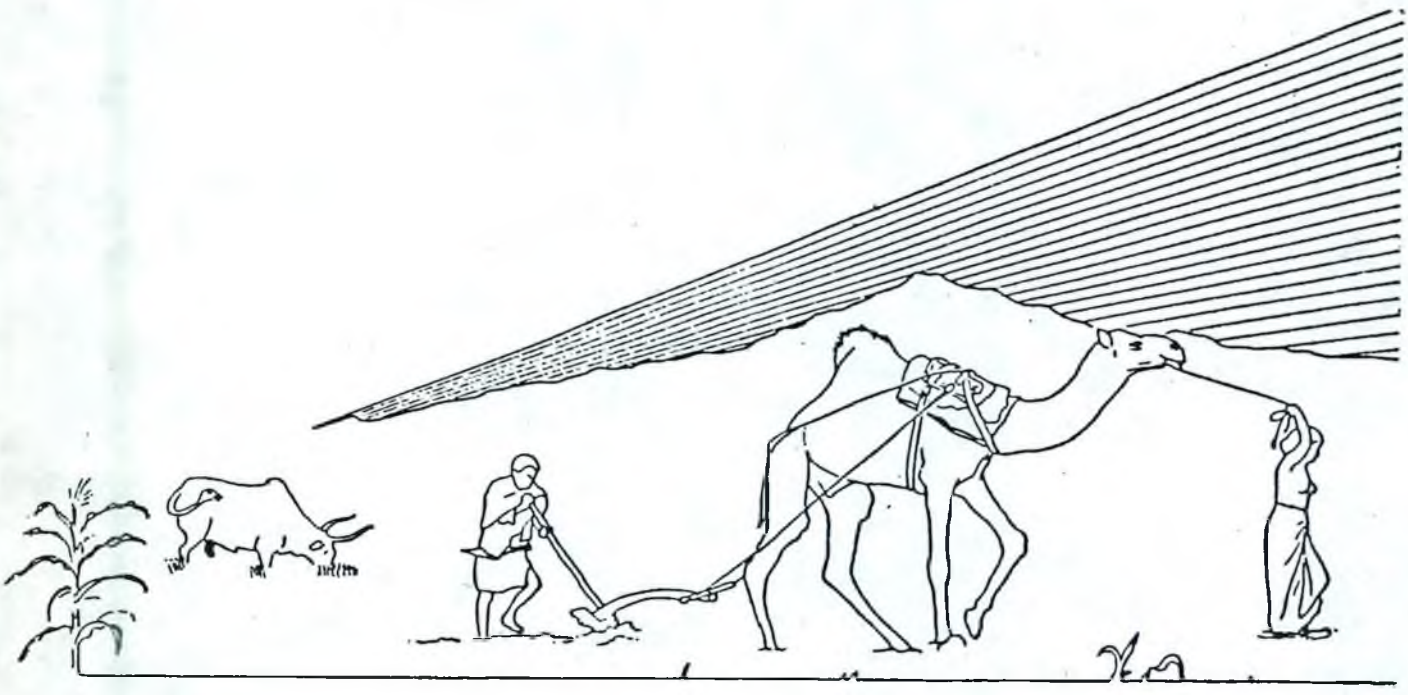
Proceedings of the

AFAR TRAINING AND SETTLEMENT PROJECT

June 16, 1986



edited by
YEBIO WOLDEMARIAM

compiled by
ZERATZION WOLDELUL

OCTOBER 1987 Addis Abeba

Published with the contribution of the french technical Cooperation

C O N T E N T S

FOREWORD

A seminar on the Amibara and Gewane nomad agricultural training and settlement projects, supported by various governmental and non-governmental agencies (NGOs), was held at Melka Werer Research Centre of the Institute of Agricultural Research on June 16, 1986. The aim of the seminar was to highlight agricultural research and development work carried out at these sites located in the Middle Awash Valley exclusively inhabited by Afar pastoralists. The seminar also served as a forum to release information on past livestock and forage research carried out at the Centre. Furthermore, on the seminar, it was clearly underscored the relevance of the research results to the settlement and training work currently underway at Amibara and Gewane.

It must be admitted here, that the spirit of the seminar, more so than theme and contents of the papers presented was very important. This is because public and private groups concerned with the development of the Afar area took part and exchanged views on how best "development" could be achieved without unduly altering the Afar way of life.

Traditionally, the Afars are predominantly herdsmen, who more than their sedentary compatriots, are dependent on nature. When nature is generous, life becomes bearable to the extent that many customs and traditions not quite evident during the lean years reappear.

In times of drought, the fragile economic structure of the Afars easily crumbles, exposing them to detestable life. When nature has been generous, man's intervention has also caused hardship. For example, the construction of flood control dykes and the expansion of cultivated fields on traditional grazing areas in Amibara has had a negative impact on Afar pastoralists.

It is with this background that the seminar was held at Melka Werer Research Centre, principally to look for different options and alternatives on how best the need of the nomad population is satisfied.

Yebio Woldemariam

.../

ABBREVIATIONS

AIPCC	-	Amibara Irrigation Project Control Centre
AIRIC	-	Agricultural Implements Research and Improvement Centre
ATSP	-	Afar Training and Settlement Project
EWWCA	-	Ethiopian Water Works Construction Authority
FTC	-	French Technical Cooperation
IAR	-	Institute of Agricultural Research
IDRC	-	International Development Research Centre
MAAE	-	Middle Awash Agricultural Enterprise
MWRC	-	Melka Werer Research centre
OXFAM	-	
RRC	-	Relief and Rehabilitation Commission
UNICEF	-	United Nations International Children's Emergency Fund
WVIE	-	World Vision International Ethiopia

.../

PARTICIPANTS

NAME		ORGANIZATION
1. Com. Abbas Mohamed Shawi	-	Gewane Wereda Administration
2. Ato Adugna Wakjira	-	IAR/MWRC
3. " Alemayehu Abebe	-	RRC - Amibara
4. " Alemayehu Rafera	-	IAR/MWRC
5. " Ambaye Balcha	-	" "
6. " Aschalew Tsegahun	-	" "
7. " Asfaw Tulu	-	" "
8. " Asefa Beyene	-	World Vision International Ethiopia
9. " Bedada Girma	-	IAR/MWRC
10. " Belachew Haile	-	" "
11. " Beniam Akalu	-	" "
12. " Bulcha Weyessa	-	" "
13. Mr. Denis Gerard	-	French Technical Cooperation/ 3rd Livestock Development Project
14. Ato Efrem Getachew	-	IAR/MWRC
15. " Endale Bekele	-	" "
16. " Frezer Zemedkun	-	Project Control Center(AIP)
17. " Iserael Degefu	-	IAR/MWRC
18. Com. Jemal Ali Kalifa	-	Mesrak Awash Wereda Administration
19. Ato Kidane G/Meskel	-	IAR/MWRC
20. Com. Mohammed Awel	-	Gewane Wereda WPE
21. Father Rene Clarin	-	Catholic Church
22. Com. Remodan Ibrahim	-	Gewane Woreda WPE
23. Ato Tadele G/Selassie	-	IAR/MWRC
24. " Tadesse Eshetu	-	" "
25. " Tilahun Hordofa	-	" "
26. " Yebio Woldemariam	-	" "
27. " Zeratzion Woldelul	-	" "
28. " Zerihun Tadele	-	" "

.../

ሰኞሌ 22 ቀን 1978 ዓ.ም

ጌድ ጀማል ዓሊ ከሊፋ

የኦሥራቀ አዋሽ ወረዳ አስተዳዳሪ

ጌድ የሰሚናሬ ተካፋዎች

በመጀመሪያ አዘጋጄው ኮሚቴ በዞኒህ በአፋር ሥልጠናና ሠፈራ ፕሮጀክት ሰሚናር የመገቢያ ንግግር አንዳደርግ ስለፈቀደልኘ ከፋ ያለ ምስጋና አቀርባ ለሁ:: ይህ የአፋር ሥልጠናና ሠፈራ ሰሚናር ወቀታዊና እጭግ በጣም አስፈሳጊ መሆኑን ለሁሳቺንም ግልጽ ይመስለኖል:: ይህም ያለምክንያት አይደለም ባንድ በኩል ካለፈው ዓመት ጀምሮ በአካባቢያቸን በተለያየ ቦታያቸ የተጀመሩት የማ ስፈርና የሚሰልጠን ፕሮግራሞቸ ጥሬ አንቀስቃሴና መልካም አርአያ ሆነው በመ ገኘታችው ባሁኑ ሰዓት ሰፋ ባለ መልኩ ተመሳሳይ የሠፈራ ፕሮጀክቶቸና የማ ሰልጠኛ ቦታያቸ ብቀ በማለት ሳይ መገኘታችው በተጨማሪም በመንግሥት በኩል የአፋር ዘሳኖቸ ቸግር ትኩረት የተሰጠው በመሆኑ አሁንም በዞኒሁ ባካባቢያቸን በዘመናዊ መልክ የግጠሽ መሬት ለማዘጋጀት የመጀመሪያ ደረሻ ጥናቶቸ በመገባ ደዱ ሳይ በመሆናችው ነው::

የአፋር ወይም ባጠቃሳይ የዘሳኖቸ ሠፈራ እጭግ በጣም አድካሜና ውስ ብስብ የሆነ ሥራ መሆኑ ለሁሳቸንም ግልጽ መሆን ይኖርበታል:: ይሸውም:—

1ኛ/ ሰያቸ መኖሪያያቸን ነው ብለው ከተያያዙት የሥራ መስክ ማለትም የከብት ርቢ ወደ አርሻ ሥራ ባንድ ጌዜ የሚሰሰ በመሆኑ፣

2ኛ/ ለዘሳኖቸ ፈጽሞ አዳጋ ወደሆነ የሥራ መስክ የሚሰሰ በመሆኑ ዕቅዱን ግብ ለማድረስ ቸግር ይገጥማል::

ለዚህም አካባቢያቸን ያለው የሠፈራ ጣቢያ አንደ አንድ ምሳሌ ማቀረብ አንች ሳለን::

.../

የሠፈራ ፕሮጀክቶች በጠቃላይ በሚቋቋሙበት ጊዜ፡

1ኛ/ የሰዎቹ የአፈናፈር ሁኔታ በወቅቱ ጊዜ አንዲገቱ ሆነው መሄዱ የለባቸውም ይገፀም እንዲሁ ሰው ከነበረው ሥነ ልቦናዊና ባህላዊ አስተሳሰብ በቀላሉ ሊላቀቅ የማይችል ነው፡፡ ጊዜያዊ ችግር ቢኖርበትም ሁኔታዎች ለመቻቻል በሆኑበት ወቀት ተመልሶ ወደነበረበት የመመለስ አዝማሚያ በቀላሉ ሊፈጠር ይቻላል፡፡

2ኛ/ የሥልጠና ፕሮግራሞች በከፍተኛ ደረጃ ትኩረት የሚሰጥባቸው ሁኔታዎች መሆን ይኖርባቸዋል፡፡ በነዚህ የማሠልጠኛ ፕሮግራሞች ገለሰቦች ሠለሠራው በይበልጥ እንዲረዱ ካላቸው የኑሮ ዘዴ የሚሻል መሆኑን በተከከለ መንገዘበና ሥራ ላይ ምን እንደሚመስል ማወቅ ይኖርባቸዋል፡፡

3ኛ/ ከአርሻው ሥራ ጐን ለጐን በሚንቀሳቀስ አርባታው ፕሮግራም አብሮ መካሄዱ ይኖርበታል፤ ምክንያቱም ለዘላኖች በጠቃላይ ከእህል ምርት ይበልጥ የወተት ምርት ቀዳሚ ወይም ተፈላጊነቱ ከፍ ያለ በመሆኑ ነው፡፡ በተጨማሪም ከበት በጠቃላይ ከዘላን ኑሮ ጋር ያለው ግንኙነት በቀላሉ ሊፈታ የማይችል የታሪክ ዕድገት በመሆኑ በገዱ ጊዜ ማስቀረት የማይቻ ከር ከመሆኑም በሻገር በአከባቢውም አንፃር ከበበሉ ያለነስ አስተዋጽኦ ስለሚኖረው በዚህ በኩልም ከፍ ያለ ትኩረት መሰጠት አለበት፡፡

4ኛ/ ከሥልጠናው ጐን አብሮ መሄድ ያለበት ዋናው ቁም ነገር ገን መረጃ መሰብሰበና ጥናት ማካሄድ ነው፡፡ በቂ ማህበራዊ ኢኮኖሚያዊና ቴክኒካዊ መረጃዎች ተሰባሰበው በደንብ ከተጠኑና ከተተነተኑ በኋላ ሠፈራዎች በምን መልክ መደራጃት አለባቸው ? የሠፈራዎቹ የሥራ ድርሻ በምን ዓይነት ቢሆን ሠፋሪዎችንም ሆነ ሀገሪቱን ሊጠቅም ይችላል? /በእርሻ ወይስ በከብት ርቢ/ የሚሉ ጥያቄዎች መልስ ሊያገኙ ይችላሉ በዚህ መልክ የተደራጁም ዘለቄታ ይኖራቸዋል፡፡

ጓደኞች፣ አሁን በአካባቢያችን የጀመርነው ሥራ ለኛ ብቻ ሳይሆን ተመሳሳይ ሁኔታ ላላባቸው አካባቢያቸም በጣም ጠቃሚ ሊሆን በሚችል በተለይ በምርምሩ ሥራ የተሰለፋን ባለሙያዎች በሰብሉም ይሁን በእንስሳት እርባታው ላሉን የምንሳቸውን ውጤቶች በዚሁ በአፋር ሥልጠናና ሠፈራ ፕሮጀክቶች ራሳችን እንደ ኤክስቴንሽን ወኪል በመሆን በሥራ ላይ አውለን ለመገምገም ዕድል በላለን የየበኩላችን ድርሻ እንድንወጣ እያሳሰብኩኝ የዚህ የሥልጠናና የጥናት ፕሮጀክት ውጤታማነት በዚህ አካባቢ ላለን ባጠቃላይ እንደ ተለቀ ፈተና ወስደን ከዚሁ የሚገኘው ውጤት ነገ ደግሞ በዋናው ሠፈራ ጣቢያና በሌሎችም መንግሥትና የአካባቢው የአስተዳደር በሚዘረጉቸው የሠፈራ ፕሮጀክቶች በሥራ ላይ እንዲውሉ ሁላችንም እንድንረባረበት አደራ እያልኩ በመጨረሻ ሰሚናሩ ውጤታማ እንዲሆን ያለኝን መልካም ምኞት አገልጻለሁ።

ሀዝባዊት ዲሞክራሲያዊት
ሪፐብሊክ ኢትዮጵያን እንመሠርታለን !!
እመሰግናለሁ

ታደለ ገብረሥላሴ
የመልካወረር እርሻ ምርምር ማዕከል
ሥራ አስኪያጅ

NOTES ON NOMAD SETTLEMENT EFFORTS AND TRANSFER OF AGRICULTURAL TECHNOLOGIES WITH SPECIAL REFERENCES TO AMIBARA AND GEWANE (ATSP)

Yebio Woldemariam[1], Zerihun Tadele[2] and Worku Bejiga[3]

INTRODUCTION

The Awash valley is located at the beginning of the great African Rift valley, which extends from the Red Sea Coast of Ethiopia to Tanzania. The widest part of the valley is located in the north-eastern part of Ethiopia with areas ranging in altitude from 60 meters below sea level in the Danakil depression in the north-east to 1200 meters above sea level around the lakes Chamo and Abyata area of the south. The estimated length of the valley in Ethiopia is 1100 km.

The inhabitants are predominantly Afars, but a good number of Oromos and Issas occupy the Upper Awash and the eastern flank of the Middle Valley respectively. Regardless of their ethnic make up, the people inhabiting the Awash valley are nomads with exception of few who practice agriculture in the Awash delta of Afambo. In the delta, the main crops cultivated are; sorghum, maize, sesame and date palm, with cotton making up the remainder. All in all, an estimated 40,000 hectares of land are under cultivation along the Awash river, of which 85% is cropped with cotton. If irrigation water permits, 70-100,000 hectares of land could be available for cultivation in the Middle and Lower Awash valley alone.

The climate of the area is characterized as semi-arid with annual rainfall of about 400 mm. The mean annual temperature is nearly 26°C with May, June and July reaching 36°C maximum. The soils of the Awash valley are classified as volcanic and alluvial deposit. The soils are rich in major nutrients.

Experiments conducted during the past 20 years show, that apart from cotton, tobacco and horticultural crops, other food and industrial crops are well adapted. The most promising of them are sesame, groundnut, wheat, maize, cowpea, kenaf and wide variety of forage crops*. Although enough data with regard to varieties evaluation and the husbandry required to grow them are available, none of the crops mentioned are raised on a commercial scale in the valley.

---

* Experimental evidences indicate that in the Lower valley, sesame yield of up to 2.8 t/ha is achievable while in the Middle valley a total yield of 2 t/ha has been achieved.

Despite the heavy soil type normally considered unsuitable for groundnut cultivation, the lowest and highest yield so far obtained is 5.5 and 8.6 t/ha.

The maximum yield for open polluted maize and cowpea reaches 4 and 3 t/ha respectively.

Progress Report, Lowland Oil Crops Project, 1970 to 1985.
Progress Report, Melka Werer Research Station, 1970 to 1980.

[1]Research Officer, Institute of Agricultural Research, Melka Werer Research Center, P.O. Box 2003, Addis Ababa, Ethiopia

[2]Assistant Research Officer, Institute of Agricultural Research, Melka Werer Research Center, P.O. Box 2003, Addis Ababa, Ethiopia.

[3]Field Assistant II, Institute of Agricultural Research, Melka Werer Research Center, P.O. Box 2003, Addis Ababa, Ethiopia.

.../

PROJECT OBJECTIVE

The objective of the project are two fold:

1. To introduce the art of cultivating crops to nomadic inhabitants of the valley and to evaluate the acceptability of the crops and other research packages handed to them along the way.

2. To promote food self-sufficiency in an area dominated by industrial crops.

The Project Sites

The sites are located in and around Amibara in the Middle valley and at Iyrole near Gewane town. The site at Iyrole, is located about 150 km north of the Melka Werer Research Centre. The farm is accessible by road except during flood periods which occur in March and August. The immediate area suitable for cultivation is about 100 ha. The soils at Iyrole are typical of the valley with vertisol and alluvial dominating. The Awash river runs close to the farms.

The farms at Amibara are small plots sandwiched between large farms run by the Ministry of State Farms Development, the Institute of Agricultural Research and the Relief and Rehabilitation Commission. The sizes of the earlier developed farms ranged from 0.2 to 0.5 ha. However, the newly developed compact farm is 30 ha and accommodate 34 farmers with an average land holding of about one hectare. The soil is predominantly vertisol.

HISTORICAL DEVELOPMENT OF THE IYROLE PROJECT

The main task at Gewane/Iyrole was to keep alive the self-made project where in previous years, squatters from the shelter camps had tenaciously stayed on the land, where they had produced a crop, mainly maize on residual moisture. This is how it happened. After the heavy floods of August receded, the "farmers" planted maize in the wet soil and travelled routinely from the shelter camps to tend to their crops. This way an estimated 8 tons of maize were harvested. At this stage of the project, neither irrigation canals nor flood control systems were in existence.

Following a number of visits to the Iyrole site, engineers from the research center determined that it was feasible to design and operate gravity irrigation system and construct flood control dykes to keep the self-inspired project afloat. Thus, the Melka Werer Research Centre volunteered to send personnel and equipment in early July 1985. The irrigation system was made operational in mid-August and first planting and irrigation was carried out on August 21. By the time the heavy flood had started in late July, the cultivated area was safe. As a result, more farmers of nomadic origin joined the project from the shelter camps and almost 35 ha of land were cultivated with maize, cowpea, groundnut, sweet potatoes and vegetables (pepper, tomatoes and spinach).

.../

TECHNICAL RESULTS

There are no exact figures documented on total yield per cultivated area or yield per hectare for each crop. Rough estimates show that 70-80 tons of maize were produced. Further estimates indicate that maize, groundnut, and cowpea yielded 3,4 and 1.5 t/ha respectively. One out of three groups of farmers sold maize worth 35,000 Birr. Perhaps for the first time the town of Gewane was less dependent on outside sources for its vegetable supply for about two months. Whether farmers produced enough grain to satisfy their families' food requirements, however, is questionable.

Social Conclusion

From a social stand point, it is too early to suggest whether indeed people of nomadic origin could strictly adhere to rules of settled agriculture without also raising large number of animals. But for now, it seems normal with settlers clearing the bush and preparing the land with the help of camels for next cropping season. One obvious observation so far made is that the pace of progress is not as dramatic as one expects in a sendentary population in the highlands. Unlike their sedentary compatriots the Afar settlers have different values and aspirations that must not be overlooked. For example, two hours of camel plowing is considered a well done job for the day. This is out of pity for the camel which,on the Afar culture, is the most revered animal. It is also true that due to peculiar climatic conditions night time activities are more common than day time. For almost three quarters of the cropping season, day time temperatures reach as high as 38°C. Time as defined by peasants in a typically northern farming community may have different meaning and interpretation in nomad settlement. The Afars and indeed any nomad lives in harmony with nature and tends to lead a simple but fragile life.

HISTORICAL BACKGROUND OF AMIBARA ATSP

Within the past ten years, some Afars close to the irrigated farms, run by the RRC and MSFD use to grow melons in small plots of land for self-consumption. This practice was neither encouraged nor opposed by the state run enterprises. However, lack of watermelon seeds and irrigation water hampered the expansion and growth of the garden size plots for sometime. All this time, none of the food crops repeatedly evaluated at the center for nearly two decades were tried by these farmers.

It was only after the persistant drought and the campaign by the media to promote self-sufficiency through home gardening that the near dying spirit of farming once again by the Afars was revived. Those elements, who previously planted melons in small plots of land, were organized by the Lowland Oil Crops Project and provided with free seeds of maize, cowpea, groundnut and sesame. With further assistance from World Vision International Ethiopia the number of farmers were increased from 20 to 54.

.../

Technical Results

Unlike the Gewane Project, the small farmers at Amibara made full use of the research findings generated at the center. Appropriate varieties recommended for the area were planted. Information on sowing time, weeding and irrigation frequency, and optimum harvesting time was generally applied. Furthermore, experienced personnel were assigned to train the farmers and keep records on technical, social and economic aspects of the project.

In the "main season", farmers planted maize, groundnut, sesame and cowpea. Except for cowpea, the varieties used were appropriate to the season. During the "off-season" early maturing groundnut, sesame, wheat and cowpea were planted.

Table 1: "Main and off-season" crop varieties planted by farmers.

	Maize	Groundnut	Sesame	Cowpea	Wheat
"Main Season"	Regular White(170)	Shulamit & NC-4X	T-85 & "S"	Black eye	
"Off-season"	" "	ICG 273	"E"	"	Blue Jays

Data collected during the off-season is not reported here, but farmers at Gelsita who planted another crop during the "off-season" tentatively proved that multiple cropping is possible under small scale farming.

The treatments in this study were:

a. To evaluate farmers readiness to accept some cultural practices generated at the center.

b. To examine different crop planting patterns and arrangement and to weigh their advantages and disadvantages.

In particular, three patterns of planting were considered on 4 crops, namely sole cropping, alternate and whithin row intercropping. The treatments were merely non-replicated-observation.

As shown in Table 2, Gelsita 'farmers' produced groundnut, cowpea, sesame and maize as single crops and with combinations. Groundnut yields ranged from 1.0 t/ha (in the within row intercropped with cowpea) to 4.1 t/ha (in the within row intercropped with sesame). The yield was greater than that obtained in sole cropping. Alternate row intercropping between groundnut + cowpea and groundnut + sesame yielded 2.7 and 2.8 t/ha of unshelled groundnut pods respectively.

Sesame gave yield about 1 t/ha in alternate row arrangement with groundnut. This shows that groundnut/sesame association in intercropping combination is possible. Sesame gave exceptionally good seed yield when intercropped with cowpea. The yield obtained was 2.4 t/ha. In the long-run, the legume-sesame combination could be useful in safe-guarding soil degradation that may arise from unjudicious use of inorganic fertilizers.

.../

Table 2: Crops produced, intercropping pattern, area of production and yield obtained for Gelsita "farmers".

Crops grown	Intercropping		Area (M^2)	Yield/plot (kg)		Total	Yield(t/ha)	
	Single	Alt/ within		Crop No. 1	Crop No.2		Crop No.1	Crop No.2
1 Groundnut(NC-4X)	Single	-	2755	1039	-	1039	3.771	-
2 Groundnut(Shulamit)	"	-	1130	150	-	150	1.327	-
3 Sesame	"	-	2407	150	-	150	0.623	-
4 Maize	"	-	3525	1000	-	1000	2.837	-
5 Groundnut + Cowpea	-	within	493	200	35	235	4.057	0.710
6 Groundnut + Cowpea	-	alternate	1699	200	250	450	2.354	2.943
7 Groundnut + Sesame	-	"	1000	140	50	190	2.800	1.000
8 Sesame + Cowpea	-	within	450	308	100	408	6.844	2.222
9 Sesame + Maize	-	"	1023	30	100	130	0.293	0.978
10 Maize + Cowpea	-	alternate	1835	150	200	350	1.634	2.180
Total			16317	3367	735	4102		

.../

Table 3(a): Crops produced, intercropping pattern, area of production and yield obtained for Kediga Dora "farmers".

Farm No.	Crops grown	Intercropping		Area (M^2)	Yield/plot (kg)		Total	Yield(t/ha)	
		Single	Alt/ within		Crop No.1	Crop No.2		Crop No.1	Crop No. 2
I	Cowpea	Single	-	330	38	-	38	1.152	-
	Maize	"	-	1482	600	-	600	4.049	-
	Groundnut	"	-	1179	350	-	350	2.969	-
	Sesame	"	-	374	38	-	38	1.016	-
	Groundnut+Cowpea	-	alternate	289	30	20	50	2.076	1.384
	Total			3654	1056	20	1076		
II	Cowpea	Single	-	258	17	-	17	0.659	-
	Maize	"	-	464	125	-	125	2.694	-
	Groundnut	"	-	120	30	-	30	2.500	-
	Sesame	"	-	405	20	-	20	0.494	-
	Total			1247	192		192		
III	Cowpea	Single	-	1099	51	-	51	0.464	-
	Maize	"	-	837	250	-	250	2.987	-
	Groundnut	"	-	496	428	-	428	8.629	-
	Sesame	"	-	919	55	-	55	0.599	-
	Groundnut+Cowpea	-	alternate	329	100	38	138	6.079	2.310
	Groundnut+Maize	-	"	1062	280	300	580	5.273	5.650
	Groundnut+Sesame	-	"	200	25	15	40	2.500	1.500
	Total			4942	1189	353	1542		

cont'd

Table 3(b): Continued

Farm No.	Crops grown	Intercropping		Area (M^2)	Yield/plot (kg)		Total	Yield(t/ha)	
		Single	Alt/ within		Crop No.1	Crop No.2		Crop No.1	Crop No.2
IV	Cowpea	Single	-	3552	772	-	772	2.173	-
	Maize	"	-	8440	2626	-	2626	3.111	-
	Groundnut	"	-	4028	1500	-	1500	3.724	-
	Sesame	"	-	1176	76	-	76	0.646	-
	Groundnut+Cowpea	-	within	260	50	36	86	1.923	1.385
	Groundnut+Maize	-	alternate	2064	380	525	905	3.682	5.087
	Sesame+Groundnut	-	within	90	15	25	40	1.667	2.778
	Sesame+Maize	-	"	1524	35	250	285	0.230	1.621
	Total			21134	5454	836	6290		
V	Cowpea	Single	-	264	54	-	54	2.045	-
	Maize	"	-	264	150	-	150	5.682	-
	Groundnut	"	-	264	125	-	125	4.735	-
	Sesame	"	-	144	25	-	25	1.736	-
	Groundnut+Cowpea	-	within	288	30	20	50	1.042	0.694
	Groundnut+Maize	-	alternate	264	55	50	105	4.167	3.788
	Groundnut +Sesame	-	"	244	24	15	39	1.967	1.230
	Sesme+Cowpea	-	within	288	10	40	50	0.347	1.389
	Sesame+Maize	-	alternate	288	4	31	35	0.278	2.153
	Total			2308	477	156	633		

cont'd

Table 3(c) Continued

Farm No.	Crops grown	Intercropping		Area (M^2)	Yield/plot (kg)		Total	Yield(t/ha)	
		Single	Alt/ within		Crop No.1	Crop No.2		Crop No.1	Crop No.2
VI	Cowpea	Single	-	310	25	-	25	0.806	-
	Groundnut	"	-	100	20	-	20	2.000	-
	Maize	"	-	518	250	-	250	4.826	-
	Total			928	295	-	295		
VII	Cowpea	"	-	140	50	-	50	3.571	-
	Groundnut	"	-	504	90	-	90	1.786	-
	Maize	"	-	744	300	-	300	4.032	-
	Sesame	"	-	504	36	-	36	0.714	-
	Groundnut+Cowpea	-	alternate	240	47	31	78	3.917	2.583
	Groundnut+Maize	-	"	504	90	100	190	3.571	3.968
	Sesame+Maize	-	"	210	5	50	55	0.476	4.762
	Total			2846	618	181	799		
VIII	Groundnut	"	-	532	95	-	95	1.786	-
	Maize	"	-	936	350	-	350	3.739	-
	Maize+Cowpea	-	alternate	240	30	28	58	2.500	2.333
	Total			1708	475	28	503		
	Grand Total			38767			11330		

SOCIAL CONCLUSION

"Farmers" at Amibara started showing enthusiasm on crops totally new to them not because they were aware that sesame and groundnut and to an extent maize were adaptable and less risky to grow in the valley more than in any other parts of Ethiopia, but it was simply the only way out from the dreadful hunger hovering over them. It is clear that food crops as well as milk and milk products were very scarce in the area when this project was launched.

Unlike maize and cowpea, which required less labour to harvest, groundnut harvesting was in their opinion time consuming. A few have shown appreciation for the wooden maize shellers (donated by Nazareth Research Center) which was issued to 10 out of 25 farmers and claimed that it cut short the time spent on shelling maize with bare hands by half.

The local prices offered for cowpea made this crop more favoured than maize. Some farmers developed a taste for it. Although maize is not out of favour by farmers, they still complain that it pays less and that it is very susceptible to wild pig damage and theft.

"Farmers" were ready to grasp any technical advise given to them without hesitation. However, many social as well as personal constraints posed obstacles to the full application of technologies offered to them.

First of all, practically all "Farmers" in the study area, at Amibara, were registered settlers on the AVA settlement farms administered by RRC. They, therefore, were required to attend regularly in their usual work place at the AVA farm because of the new RRC policy of handing over farms to these registered, but peculiar type settlers (by all definition absentee land lords).

Secondly, the time honoured customs and traditions weighed heavily over qualitative work performance. Attending social ceremonies is obligatory to the Afars. Any slight disobedience or negligence of customs and traditions may cause embarrassment, harassment and social alienation. Thus, exact application of certain cultural practices such as gapping, weeding and irrigation was not possible.

During the season, the death rate among infants and old people at Amibara was high. Out of 25 farmers, two never had the chance to harvest their first crop. They died before the end of the season. In addition, frequent out-breaks of malaria used to cripple almost half the work force. Usually, recovery from disease was very slow and thus affected the total work done. As a result, some fields in the Gelsita and Kediga dora farms lacked proper management with respect to weeding and optimum period of harvesting. In addition, late gapped groundnuts were harvested along with early planted ones, drastically reducing kernel quality. Sample estimates show that over 25% of sesame seed was lost due to late harvesting. Although groundnut was planted a month after the recommended date, vigor and performance was good. One sample farmer was able to harvest 8.6 t/ha of groundnut. Sesame sowing was done at the recommended date but optimum date of thinning was not maintained. Future work will determine whether nomads taking up sedentary agriculture will be as effective as the highland farmers.

.../

It is prudent to state, however, that one needs to be patient and understanding in order to reconcile the age-old customs and traditions of the Afars that has its origin in the specific mode of production with that of modern technology that the research center is striving to advance. It is also necessary to observe that those recently become farmers were quick to grasp and accept voluntary advice and technologies provided to them. Perhaps this is in contrast to sedentary farmers who may or may not accept new technology right away.

.../

AFAR TRAINING AND SETTLEMENT PROJECT TECHNICAL REPORT

Zeratzion Woldelul[1]

INTRODUCTION

The Afars are predominantly pastoralists occupying the Middle and Lower Awash basin with little or no experience of irrigated agriculture. The projects mentioned in this report are located at Amibara (Misrak Awash Wereda) and Iyrole (Gewane Wereda). Both areas are characterized as low rainfall, too low to raise food crops.

Despite the nationwide literacy campaign currently in progress, the inhabitants remain illitrate but have a tremendous capacity to understand innovations provided to them. The men do less day-to-day work than the women. In order to achieve project objectives, therefore, a good deal of manpower was required. However, due to shortage of time and manpower familiar with irrigation earth work, the basic irrigation network and other structures required for an irrigated scheme were done by machinery.

To execute the project, Melka Werer Research Centre (MWRC) and the Amibara Irrigation Project Control Centre (AIPCC) donated machinery and other services for all supervision and construction work. The Middle Awash Agricultural Enterprise (MAAE) provided tractor service for plowing, levelling and furrowing for the Amibara located project. All fuel costs and allowances were covered by French Technical Cooperation (FTC) and World Vision International Ethiopia (WVIE) to support the Iyrole and Amibara projects respectively. The Party and Administrative Offices of both Weredas, where the projects were located provided moral and material support. Close technical advice and supervision was provided by volunteer staff from MWRC. The International Development Research Centre (IDRC), through the Oil Crop Project it supported, has played a decisive role in the implementation of the project.

Main and tertiary canal reshaping and field canal digging was done by the settlers themselves.

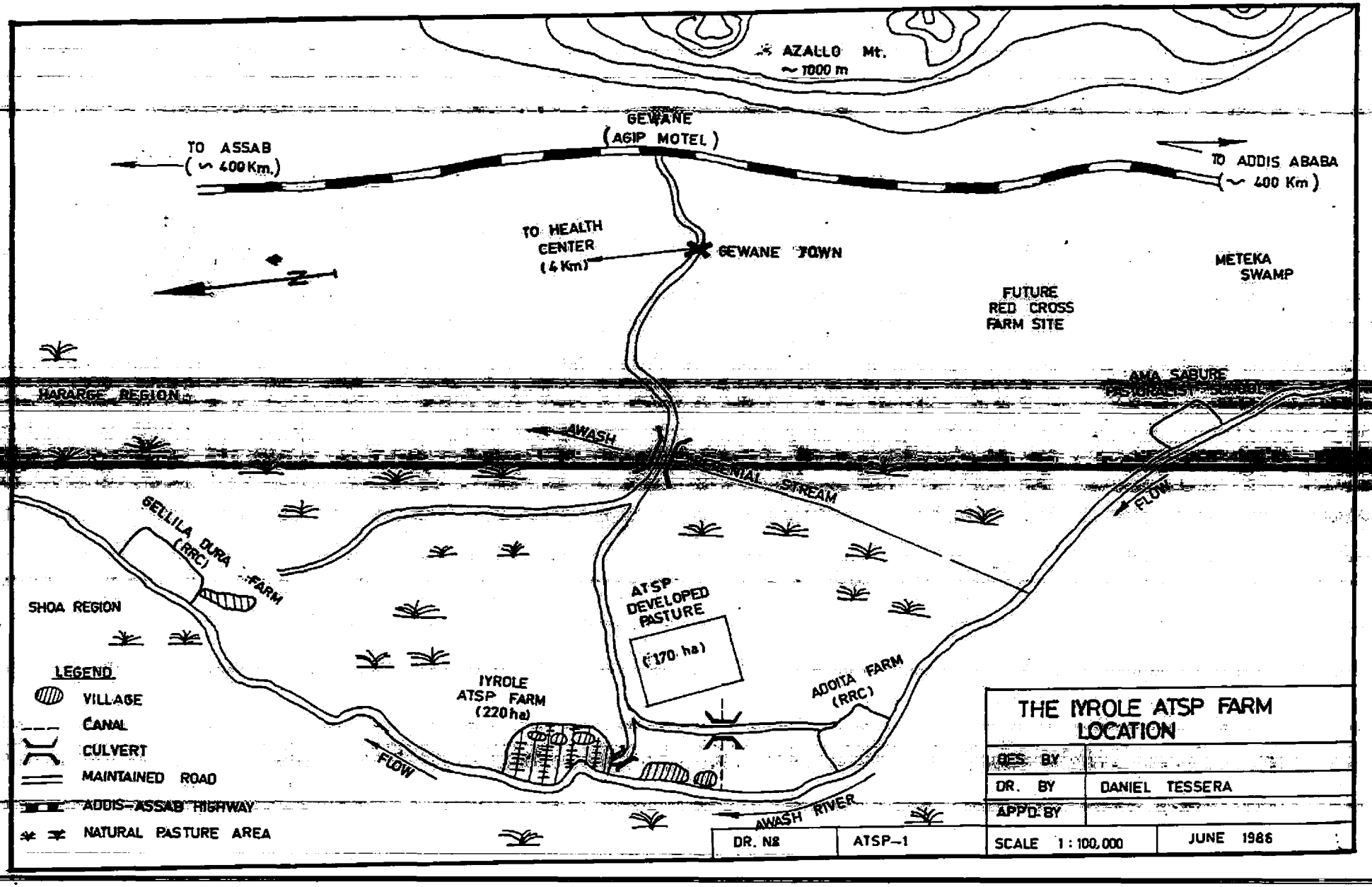
1. The Iyrole ATSP - Iyrole is located about 12 km west of Gewane town along the Awash River at an altitude of 500 meters above sea level (Fig. 1). The total annual rainfall in this area does not exceed 400 mm. The day temperature reaches a maximum of 36°C in July and a minimum of 15°C in January. For nearly six months of the year, wind velocities are very low and since the area is devoid of trees and vegetations, the flow is generally laminar.

2. The Amibara ATSP - The Amibara ATSP is located adjacent to MWRC. The land is virtually surrounded by MWRC, RRC and MAAE farms. Data from nearby weather station show that the mean maximum temperature recorded is 38°C in July with a minimum of 11°C in January. The average total annual rainfall is 450 mm with an average 8 hours of bright sunshine daily. The altitude at Amibara is 750 meters above sea level.

[1]Research Officer, Agricultural and Energy Engineer, Institute of Agricultural Research, P.O. Box 2003, Addis Ababa, Ethiopia.

.../

Figure 1: The Iyrole ATSP farm aereal view.



THE CONSTRUCTION WORK AT ATSP

Iyrole ATSP

The first step taken in the initial phase of the project was to construct a 570 m long dyke and a stoplog type offtake structure to check gravity water flow into the farm. The dyke was meant to protect the 25 ha of land which were being plowed. This operation was done between early and late July 1985. A main canal with theoretical flow capacity of 100 l/s was also constructed to feed the 4km long field canals. Because of late field operations and construction work, it was thought that the level of the river would be too low for gravity irrigation. As a result, small pumps with a capacity of 30 l/s were installed. The average total pumping head in both pumps was approximately one meter.

Later, in mid-1986, the entire project area was cadastrally and topographically surveyed. The total land area was 220 ha. Using data obtained from the survey work, grader (CAT 130G) was employed to construct canals. At this state of operation, a 2 km long dyke has been renovated. An additional 4 km long new dyke was built. A total of 9 km long main canals with a capacity of 50 l/s and 20 km long field canals were also laid down. Moreover, a total of 8 km long field roads were constructed. The 12 km long Gewane to Iyrole road was also graded to give dependable access for both RRC and Iyrole settlers. All the operations mentioned above were completed in almost one month. (See Fig. 2).

Lack of proper machinery, the dyke was not compacted up to a standard. Therefore, some leakage was expected during the first year. Thereafter, it is expected that weeds and grasses grown in the dyke will act as stabilizers. The graded road surface was devoid of base agregate materials usually recommended for all weather roads. All canal work was left to be trimmed by hand. Topographically, the land was flat, thus, no effort was made to check canal bed slopes. If water velocities in the canal are found to be higher than the recommended flow velocity, stones will be placed in the canal beds to act as drop checks. Moreover, no land levelling or terracing was required.

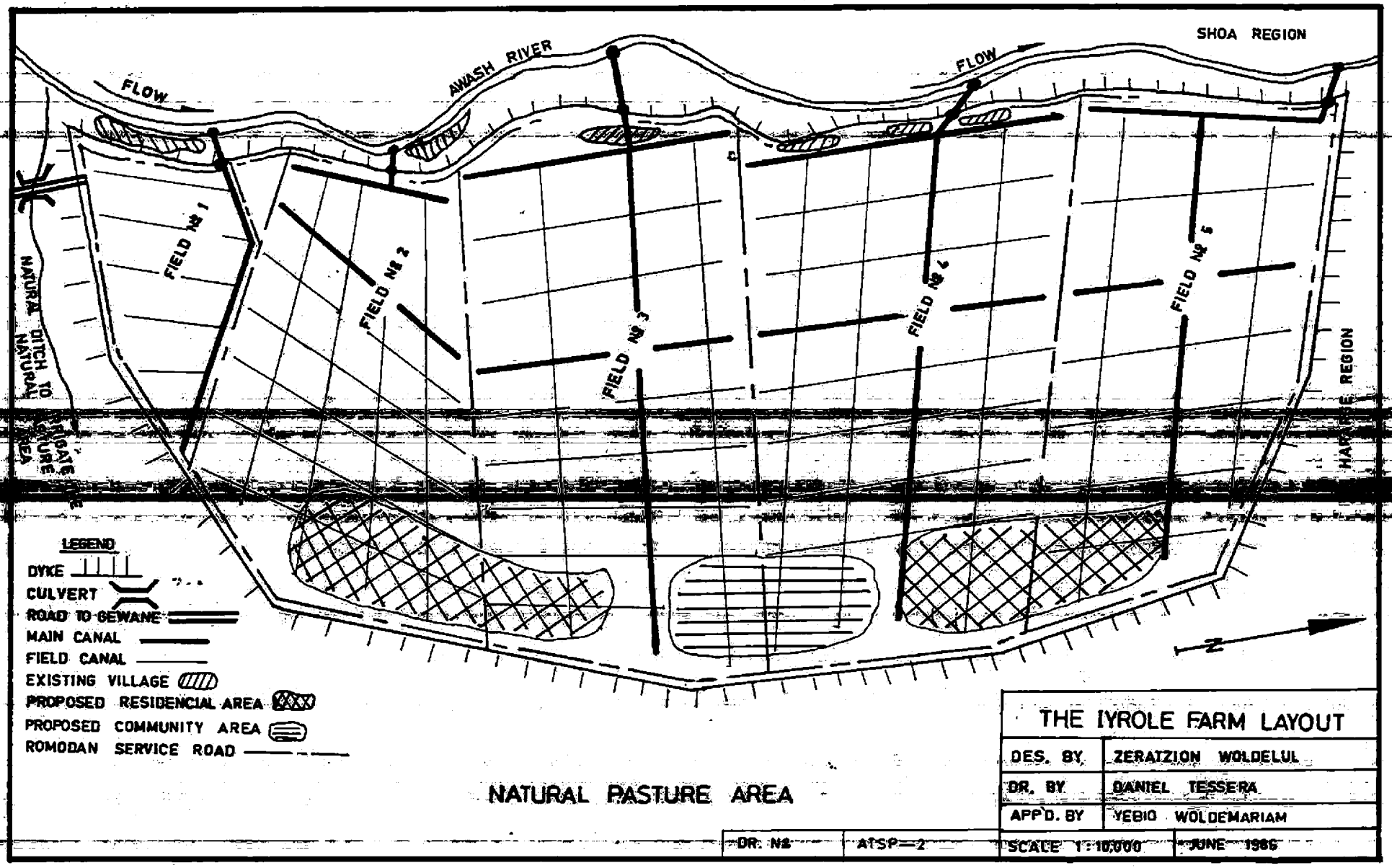
Another major work undertaken was the development of 170 ha grazing area. The area was surrounded by 6 km long bands to contain flood waters that cause swamp in the lower spots while dry and devoid of grasses in the higher spots. Thus, 170 ha grazing area was completed in 1986 with numerous canal network to guide flood water admitted through two main canals.

In the design, two prototype village sites have been proposed with communal marketing place and public utility centers such as health, education and religion. Result obtained from the Geologic Research Institute indicates that there is huge amount underground water to be tapped between 4 and 11 meters below the surface within the proposed village sites. The quality of water has not yet been determined.

It is envisaged that trees will be planted along all road sides, community centers and residential areas to justify the change of name from Iyrole (meaning sunny spot devoid of vegetation) to Arawali (meaning green with vegetation). The trees will also act as wind breaks and can also partially

.../

Figure 2: The Iyrole farm layout including the newly constructed irrigation canals, dykes and field roads.



reduce the present shortage of wood for both fuel and construction. The use of renewable source of energy such as bio-energy is also being contemplated.

Two donkey driven carts and modified groundnut sheller manufactured locally will be employed for the 1986-87 harvest season. More wooden maize shellers will be supplied to farmers. For more details, refer to Annex I .

Amibara ATSP

Surveying results showed that the total land area of the Amibara project farm was 70 ha. Based on the agreement reached with the funding agency, WVIE, the development will have two phases. In phase I, 30 ha of land was to be developed. Irrigation water for this parcel of land was diverted from the MWRC main canal. An appropriate offtake structure was built according to MWRC standards to supply irrigation water for 30 ha of land. Irrigation water distribution is done by a 400 m long feeder canal and five tertiary canals with a total length of about 3 km. Numerous field canals have also been constructed manually by individual farmers. The feeder canal and tertiary canals have been constructed with the help of a grader (CAT-130G). For details see Fig 3.

A 2400 m long service road joing P07 outlet along the MWRC fence has been completed. A 450 mm diameter culvert (Fig.4) was also constructed according to AIP standards. The road and the culvert can be used safely by heavy machinery.

The land to be developed in phase II of the project is relatively flat and will not require levelling work. One 3.5 km long feeder canal, 5 tertiary canals and a 2.8 km long service road will be required by 1987 to complete this phase of the project.

COST ESTIMATION

Most technical work of the ATSP was done by freely donated machinery from MWRC and AIPCC. In the case of the project located at Amibara, land preparation such as plowing, levelling and furrowing was done by MAAE. Part of the cost and labour expense was covered from project fund. As shown in Table 1 and 2, the cost of developing one hectare of land in Iyrole is 329.00 Birr and that of Amibara is 1,263.00 Birr. The total cost needed to develop one hectare of AIP-II farm is estimated to be 15,000.00 Birr. Thus, when compared to the cost involved in developing the Amibara Irrigation Project-II farms, the cost of ATSP is extremely low.

.../

Figure 3: The Amibara ATSP farm layout and its irrigation water way and design.

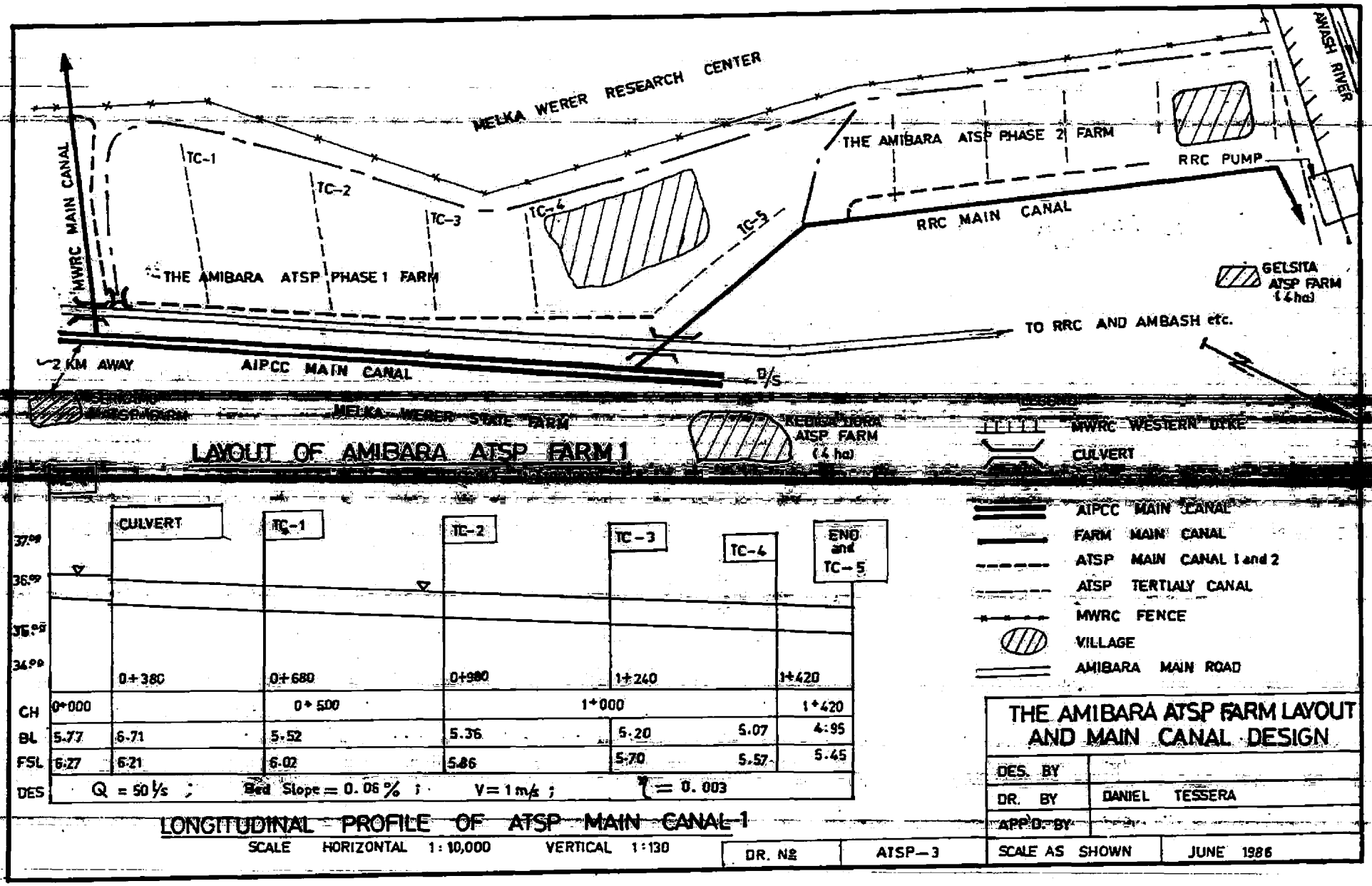
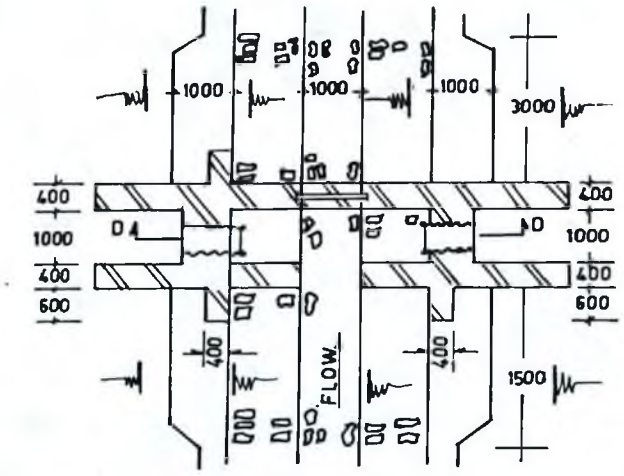
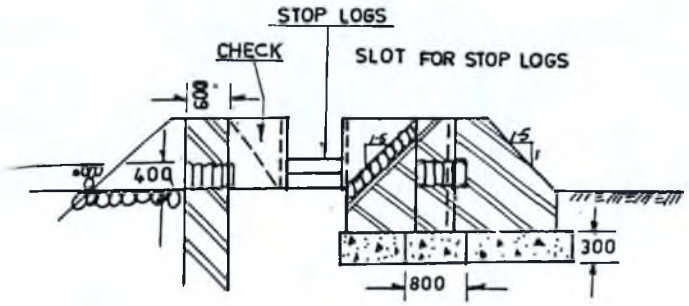


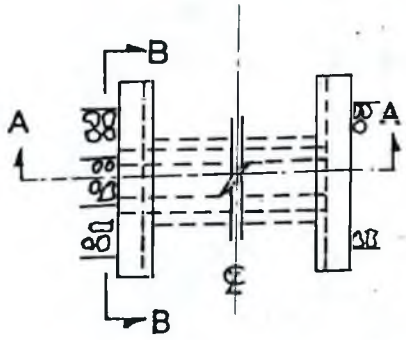
Figure 4: Offtake and culvert structural design for the Amibara ATSP.



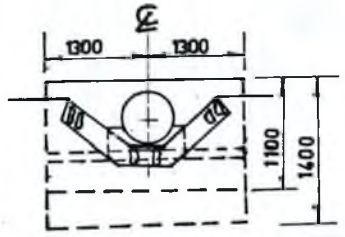
PLAN OF ATSP CANAL OFFTAKE
SCALE 1:150



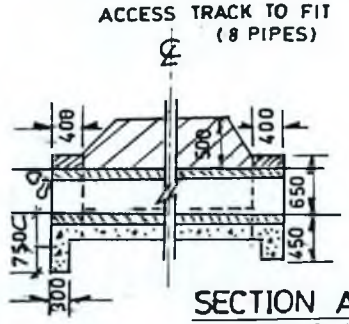
SECTION D-D
SCALE 1:150



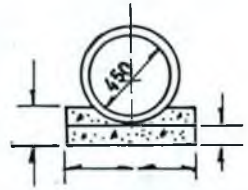
PLAN OF CULVERT
SCALE 1:100



SECTION B-B
SCALE 1:100



SECTION A-A
SCALE 1:100



PIPE BEDDING AND HAUNCH DETAIL
SCALE 1:50

NOTES

1. REFER DR.Nº MSAS 2C 122 FOR DETAILED OFFTAKE STRUCTURAL DESIGN.
2. REFER DR.Nº MSAS 2F SSK 163 FOR DETAILED CULVERT STRUCTURAL DESIGN.

AMIBARA ATSP OFFTAKE & CULVERT STRUCTURES			
DES. BY	ZERATZION WOLDELUL		
DR. BY	DANIEL TESSERA		
APP'D. BY	YEBIO WOLDEMARIAM		
DR. Nº	ATSP-4-A	SCALE AS SHOWN	JUNE 1986

Table 1(a): The Amibara ATSP cost breakdown.

Item No.	Service Description	Rate (Birr/hr)	Services Rendered (hr)	Total Cost (Birr)
1	Dozzer (CAT-D4)	65.--	135	8,840.--
2	Grader (CAT-130G)	120.--	61	7,320.--
3	Tractor	25.--	120	3,000.--
4	Truck	33.--	8	264.--
5	Vehicle	45.--	50	2,250.--
6	Construction Materials	-	-	5,015.--
7	Liquid Cash	-	-	6,200.--
8	Supervision and Maintenance	50.--	100	5,000.--
	Total			37,889.--

Table 1(b): Contribution breakdown by agencies.

Item No.	MWRC	AIPCC	MAAE	District Office	WVIE	Total Cost (Birr)
1	8,840.--	-	-	-	-	8,840.--
2	-	7,320.--	-	-	-	7,320.--
3	200.--	-	2,800.--	-	-	3,000.--
4	-	264.--	-	-	-	264.--
5	2,250.--	-	-	-	-	2,250.--
6	1,500.--	250.--	425.--	2,840.--	-	5,015.--
7	-	-	-	-	6,200.--	6,200.--
8	5,000.--	-	-	-	-	5,000.--
Total	17,790.--	7,834.--	3,225.--	2,840.--	6,200.--	
Grand Total						37,889.--

.../

Table 2(a): The Iyrole ATSP cost breakdown

Item No.	Service Description	Rate (Birr/hr)	Service Rendered (hr)	Total Cost (Birr)
1	Grader (Volvo)	120.--	6	720.--
2	Grader (CAT-130G)	120.--	208	24,960.--
3	Dozer (CAT-D4)	65.--	220	14,300.--
4	Vehicle	10.--	160	1,600.--
5	Fuel	-	-	17,400.--
6	Casual expenses	-	-	2,000.--
7	Supervision and Management	50.--	100	5,000.--
	Total			65,980.--

Table 2(b): Contribution breakdown by agencies.

Item No.	MWRC	AIPCC	Gewane RRC	Gewane District Office	FTC	Total Cost (Birr)
1	-	-	720.--	-	-	720.--
2	-	24,960.--	-	-	-	24,960.--
3	14,300.--	-	-	-	-	14,300.--
4	1,600.--	-	-	-	-	1,600.--
5	-	-	-	-	17,400.--	17,400.--
6	-	-	-	2,000.--	-	2,000.--
7	5,000.--	-	-	-	-	5,000.--
Total	20,900.--	24,960.--	720.--	2,000.--	17,400.--	
Grand Total						65,980.--

.../

PAST LIVESTOCK RESEARCH AND ITS IMPLICATION ON PASTORALISTS AND HIGHLAND FARMERS

Beriam Akalu[1]

INTRODUCTION

Ethiopia is endowed with a large cattle population which makes it the first in Africa and among the top ten in the world. The cattle are mainly Zebu type, but small number of exotic dairy cattle and their crosses have been introduced into the country. The highlands (over 700 mm of rainfall) where 92% of the population live, have about 73% of the national cattle pupulation, 75% of the national sheep and 27% of the goat flocks. The lowlands (less than 700 mm), however, are inhabited by 8% of the human population and have about 22% of the national cattle, 25% of the sheep and 73% of the goat populations.

In both distinct geographical zones, milk and milk products play an important role in the dietary habit of the people. It is generally a subsistence type of livestock enterprise serving the immediate family need. The pastoralists and the semi-nomads depend largely on milk from cattle, sheep, goats and camels as their staple food. In mid and high altitude zones, where cultivated agriculture is the main emphasis, animal husbandry plays a secondary role. In general, the rural population consumes nearly all the milk that is produced and only a small portion is marketed in the form of butter or ghee.

Milk production system can be broadly classified into the traditional and modern sectors. The traditional sector is the subsistence type of production and is largely based on the milk obtained from low producing, unselected, native Zebu cattle. This sector constitutes the major source of the milk produced in the country but is mainly for home consumption and is not market oriented. There is no specialized feeding system, and cattle graze on natural pastures.

The modern dairy sector is where exotic crossbreed and purebreed cattle are used by individual farmers, cooperative or government institutions. The sector is not well developed, but is increasingly becoming important and is a major supplier of milk to the urban population. The modern dairy sector is largely found in the highlands where conditions are favourble for dairy development.

In the highlands, sheep and goats are given less attention in terms of feed and are mainly kept as scavengers. The average number of sheep and goat per landholding in the whole country except Eritrea, Tigray and the nomadic areas is 3.8 and 3.5 respectively. Male lambs, usually immature, and culled ewe and rams are marketed locally and a relatively great number of them, especially lambs find their way to the urban centers. Finishing immature lambs is not a common practice, and if done, it is only on an individual scale during religious holidays.

---

[1]Research Officer, Institute of Agricultural Research, Melka Werer Research Center, P.O. Box 2003, Addis Ababa, Ethiopia.

.../

LIVESTOCK PRODUCTIVITY

Relatively speaking, Ethiopian cattle are not very productive. Annual culving percentage is estimated at about 50% and mortality rate is 8.5%. Heifers do not calf before they are 2½ to 4 years old and every two years thereafter. Mature live weight varies with the breeds concerned but on the average small breeds weigh between 210 and 280 kgs, while the larger breeds can weigh as much as 500-600 kgs. Draft, milk, meat and manure are the important products. An average caracas weight of around 125 kgs is achieved. Total annual estimated beef production is 245,000 tons and there is a potential of approximately 368,000 tons (AACM, 1984). Most of it comes from aged bulk, and over-worked oxen. The beef quality is poor.

A mere 77 kg of beef is produced from each head of cattle in Ethiopia. The estimated average offtake is about 7.2% (FAO, 1980). The mean average offtake for other African countries ranges from 8-12%(FAO, 1980).

The offtake rate for sheep is about 30%. Goats have an offtake rate of 36%. Caracas weights for sheep and goats range from 9-10kg. The caracas yield in the national flock is about 3 kg, compared to world average of about 5 kg.

Major Constraints to Livestock Production in Ethiopia

1. Low genetic potential of the local livestock:

   Milk production is largely based on the indigenous Zebu cattle which are genetically low milk producers.

2. Breeding and Management Systems:

   In the peasant sector, where the vast majority of cattle exist, the standard of animal husbandry practice is generally poor. Diseases are not adequately prevented or treated. Since controlled breeding is not practical, a great deal of inbreeding has taken place and this has resulted in less genetic diversity within the breeds. Physical maturity is not reached before 4 to 5 years of age. Fertility is very low and consequently life time productivity for draft, meet, milk and mutton is greatly reduced.

3. Nutrition:

   There is an overall scarcity of feed resources arising from poor grazing land and lack of improved feeding practices. Liveweight gained during the wet season is lost during the dry season.

4. Disease and Mortality Rate:

   In general, the occurence of serious diseases limits production and offtakes. The prevalence of contagious diseases is a major obstacle to livestock productivity and development in the country. It is estimated that 8.5%, 14.5% and 11.6% of cattle, sheep and goat,

.../

respectively die every year. A majority of these are young animals (Charette, 1984). The most common disease known in the country is riderpest quite unknown to the country before the turn of the century. It is believed that the Italians were responsible for introducing the disease through their colony, Eritrea.

5. Marketing, Processing and Infrastructure:

Unavailability of marketing structure, fatigue caused by trecking long distance before reaching slaughter houses, lack of feeding and watering facilities along the trecking routes, seasonality in the demand for meat, especially in the domestic market, financial constraints and the role played by the middlemen leaves very little margin of profit for the producer. The farmer or the pastoralist hence lacks the incentive to produce better finished animals. Despite the proximity of Ethiopia to high income and high mutton consuming countries, the export market suffers from lack of a persistent policy. In the past, an unarticulated policy has encouraged illegal trading of animals across boarders with a loss of revenue badly needed for national development.

6. Sociological Considerations:

To many of the Ethiopian people and especially the pastoralists, cattle are a sign of wealth and status. Preference is given to quantity rather than quality. In some regions of the country, there exists a prejudice against the consumption of goat milk and meat.

LIVESTOCK RESEARCH AND DEVELOPMENT SERVICES

Despite the fact that Ethiopia is an important livestock country, research on livestock production is very recent. Considering its potential, research on animal production has lagged behind that of other disciplines.

There are a number of developmental and research institutions that are presently dealing with livestock research and production. Some of the institutions are:

- Arsi Regional Development Programme (ARDP)
- Ministry of State Farm Development (MSFD)
- Ministry of Foreign Trade (MSFD)
- Higher Institutions of Learning (Alemaya, Awassa, Debre Zeit etc.)
- Ministry of Agriculture (MOA/ARDD)

The Institute of Agricultural Research incorporated cattle research in its programme in 1970 at four centers and sheep and goat programmes at other two centers. The cattle programme was started by first assessing the different characteristics and production potential of four types of indigenous Zebu cattle, namely: Borona, Horo, Barka, and Fogera which are considered distinct and represent different regions of the country. Although the Fogera breed was initially included in the programme, it was latter discontinued. The assessment was done on growth rate, reproductive efficiency and production potential for meat and milk. Average results from four to six locations, indicated that the milk yield

.../

per year of each of the three breeds did not exceed 700 litres under relatively improved management conditions. Only a small percentage of them gave more than 1500 litres with a higher proportion of them giving not more than 100 litres per lactation (Progress Report 1971/72).

In the light of these findings, it was determined that it would be too big and too slow a task to improve the national average level of milk production by using native Zebu alone. A long term cross breeding research programme was, therefore, proposed in 1972 (Progress Report 1982/83). The result of this cross breeding research programme are hoped to provide guidelines for the kind of dairy breeding policy to be followed in the future in the different agro-climatic zones of the country. The indigenous breeds used in the programme are all except the Fogera. Their exotic counterpart are Fresian, Jersey and Simmental.

A study made on the reproductive characteristics of some exotic F_1 breeds and Zebu cows has been published in the Ethiopian Journal of Agricultural Sciences (EJAS). A short summary on reproductive characteristics for the semi-arid research centres (Melka Werer and Adamitulu) is shown in Table 1.

Table 1: Reproductive characteristics for Semi-Arid Melka Werer and Adamitulu Research Centers.

	Local	X-Breed
Number of Service per conception	1.98	1.74
Gestation length (days)	281.00	282.00
Days open till conception	250.10	-
Age at first calving (months)	-	40.30
Calving rate (calf/cow/yr)	0.33	0.60
Calving interval (days)	484.00	-

Source: Department Progress Report for the period April 1981 and March 1982 (IAR).

In addition, preliminary analysis of milk production of F_1 has also been made. Average milk production for 305 days for Friesian and Jersey were 1697 and 1845 kg respectively. Cows from Barka dams gave the highest milk production (1897 kg) followed by cows from Borona dams (1854 kg) and those from Horo dams (1672 kg). There was also location effect observed, with cows at Adamitulu giving the highest milk production (2073 kg) followed by Holetta (1854 kg) Bako (1687 kg) and Melka Werer Research Centers (1590 kg) (Progress Report 1980/81).

In the field of breeding and genetic improvement, an attempt has been made to increase the body size of Adal and Black head Somali sheep at Melka Werer, and of Horo sheep at Bako. There is also breeding research on Adal goats with the main aim of improving milk yield and growth rate. Even though selection is a long term endeavour, a general positive trend of weaning 6 months weight and post weaning daily gain with time has been seen. Mean summary of the economically important traits is shown in Table 2.

.../

Table 2: Means of some economically important traits of sheep and goats.

Traits	Sheep		Goats
	Horo	BHS	Adal
Lamb/kid			
Birth weight (kg)	2.50 (0.40)	2.70 (0.10)	2.10 (0.10)
Weaning weight (kg)	13.00 (0.50)	14.20 (0.50)	8.00 (0.20)
6 months weight (kg)	18.40 (0.50)	17.70 (1.00)	-
Yearling weight (kg)	25.80 (0.20)	24.80 (0.70)	20.70 (0.40)
Ewe/mature weight (kg)	31.60 (0.40)	31.70 (0.60)	28.40
Post weaning ADG (gm)	67.00 (3.00)	47.00 (0.10)	79.00
Weaning live ability(%)	93.00	94.00	79.00
Conception rate (%)	78.00	63.00	45.00
Lambing/kidding (%)	105.00	104.00	114.00
12 weaks milk yield (l)	26.30 (16.00)	-	20.00

Source: (1) Galal, E.S.E. Animal Genetic Resource Information 1983, 1:4-12.

(2) Galal, E.S.E. Report on Sheep and Goat Production Work, IAR 1982.

Some management studies have also been conducted on Adal sheep using a mixture of grazing and concentrate feeding systems to evaluate the capability of this breed in performing under improved conditions. If good pasture is available, these rams are capable of reaching reasonable market liveweight of 40 kg in 341 days if not supplemented and 297 days if supplemented with concentrates. This is on the assumption that they are put on pastures at six months of age with an average weight of 18.4 kg (An. Pro. Bul. 1977). A study shows that fattening young lambs on irrigated pasture was the only livestock enterprise that could compete successfully with cotton and other cash crops (Lines et. al, 1974)

SUMMARY

It has been stated earlier, the pastoralists (nomads) are normally found in the lower altitude where the annual rainfall is less than 700 mm. Cattle are kept to provide milk and meat for the family. Animal production usually concentrates around water points. Herd size per family is usually large. Hence, before any livestock development work starts with the Afar pastoralists the advantage and disadvantage of keeping too many unproductive cattle must be systematically investigated.

It is also possible to establish dairy farms consisting of 5 to 10 dairy cows of 50% crosses at communal centers, where peasant associations are strong. Small dairy farms dependent on irrigated pasture and forage are not only possible but a sure way of developing the area where animal husbandry is already practiced by the population.

.../

Dairy farms may require construction of barns which can be built from locally available materials at low cost. At this stage, support from research and development institutions are essential to the farmer.

The Ministry of Agriculture is implementing such programme in the highlands. Within the coming five years, there are plans to increase the present number of 98 cooperative dairy farms in the highland to 600 cooperatives with an average herd size of 40 cows.

.../

REFERENCES

1. A.A.C.M., 1984. Project Preparation Report, Feeds and Forage Project. Annexes, Vol. 1, MOA, Ethiopia.

2. Charette, L.A., 1984. Report of the East African Regional Meeting on Agriculture Research Priorities, Nairobi, Kenya.

3. Ethiopian Journal of Agricultural Sciences, Vol. III, No. 1 and 2, Addis Ababa, Ethiopia.

4. FAO Committee on Commodity, Problems, Intergrovernmental Group on Meat 6th Session, Rome 4-8 October 197[illegible], Rome, Italy.

5. Galal, E.S.E., Sebhatu Gebrelul and Getachew Feleke, 1977. Performance of the First Crop of Lambs/Kids, NARC, Anim. Pro. Bul. No. 2, IAR, Addis Ababa, Ethiopia.

6. _____, 1980. A contribution towards a plan for sheep development in Ethiopia, IAR, Addis Ababa, Ethiopia.

7. _____, 1982. Report on Sheep and Goat Production Work (Unpublished) IAR, Addis Ababa, Ethiopia.

8. Institute of Agricultural Research, 1972. Progress Report, for the period of April 1971, Addis Ababa, Ethiopia

9. _____, 1981. Progress Report, for the period of April 1980 to March 1981, IAR, Addis Ababa, Ethiopia.

10. _____, 1982. Progress Report, for the period of April 1981 to March 1982, IAR, Addis Ababa, Ethiopia.

11. _____, 1983. Progress Report, for the period of April 1982 to March 1983, IAR, Addis Ababa, Ethiopia.

12. Lines, G.E. and R.J. Pattison, 1974. Development of the Awash Valley, Phase III, Progress Report on Technology and Economics of Irrigated Pasture in Awash Valley, UNDP/FAO/ETH/72/006, Informal Technical Report No. 25, Rome, Italy.

13. L.M.B. Ethiopia, Livestock Service Project, 1976. Report to Government of Ethiopia, Livestock and Meat Board, Vol. I, Addis Ababa, Ethiopia.

.../

PASTURE AND FORAGE RESEARCH AND ITS RELEVANCE TO PASTORALISTS AND FARMERS IN AWASH VALLEY

Aschalew Tsegahun[1]

INTRODUCTION

More than 85% of the Ethiopian population depends on agriculture for existence. In this regard, livestock has a major share in terms of providing milk and meat as well as draft provision.

Ethiopia has the largest animal population in Africa. The estimate runs between 26 to 27 millions head of cattle. However, the revenue generated from livestock production is negligible when compared with its size. This is mainly because of the poor class of livestock and marketing channels that exist in the country.

The major source of feed for livestock is natural pasture. The productivity of the natural grass land in most parts of the country is too low even to provide enough feed for animal maintenance throughout the year. Feed shortages can be serious during dry seasons and the weight that is normally gained during the rainy season is lost during the dry period. As a consequence, overgrazing is left in subsequent years with harmful effects on formerly lush pastures.

In the Middle Awash valley, much agricultural development work has been carried out in the field of industrial crop production, but perhaps at the expense of natural grazing grounds which previously supported quite a number of animals in the region. The development ventures so far launched in the region has created economic and social inbalance to the pastoralists of the area and aroused the need to develop irrigated pastures in order to compensate for the loss of natural grazing grounds.

The sources of livestock feed in the valley are listed below:

1. Natural grass/grazing areas.
2. Irrigated pasture.
3. Food and industrial crop leftovers.

(1) Natural Grazing Areas

As is true for most parts of the country, natural pasture is managed very poorly in the valley. The result is seriously land degradation leading to the disappearance of valuable species and the spread of unpalatable ones. Although the productivity of the natural grazing area decreases from time to time, a major part of animal feed is obtained from socially owned pastures. It is important to note that serious degradation of the pasture is evident adjacent to water ponds while relatively under-utilization is seen in areas where there are no watering facilities.

[1]Research Officer, Institute of agricultural research, Melak Werer Research Center, P.O. Box 2003, Addis ababa.

.../

1.1. How to improve the Grazing Areas: There are numerous ways to improve grazing ground in a more rational way.

a. Providing shade and water - Providing shade and water at a specified distance encourages a rational way of grazing by evenly distributing the animal population in the grazing ground.

b. Controlled grazing - The amount of time in which the animal is kept in one area should be determined before hand to avoid overgrazing. Unfortunately, no research has been conducted along this line.

c. Number of animals - The practice of keeping large numbers of animals for the purpose of promoting social status must be discouraged. However, care should be exercised not to upset the traditional life pattern of the nomad whose social position depends on the number of livestock he owns. It is imperative, however, that the number of livestock should correspond to the carrying capacity of a given grazing area.

d. Removal of weeds and toxic plants from the grazing ground - Since weed compete for moisture and nutrients with the economically important palatable grasses, their presence should be reduced if not completely eliminated. Some weeds could also be toxic to animals.

e. Limiting grazing ground - Grazing areas which are known to be highly degraded as a result of overgrazing should be protected for specified times. This will give the grass a chance to regenerate fully for eventual systematic grazing.

f. Conservation of hay - Any surplus feed should be harvested bailed and preserved as hay. With the introduction of crops other than cotton in the Awash Valley, surplus hay could be made easily available.

g. Systematic burning of the grazing ground - Careful burning of the ground can be practiced to eliminate undesirable weeds. However, burning could be recommended when the grazing area is dominated by unpalatable weed species and if infested by external parasities. If burning is found to be necessary, it should be done before the onset of the rain.

h. Manuring - Manure application is one way of improving the quality and quantity of the pasture. Manure also improves soil structure.

i. Planting improved forage - After disturbing the land by light discing or forked twigs, planting of forage legumes may improve the condition of the pasture greatly and replace unwanted weed species.

.../

(2) Irrigated Pasture

One of the advantages of irrigated culture is that it facilitates the continuous availability of feed both in quality and quantity throughout the year. Atpresent, few well adapted grass and legume are available for cultivation.

2.1. Some of the factors to be considered when choosing seeds for irrigated pastures are:

a. Well adapted variety.

b. High yielder.

c. Longevity and persistance of the pasture.

d. Palatability

e. Nutritive value of the forage

f. Regenerative capacity of the grass after harvesting or grazing.

Irrigated pasture requires that soil be fertilized to remain productive throughout the year. Low soil fertility and water logging conditions are primary limiting factors for pasture production. Maximum yield is expected under irrigation if the pasture is fertilized and properly grazed.

2.2. Cultural practices required to establish forage crops under irrigation are listed as follows:

a. Land preparation - Thorough plowing and discing is necessary in the initial stage. The depth and the intensity of the land preparation will depend on the type of soil and forage crops to be cultivated. Small seed forage crops require well prepared fine seed bed.

b. Levelling - The land should be well levelled to allow even distribution of irrigation water in the field.

c. Seeding practice - Utmost care must be excercised when planting forage crops. In order to insure uniform distribution of seeds in the field, small seed forage crops should be mixed with fertilizer or sand at sowing time. Large ones could be planted at the recommended time. After sowing, the seeds must be lightly covered with soil by dragging accacia twigs or similar branches across the field or by using a spike tooth harrow in the case of mechanized farming.

e. Intercrop - Intercrop of food and forage crops are common.

2.3. Irrigated pasture can be utilized in the following manner:

a. Green feed (cut and carry).

b. Grazing.

c. Cut for hay or silage.

.../

2.4. Many different pasture species have been tested for their adaptability, vigor of growth, disease resistance, earliness to shooting, uniformity of flowering and methods of propagation under irrigated condition. The following forage and pasture species have been found to be suitable for the Middle Awash Valley conditions.

COMMON NAME		SCIENTIFIC NAME
Lucerene	-	Medicago sativa
Laelab beans	-	Lablab purpurous
Siratro	-	Macroptilium stropurproum
Desmodium	-	Desmodium unicinatum
Rhodes	-	Chloris gayana
Guniea	-	Panioum maximum
Blue panic	-	Penicum antidotale
Buffel	-	Cenchrus ciliaris
Napeir	-	Penistum purpureum
Colombus	-	Sorghum almum
Sudan	-	Sorghum sudanesse
Leucaena	-	Leucaena leucocephala
Sesbania	-	Sesbania aculata

Recommended mixtures:

Panicum antidotale	-	with Medicago sativa
Chloris gayana	-	with lablas purpureus
Zea mays	-	with lablab purpurous
Sorghum bicoler	-	with Lablab purpureus
Cenchrus ciliaris	-	with Medicago sativa
Chloris gayana	-	with Medicago sativa

Protein content of the major forage crops is indicated below:

Species/variety		Protein %
Luecrene	-	18.4
Panicum antidetale	-	16.3
Panicum coloratum	-	11.7
Panicum maximum	-	10.0
Chloris gayana	-	8.6
Napier grass A 145	-	10.6
Pigeon grass A 115	-	9.5

2.5. Seed production - One of the major limiting factors in the development of pasture throughout the country is the unavailability of seed material. At the present juncture, there is no particular institution which is fully responsible for the production of seeds. In recent years, the Ethiopian Seed Enterprise started producing seeds, but in very small quantities to cover regions such as the Awash Valley.

.../

The major problems associated with forage seed production are:

a. Shattering - Most of the forage crops have the tendency to shatter. Unless close supervision is excercised during production, most of the seeds can be lost to the ground before they are harvested/collected.

b. Uneven maturation - Uneven maturation makes machine harvesting difficult and hand picking tedious.

c. Dormancy - Some forage seeds cannot be planted immediately after harvesting. They have to break their dormancy period. The only way known todate is by chemicals.

d. Storage - Storage temperature and seed moisture content are the most important factors determining the rate of deterioration of stored seed.

The following alternative sets of conditions are recommended for safe storage of seeds for short, intermediate and long term periods.

	Temperature °C	Relative Humidity %
Short term storage (1-9 months)	20-30	50-60
Intermediate term storage (18 months)	10-20	40-50
Long term storage (3-5 years)	10	45

(3) Food and Industrial Crop Leftovers

3.1. Crop residue or crop byproducts can be an excellent source of animal feed if supplemented with other feeds. Wheat and maize straw, cotton stalks, the top part of sweet potatoes and ground-nut leaves could make excellent feed for animals.

3.2. Industrial by-products - In the Awash Valley, seed cotton and sugar cane by-products should be used by farmers if resources are to be properly utilized. This source of feed has yet to be exploited properly in the Valley.

.../

RECOMMENDATION AND CONCLUSION

To this date, most of the research results generated during the past few years have not been put to the best use. Lack of extension machanism is partly to blame.

Any potential farmer in the valley could choose varieties of forage crops already evaluated in the research center. However, the most common ones to start with are listed below:

Grasses	Legumes	Shrubs
Rhodes	Siratro	Leucaena
Panioum spp	Desmoudium	
Buffel	Alfalfa	

To improve natural pasture in rainfed areas for grazing purposes, Stylosanthes sp. could be advantageous. If the area receives an ample amount of rainfall (400-500mm), and has an even distribution pattern, Desmoudium sp. could also be used as an alternative.

In commonal grazing areas of the valley, alternate grazing system must be adapted. Unless emphasis is placed on a rational method of natural grazing, there is no way irrigated pasture alone could sustain the livestock in the region. Hence, wise management of the pasture should be an integral part of livestock production.

Although feed plays a major role in animal performance, veterinary services are no less important.

Table 1: Illustrates clearly the potential yield of forage crops in the Valley.

Sp. Variety	Forage Yield DB tons/ha	Growth Habit	Seed Yield kg/ha
Medicage sative	55	Erect	164.5
Lablab purpurous	45	Creepong	106.5
Desmodium onioinatum	-	"	-
Macroptilium atropurpureum	12	"	67.5
Chloriss gayana	42	Erect	192.0
Panicum maximum	46	"	240.0
Panicum antidotals	65	"	431.0
Cenchrus ciliaris	30	"	240.0
Pennisetum purpureum	48	"	-
Sorghum almum	-	"	2680.0
Sorghum sudanesse	49	"	2170.0
Leucaenakleucocephala	44	"	1500.0
Sesbania aculata	-	"	-

.../

VOTE OF THANKS

In the name of the organizers, I would like to thank the participants of this seminar. Indeed without the active support of the participants, the seminar would not have been successful.

Many of these small projects were supported by governmental and non-governmental organizations. Among them, the French Technical Cooperation, World Vision International Ethiopia and the Institute of Agricultural Research stand high. My gratitude is also extended to the International Development Research Center (IDRC) without whom the oil crops improvement project's outreach programme, and agricultural development work would have been difficult.

At last I would like to thank Ms. Almaz Degefu for typing the final manuscript.

Zeratzion Woldelul

PROLOGUE

Since last year, the mini projects at Gewane and Amibara have been gradually expanding to attract more government and private aid. As a result, more land came under production at Amibara while at Gewane modest number of pastoralists joined the project.

At Amibara ATSP, farmers continue depending on borrowed tractors to plow their land. Very recently, though the Agricultural Implements Research and Improvement Centre (AIRIC) of the Institute of Agricultural Research (IAR), has initiated a study on animal drawn locally manufactured implements at Melka Werer. After the completion of the study, it is hoped that farmers at Amibara may benefit from the innovations generated at AIRIC. It is reassuring to observe, however, farmers at Iyrole and Kassem/Kebena ATSPs, continue plowing their lands with camel and oxen respectively.

At Amibara, over 50% of the farmers have been double cropping their fields. Wheat and early maturing groundnut cultivars were found to be appropriate for off-season cultivation, which is normally shorter than the main season. Twenty-two out of ninety farmers at Amibara ATSP are specializing on vegetable production.

In the past years, quite a number of agencies extended their helping hands to the ongoing nomad settlement projects.

The Red Cross at Gewane donated three draft camels with their harness to the Iyrole Project. In addition, the Red Cross transfered a substantial number of hand tools from its projects in Wello.

The Ministry of Agriculture also provided 50 lt/sec capacity pump to the Iyrole Project. This is on top of two pumps with 30 lt/sec capacity supplied by EWWCA during the 1985/86 cropping season. The total number of pumps presently available at Iyrole are four.

The most novel thing to happen at Iyrole this year is the installation of a UNICEF donated flour mill. The mill is serving not only farmers at Iyrole but also other people nearby.

Among NGOS, the French Technical Cooperation continued to support the Iyrole Project actively. In addition to hiring a monitor, who will assist farmers in their day-to-day activities, the agency also financed store construction. Furthermore, the FTC initiated village level medical programme by hiring a health assistant who is qualified to spense malaria tablets, dress wound and administer eye midicine.

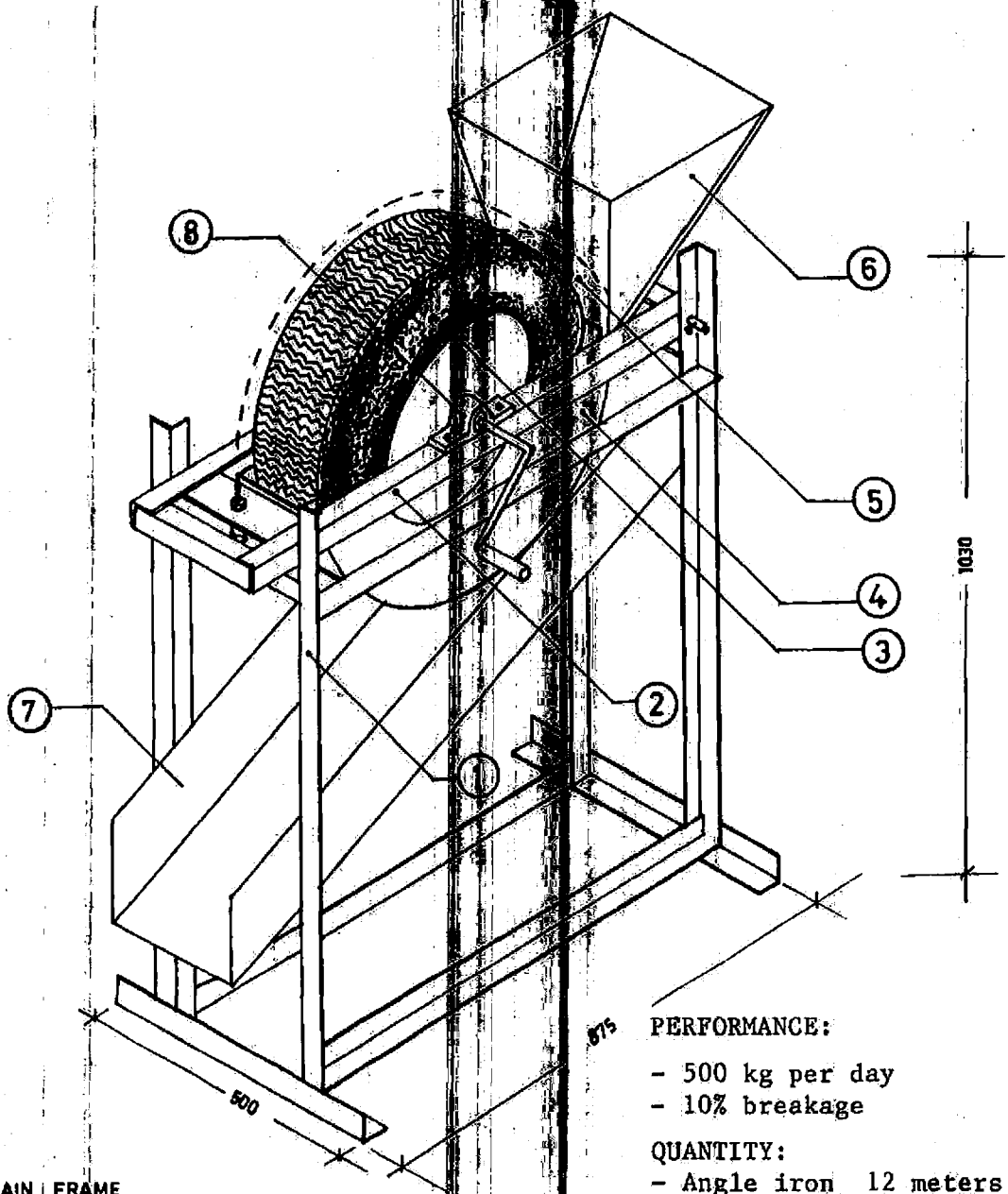
With the financial aid provided by the Canadian Embassy, the farm lands at Amibara was levelled to less than 1% slope. This will allow irrigation water to run smoothly in the fields. Simultaneously, the main canal was reinforced and terry canals remade. An additional 8 ha of land was developed and main and field canals of 5 km length constructed. The World Vision International Ethiopia, which had partly financed the project at Amibara, suddenly withdrew its earlier promises to support Phase II, hence for the Canadian Embassy involvement.

.../

The Melka Werer Research Center is the center pivot of these projects. It continues coordinating the development activities and is the main supplier of seeds and advice. So far, it has trained intensively six contact farmers in its center facilities. One pump attendant has also been trained at the center workshop.

Kessem/Kebena (ATSP)

Some 25 km west of Amibara, between the rivers of Kessem, Kebena and Awash, 100 more Afar farmers are in the process of registering themselves into Peasant Association (Iyrole and Amibara ATSPs are already registered peasant association members). The main supporters of this project are the IAR and OXFAM. OXFAM, last year agreed to purchase nine pair of oxen and sizeable number of hand tools. They have also sponsored the training of three farmers at the center. The IAR supplied seed materials.



1. MAIN FRAME
2. RUBBER TIRE FRAME
3. RUBBER TIRE ASSEMBLY
4. CONCAVE
5. COVER
6. HOPPER
7. TROUGH
8. BEARING

PERFORMANCE:

- 500 kg per day
- 10% breakage

QUANTITY:

- Angle iron 12 meters
- 2 x bearings
- 1 x used tyre
- 3 x sheet metal (2 x 1m)
- 1 x wiremesh (2 x 1m)

TOTAL COST = 1200 Birr

RUBBER TIRE GROUNDNUT SHELLER	
DES. BY	ZERATZION WOLDELUL
DR. BY	DANIEL TESSERA
APPD. BY	DENIS GERARD
DATE	JULY - 86
SCALE	1:12·5

Figure 5: Rubber tyre groundnut sheller constructed for the Tyrole ATSP. (Courtesy FTC).

Figure 6. Rubber tire groundnut sheller of the Iyrole ATSP under operation. (Courtesy FTC).

Figure 8a. Donkey driven cart constructed under joint project of ATSP.

Figure 8b. Donkey driven cart constructed under joint project of ATSP.