the environmental impact this concept will have.

A review and assessment of which part of the population which will have enough land to participate should be made. Average household in Ethiopia is 1 ha and leaving half of this land for grazing seems to be unrealistic.

### Technical assumptions for the profitability of the activity.

There are some of the assumptions concerning feeding of cows and calves in appendix I that probably are not correct.

There is no need to give calves below two months grass in addition to milk. The feeding plan for 2.5 year old cow and feeding of cow with calf has probably been exchanged.

Milk production for improved cows has in the main document and annex I been set to 3000 l/year. This seems to be high and the amount mentioned in annex II, 2000 l/year seems to be more realistic.

The assumed mortality rates for calves seem to be too low.

An analysis of the feasibility of using other fodder resources in addition to zero-grazing should be undertaken.

A review should be made on the potential for using crop residues and forage harvesting from forested areas as an addition to the zero-grazing area, thereby making it possible for households with less land to participate.

In addition Noragric would like to propose that a professional co-operation with Awassa Agricultural College be attempted in the areas of :

- improved fodder techniques (crop residues)
- improved dairy-processing techniques for women in the project

## Annex 2

### Diary

#### 9 August Saturday

- 9:50 - Arrival of Team members (Berehane & Ola).
- 16:00 - Brain Storming Session relating to TOR, project proposal, programme for the Review.

10 August Sunday - Individual preparation; review of project documents.

#### 11 August Monday

- 9:00-10:00 - Meeting with Ato Gilgelu Sadu and The Financial Officer at ADRA/Ethiopia.
- 11:00-12:00 - Meeting with Ato Lulseged Asfaw, Programme Department, CRDA.
- 12:30-14:00 - Lunch.
- 14:00-15:00 - Travel to ILRI Research station at Debre Zeit.
- 15:00-17:00 - Discussion with Dr. Pascal Osuji and Dr. Azage Tegegne.
- spent the night in Debre Zeit.

#### 12 August Tuesday

- 7:00 - Departure to Awassa.
- 10:00-11:00 - Visited Abernossa Cattle Breeding Ranch Met with Ato.....
- 11:00-13:00 - Visited Children's Village Met with
- 13:00-14:00 - Lunch at Langano.
- 16:00-17:00 - Met with Samual Bekalo, Project Director, ADRA/Ethiopia.
- 19:00-20:00 - Met with Dr. Fekadu Beyene and Dr. Girma Abebe at Awassa College of Agriculture.

#### 13 August Wednesday

- 7:00 - Departure to Durame.
- 9:00-11:00 - Visited farms and discussed with beneficiaries.
- 13:00-14:00 - Lunch at Rift Valley.
- 14:00 - Ola left for Addis Ababa by a car kindly provided by Awassa College.
- 15:00-16:00 - Visited the Bureau of agriculture of Southern Peoples Regional State and met with



14 August Thursday

- 7:00 - Departure to Durame.
- 9:00-10:00 - Visited the Kambata, Alaba and Timbaro Zonal agricultural Office and met with Ato Heramo Sebro, the Head, and \_\_\_\_\_  
- Dessalegn \_\_\_\_\_ the ADRA/Ethiopia field worker was also present.
- 10:30-11:30 - Visited the Kedeḋa and Gamelo Woreda Agricultural Office and met with Ato Yohannes Lebango, the Head.
- 12:00-13:00 - Lunch at a restaurant in Durame.
- 15:00-16:00 - Visited the market in Alaba.
- 17:30 - Awassa Hotel.

15 August Friday

- 7:00 - Departure to Gobe Cattle Breeding ranch.
- 9:00-10:00 - Visited the ranch and met with
- 11:00 - Returned to Shashemene.
- 11:30 - Departure to Addis Ababa.
- 12:30-13:30 - Lunch at Langano.
- 16:00-17:00 - Meeting with Dr. Pascal Osuji and Dr. Azage Tegegne at ILRI Debre Zeit Station.
- 19:00 - Returned to Addis Ababa.

16 & 17 August Saturday and Sunday - Study of documents.

18 August Monday

- 10:00-11:30 - Visited the Oromia Bureau of Agriculture with Ato Gelgelu Sadu and met with.
- 12:00-13:30 - Lunch break.
- 14:00-15:00 - Met with Ato Lulseged Asfaw in the presence of Ato Gilgelu Sadu to brief him on the findings of the field visit and to discuss certain alternative possibilities.
- 15:00-17:00 - Work at Noragric Office.

19 August Tuesday

- 10:00-11:00 - Visited the Institute of Agriculture Head Office and met with Dr. Tadesse G. Medhin, the General Manager.
- 12:30-13:30 - Working lunch with Ato Tefera G. Meskel of Farm Africa.
- 14:00-15:00 - Met with Ato Gilgelu Sadu for debriefing.
- 16:00-17:00 - Met with Dr. Alemu Gebrewold of IAR and Dr. Azage Tgegne of ILRI in Noragric's Office.

20 August Wednesday - Dr. Berhane left for Asmara.



## Annex 2

### Potential beneficiaries and their respective land holdings

No.	Name	Residence	Land holding (ha)
1.	Dilamo Kelbore	Hambo PA	1.25 ha
2.	Ashebo Tirore	"	2
3.	Roba Genemo	"	2
4.	Tesfaye Tirore	"	1
5.	Yohannes Genemo	"	0.5
6.	Daniel Obola	"	1
7.	Yohannes Wanore	Abonsa PA	0.5
8.	Sinebo Degelo	"	1
9.	Hibiso Shimelo	"	1
10.	Taddesse Awano	"	1.5
11.	Shonde Gaga	"	1
12.	Mikias Mirkeno	"	0.25
13.	Lambebo Madebo	Jore	1
14.	Tesfaye Kabule	"	1.5
15.	Katiso Jofe	"	1.25
16.	Fromo Gadoro	"	3
17.	Yohannes Hirigu	"	1.75
18.	Teketel Helsebo	"	0.5
	<b>Average land holding</b>		<b>1.2ha</b>

### **Annex 3**

#### **Diary**

- 9 August Saturday  
9:50 - Arrival of Team members (Berehane & Ola).  
16:00 - Brain Storming Session relating to TOR, project proposal, programme for the Review.
- 10 August Sunday  
- Individual preparation; review of project documents.
- 11 August Monday  
9:00-10:00 - Meeting with Ato Gilgelu Sadu and ADRA/Ethiopia.  
The Financial Officer at 11:00-12:00 - Meeting with Ato Lulseged Asfaw, Programme Department, CRDA.  
12:30-14:00 - Lunch.  
14:00-15:00 - Travel to ILRI Research station at Debre Zeit.  
15:00-17:00 - Discussion with Dr. Pascal Osuji and Dr. Azage Tegegne.  
- spent the night in Debre Zeit.
- 12 August Tuesday  
7:00 - Departure to Awassa.  
10:00-11:00 - Visited Abernossa Cattle Breeding Ranch Met with Ato.....  
11:00-13:00 - Visited Children's Village Met with  
13:00-14:00 - Lunch at Langano.  
16:00-17:00 - Met with Samuel Bekalo, Project Director, ADRA/Ethiopia.  
19:00-20:00 - Met with Dr. Fekadu Beyene and Dr. Girma Abebe at Awassa College of Agriculture.
- 13 August Wednesday  
7:00 - Departure to Durame.  
9:00-11:00 - Visited farms and discussed with beneficiaries.  
13:00-14:00 - Lunch at Rift Valley.  
14:00 - Ola left for Addis Ababa by a car kindly provided by Awassa College.

16:00 - Visited the Bureau of agriculture of Regional State and met with briefing. IAR and

Thursday

7:00 - Departure to Durame.  
10:00 - Visited the Kambata, Alaba and Timbaro Zonal Office and met with Ato Heramo  
- Dessalegn \_\_\_\_\_ the ADRA/Ethiopia field worker present.  
11:30 - Visited the Kedebe and Gamelo Woreda Office and met with Ato Yohannes  
13:00 - Lunch at a restaurant in Durame.  
16:00 - Visited the market in Alaba.  
17:30 - Awassa Hotel.

Friday

7:00 - Departure to Gobe Cattle Breeding ranch.  
10:00 - Visited the ranch and met with  
11:00 - Returned to Shashemene.  
11:30 - Departure to Addis Ababa.  
13:30 - Lunch at Langano.  
17:00 - Meeting with Dr. Pascal Osuji and Dr. Debre Zeit Station.  
19:00 - Returned to Addis Ababa.

Just Saturday and Sunday - Study of documents.

Monday

11:30 - Visited the Oromia Bureau of Agriculture with Sadu and met with.  
13:30 - Lunch break.  
15:00 - Met with Ato Lulseged Asfaw in the Ato Gilgelu Sadu to brief him on the findings of discuss certain possibilities.  
17:00 - Work at Noragric Office.

Tuesday

11:00 - Visited the Institute of Agriculture Head with Dr. Tadesse G. Medhin, Manager.  
13:30 - Working lunch with Ato Tefera G. Meskel of

## **Annex 4**

### **List of persons and institutions contacted**

1. Adventist Development and Relief Agency, ADRA, Addis Ababa  
  
Ato Gelgelu Sadu  
Deputy Director, ADRA - Ethiopia  
  
Pastor Tinsae Tolesa  
Board Chairman and President, Ethiopia Adventist Mission,  
Ethiopia
2. Christian Relief and Development Agency, CRDA, Addis Ababa  
  
Ato Lulseged Assfaw  
Head, Programmes Department, CRDA - Ethiopia
3. International Livestock Research Institute, ILRI, Debrezeit  
  
Dr. Paschal O. Osuji  
Animal Nutritionist Co-ordinator, Utilization of feed Resources,  
ILRI, Debrezeit  
  
Dr. Azage Tegegne  
Animal Scientist, Utilization of Feed Resources and Production  
Systems ILRI, Debrezeit  
  
Mr. Dennis Mpairwe  
Fodder Agronomist, PHD Candidate, ILRI, Debrezeit
4. Abernossa Cattle breeding research station, Abernossa  
  
Ato Desta Debliso  
Deputy Manager, Abernossa cattle breeding station, Abernossa
5. Ethiopian's children Amba, near Lake Abiyata and Shala  
  
Ato Tewolde Hagos  
Deputy General Manager, Ethiopia's Children Amba  
  
Ato Mohammed Awel  
Dairy Manager, Ethiopia's Children Amba

6. Adventist Development and Relief Agency, ADRA Ethiopia, Shashemene

Ato Samuel Bekalo  
Field Manager, Durame Adventist Development and Relief Agency (ADRA- Ethiopia), Agricultural project

7. Awassa College of Agriculture, Awassa

Dr. Fekadu Beyene  
Vice Dean and Dairy Technologist, Awassa College of Agricultural, Awassa

Dr. Girma Abebe  
Dairy and Goat Production Scientist, Awassa College of Agriculture, Awassa

8. ADRA Dairy Project participating Farmers, Kedida and Gamela woreda, Duramme

Ato Tesfaye Tirore,	Mixed Farming farmer, Durame
Ato Roba Genama,	“ “ “ , Durame
Ato Zekarias Genamo,	“ “ “ , Durame
Ato Yohannes Genamo,	“ “ “ , Durame
Ato Dilamo Kelbesa,	“ “ “ , Durame

9. Awassa Southern Peoples Regional Bureau of Agriculture, Ministry of Agriculture in Awassa

Ato Assefa Amelde  
Animal Production Extension officer, Awassa

Ato Tigineh Alemu  
Forage Production Extensions officer, Awassa

Ato Laloto Sedore  
Fisheries Production extension officer, Awassa

10. Kambatta, Alaba and Tembaro zone Agricultural office, Duramme

Ato Hirano Sebro  
Kambatta, Alaba and Tembaro zonal Agricultural officer, Duramme  
Zone Agricultural office, Duramme

Ato Desta Gebreal

Zonal Animal Production officer, Durame

11. Kedida and Gamela Woreda, Agricultural office, Duramme

Ato Yohannes Lobango  
Wareda Animal production officer,

Ato Desalegne Desta,  
Field officer, ADRA-Ethiopia, Duramme

12. Gobe Cattle Breeding Research Station, Gobe

Ato Dedefo Adima  
Administrative & Information officer, Gobe

Ato Teni Waldeyohannes  
Animal Feeds Production officer, Gobe

13. Oromia Region Bureau of Agriculture, Addis Ababa

Ato Mekonnen Mengesha  
Team Leader, Cattle breeding programme, Addis Ababa

14. Institute of Agricultural Research, IAR, Addis Ababa

Dr. Tadesse Gebremedhin  
General Manager, IAR, Ethiopia

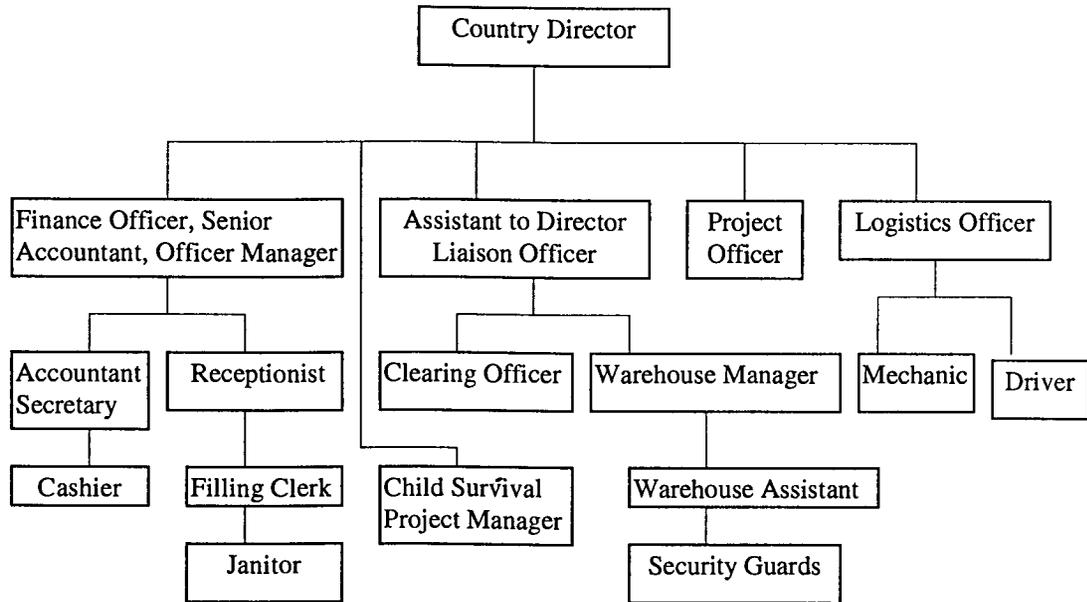
Dr. Alemu Gebrewold  
Team Leader, Animal Production Research, Kalitte

15. Farm Africa, Addis Ababa

Ato Teferra Gebremeskel  
Co-ordinator, Dairy Goat, Development Project

Annex 5

ADRA ETHIOPIA ORGANIZATIONAL CHART



# Ploughing with cows feasible in East African highlands

Research by ILRI and the Ethiopian Institute of Agricultural Research (IAR) has shown that crossbred cows can be successfully used for both traction and milk production in the East African highlands as long as they are adequately fed. Since 1993, scientists from ILRI and IAR and staff of the Ethiopian Ministry of Agriculture have been working with groups of farmers testing dairy-draft crossbred cows on farms in the Holetta area, about 60 km west of Addis Ababa. A survey of the attitudes of these farmers in 1995 is helping IAR and ILRI determine future courses of action.

The 1995 survey showed an emerging group of younger farmers with more formal education who were more likely to adopt the use of crossbred cows as dairy-draft animals than older farmers with little formal education. Although this is a small group, it offers the best prospects for sustainable adoption of dairy-draft crossbred cows.

All the farmers were keen to have crossbred cows, but most were primarily interested because crossbred cows produce 8–10 litres of milk a day whereas local cows produce less than two litres a day. Project farmers estimate that they make US\$ 320–400 net profit a year from their dairy enterprise, compared with only US\$ 20–25 a year for farmers who do not keep crossbred cows.

Moving beyond the project in Ethiopia, in September 1995 ILRI hosted an expert consultation on the transfer of technology for multi-purpose cows for milk, meat and traction in smallholder mixed farming systems. This meeting was organised in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and the Australian Centre for International Agricultural Research (ACIAR). Participants from Ethiopia, Kenya, Malawi, Mozambique, Tanzania and Uganda brought proposals for adaptive trials in their countries. Scientists from Australia, Bangladesh, China, India, Indonesia, the Philippines and Thailand shared their experiences with cow traction. The participants developed a funding request for a regional FAO/ILRI project to implement and study the transfer of the IAR/ILRI multi-purpose crossbred cow technologies to East African smallholders. Subject to funding, activities in each country will be carried out with assistance from FAO experts, with ILRI scientists acting as resource persons.

*Extensive on-station trials by the Ethiopian Institute of Agricultural Research and ILRI have demonstrated the technical feasibility of using crossbred cows as draft animals in the East African highlands.*

