

Table IV.2.3 Farmland Use and Grazing Sources in Dugda Bora

No.	Peasant Association	Farmland(ha)	TLU	Grazing land, ha	Grazing condition	Ha/TLU
1	Kersa Gambala	1,307	1,901	469	poor,fl	0.24
2	Abene Kumuro	1,155	1,831	529	poor,fl	0.28
3	Adele Mirt Meteia	1,308	2,177	400	med,fl	0.18
4	Biliti Balewoid	1,012	2,685	575	med,fl	0.21
5	Koto Biliti	1,446	2,309	657	med,fl	0.28
6	Argo Gadilala	627	1,536	1,191	poor,fl	0.77
7	Tuchi Denbel	1,077	3,079	474	good,nl	0.15
8	Wayo Gebriel	1,179	1,793	279	poor,nl	0.15
9	Aboro Gebriel	841	2,324	625	med,nl	0.26
10	Dodoti Dembel	832	1,948	782	med,nl	0.40
11	Mukiye 1	1,942	2,986	1,160	med,fl	0.38
12	Birbirsu Guda Sabole	2,081	1,710	850	poor,fl	0.49
13	Birbirsu Gale	1,057	4,092	599	good,fl	0.15
14	Eela Gebre Daiech	864	4,874	644	good,fl	0.13
15	Menjegso Weji	951	3,165	1,044	good,fl	0.32
16	Joro Reka	952	1,476	726	poor,fl	0.49
17	Korke Adama	1,237	3,402	467	good,fl	0.13
18	Goro Korke	1,651	3,402	1,097	med,fl	0.32
19	Kiltu Ombole	1,745	3,277	792	good,fl	0.24
20	Doyo Laman	1,303	1,551	469	poor,fl	0.30
21	Tute Koremtu	1,561	3,480	855	good,fl	0.24
22	Koye Jejeba	1,284	1,906	1,068	med,fl	0.56
23	Hafe Kemale	1,066	1,806	700	poor,fl	0.38
24	Weldia Hafa	1,160	2,531	719	med,fl	0.28
25	Bevimogusa	1,200	3,261	1,088	good,fl	0.33
26	Dongorota	906	3,395	726	good,fl	0.21
27	Mukiya 2	1,002	3,069	609	med,fl	0.19
28	Hate Leman	1,256	1,633	709	poor,fl	0.43
29	Tepho Choroke	1,610	3,437	307	good,nl	0.08
30	Giraba Korke Adi	1,764	2,533	679	med,nl	0.26
31	Bekele Girisa	1,125	4,568	435	good,nl	0.09
32	Weldiyo Mekidela	1,493	2,024	67	med,nl	0.03
33	Weldiyo Kelina	1,442	2,717	812	good,nl	0.29
34	Saubi Gamo	1,437	3,805	215	good,nl	0.05
35	Tuchi Sumeyo	1,533	4,864	232	good,nl	0.04
36	Jawe Bofa	1,082	1,958	499	poor,fl	0.25
37	Oda Bokota	1,071	1,507	702	poor,fl	0.46
38	Derara Dalecha	1,529	2,310	150	med,nl	0.06
39	Burka Debrebeg	1,478	941	300	poor,nl	0.31
40	Jirme Bora	1,501	4,115	1,412	good,fl	0.34
41	Berta Sami	1,396	4,701	1,150	good,fl	0.24
42	Sori Dolesa	1,536	1,903	836	med,fl	0.43
43	Tuka Largamo	818	2,536	818	med,fl	0.32
44	Gose Korke	1,610	2,485	717	med,fl	0.28
45	Tuchi Deko	1,217	3,487	884	good,fl	0.25
46	Elen	1,027	1,962	1,147	med,fl	0.58
47	Kushe Huluko	1,080	1,638	530	poor,fl	0.32
48	Lafesa Germeji	913	2,460	699	med,fl	0.28
49	Gora Leman	534	2,065	700	med,fl	0.33
50	Dodo Wedera	1,586	2,775	694	med,fl	0.26
51	Malema Jere Bera	1,172	1,465	350	poor,fl	0.23
52	Tube Suti	1,223	2,307	724	med,fl	0.31
53	Dalota Mati	792	2,543	828	med,fl	0.32
54	Sera Wekele	1,114	1,819	510	poor,fl	0.28
Total		67,085	141,524	36,700		0.26

fl= far from lake, nl=near lake

Source: Agriculture Bureau Office, Dugda Bora Woreda Office, Year 2000-2001

Table IV.2.4 Estimate of Crop Residue from 1.5 ha of Farmland

Crop	Yield/ha in kg	Area planted (ha)	% total area planted	Portion of 1.5 ha (ha)	Yield from portion (kg)	Ratio of residue yield to grain yield	Total residue from grain yield (kg)
Teff	700	15,745	30.0	0.45	315	1.7:1	536
Maize	1,600	2,157	4.0	0.06	96	1.7:1	163
Wheat	2,200	15,354	29.0	0.43	946	1.7:1	1,608
Barley	1,800	251	0.5	0.01	18	0.6:1	11
Sorghum	1,200	900	1.6	0.02	29	1.7:1	49
Haricot/b	1,000	14,730	28.0	0.42	420	0.5:1	210
Pea	600	787	1.5	0.02	12	0.5:1	6
Horse/b	600	870	1.6	0.02	14	0.5:1	7
Chick pea	600	230	0.4	0.01	6	0.5:1	3
Lentil	300	180	0.3	0.01	3	0.5:1	2
Total							2,594

Table IV.2.5 Estimated Nutrient Requirement for Grazing Livestock for Dugda Bora

Livestock species	Number	Estimated Live-weight (kg)	Dry Matter Intake per day / animal (kg)	Total DMI Require.	ME req./ animal	Total ME reqment MJ/day	DCP req./ animal	Total DCP reqment g/day
Oxen	70,930	320	9.0	638,370	43.0	3,049,990	200	14,186,000
Cows	135,370	265	7.0	977,590	63.0	8,528,310	405	54,824,800
Sheep	28,473	35	1.5	42,709	6.7	190,769	45	1,281,285
Goats	60,772	25	1.5	91,158	6.7	407,172	45	2,734,740
Donkeys	12,164	115	8	97,312	9.0	109,476	500	6,082,000
Horses	525	140	10	5,250	10.0	5,250	550	288,750
Total req./day				1,852,389		12,287,950		79,397,575

References: ILCA (1991).

Table of Livestock Population of Dugda Bora Wareda provided by Veterinary Office Annual Census Report of Dugda Bora Wareda.

Table IV. 2. 6 Daily Nutrient Supply and Nutrient Deficit from Grazing and Crop Residues

Item	DM	ME(MJ)	DCP(g)
Grazing : 56,891 ha at 2,250kg/ha = 128,004,7tons (at mean 70% DM)	89,603.3 ton	716,826,400	50177848000
Per day	245,480 kg	1,963,840	13,746,880
Residues 2.6 tons per farm x 52 farms = 135.2 tons	121,680 kg	973,440	4,867,200
Per day	333.36	2,000.16	13,334.4
Total per day	245,813	1,965,840	13,760,214
Requirement /day	1,852,389	12,287,950	79,397,575
Deficit per day	1,606,576	10,322,110	65,637,361
% Requirement met	13.27%	15.99%	17.33%

Sources: Sayoum and Zenash, 1989
ILCA, 1991

Breakdown of Estimation

Grazing capacity is probably equivalent to Natural Region 4 in Zim (semi-arid, middle veld). This amounts to grazing capacity of 8 L.U. per ha.

L.U. on veld.: 8 ha./LU (Oliver and Topps, 1990)

Livestock	Population (Head)	TLU/Head	Total TLU
Cattle	206,300	0.70	144,410
Sheep	28,473	0.08	2,278
Goats	60,772	0.06	3,646
Donkeys	12,164	0.40	4,866
Horses	525	0.50	262
Total	122,564		155,462

Cattle 206,300 0.7 144410
Sheep 28,473 0.08 2 278
Goats 60,772 0.06 3 646
Donkeys 12,164 0.4 4 866
Horses 525 0.5 262
Total 155,462

Cattle = 0.7 LU = 0.33 ha per animal
Sheep and goats = 0.044 ha per animal
Donkeys = 0.2 ha per animal
Horses = 0.27 ha per animal

Total number of households = 52 PA x 417 (av) households = 22516.

Average number of LU per household = 5.9 (6)

Typical farm has 0.45 ha of grazing land giving 4500 kg dry matter production per ha. (Bekele, 1991). However, available consumption forage produced annually from pastureland is assumed to be 50% of gross production because of cattle selectivity and trampling, use by wildlife and loss due to fire (Houerou and Hoste, 1977). Therefore, work on 2250 kg per ha.

0.33 ha for cattle = 742.5 kg dry matter/cow or ox

Crop residue

Tons per household of crop residue = 2.65 tons.

Crop residue per TLU = 0.44 tons or 440 kg (amount per cow).

0.7 TLU= 308 kg crop residue per ox=277.2 kg dry matter

Nutrient supplied: DMME (MJ)/kgDCP (g/kg).

Pasture 458.056

Residue 90640

Table IV.2.7 Planned and Actual Activities of Veterinary Office in Dugda Bora (1997-1999)

Activity		1997	1998	1999
Vaccinations	Planned	73,822	67,512	60,784
	Actual	69,486	25,948	10,290
Internal parasites	Planned	15,600	16,380	8,160
	Actual	2,881	6,024	4,037
External parasites	Planned	11,000	13,650	11,143
	Actual	6,120	5,156	6,966
Infectious diseases	Planned	7,200	8,190	5,070
	Actual	2,220	1,817	1,911
Surgical treatment	Planned	20	20	10
	Actual	12	12	8
Fecal samples	Planned	480	260	224
	Actual	334	1467	0
Castration	Planned	1,000	1367	648
	Actual	728	421	305

Table IV.2.8 Frequency of Disease Outbreaks in Dugda Bora in 1996/1997

Disease	No. months outbreaks	No. locations outbreaks	No. locations vaccinated
Anthrax	8	19	19
Black leg	3	6	6
Pasteurellosis	5	10	10
Sheep and goat pox	3	4	4
Lumpy skin disease	4	11	11
AHS	1	3	1

Table IV.2.9 Distribution of Cropping Land Area

Category	Mean (ha)	Minimum (ha)	Maximum (ha)
1) GGNL			
Tuchi Denbel	2.75	1.00	6.00
Bekele Givisa	2.60	1.00	12.00
Tepho Choroka	7.30	4.00	10.00
Average	4.21	3.00	9.30
2) GGFL			
Gusa dongorata	2.56	1.00	6.00
Berta sami	3.20	1.00	7.00
Beyimo Gusa	4.70	1.00	10.00
Average	3.48	1.00	8.00
3) MGNL			
Givabe korke adi	5.07	2.00	10.00
Aboro Gabriel	2.11	0.50	8.00
Dodoti Dembel	3.22	1.00	9.00
Average	3.46	1.50	9.00
4) MGFL			
Weldia hafa	4.30	1.00	6.00
Koye Jojoba	3.20	1.00	5.00
Doyo Laman	3.80	1.00	5.00
Average	3.77	1.00	5.50
5) PGNL			
Wayo Gabriel	2.90	0.50	10.00
Burka Debrebeg	1.40	0.50	2.50
Hate Leman	2.10	0.50	5.50
Average	2.11	0.50	6.00
6) PGFL			
Hafe Kemale	2.90	1.00	4.50
Jawe Bofa	4.00	2.00	12.00
Birbirsa Guda Sabole	3.60	1.25	8.50
Average	3.50	1.50	8.50

Remarks : Category of grazing sources

- 1) Good grazing, near the lake (code GGNL)
- 2) Good grazing, far from the lake (code GGFL)
- 3) Medium grazing, near the lake (code MGNL)
- 4) Medium grazing, far from the lake (code MGFL)
- 5) Poor grazing, near the lake (code PGNL)
- 6) Poor grazing, far from the lake (code PGFL)

Table IV.2.10 Grazing Management of Cattle in the Rainy Season

PA Code	Grazing Conditions	Feeding in Rainy Season		Grazing Pattern in Rainiy Season (%)				
		Grazing Only	Grazing+Supple	1	2	3	4	5
Near Lake								
8	Poor	25	50	65	25	10	35	90
40	Poor	50	40	20	70	10	80	90
9	Medium	45	40	60	25	10	35	85
30	Medium	45	55	0	15	85	100	15
7	Good	60	25	50	5	45	50	55
29	Good	100	0	25	25	50	75	50
31	Good	30	70	5	95	0	95	100
Far from Lake								
23	Poor	95	0	60	30	5	35	90
36	Poor	0	100	5	5	0	0	90
22	Medium	100	0	15	20	40	25	35
24	Medium	100	0	25	50	25	75	75
25	Good	35	65	0	0	100	100	0
42	Good	10	90	100	0	0	0	100
26	Good	50	50	0	0	100	100	0

Note:

- 1 Near PA
- 2 By the Lake
- 3 By the River
- 4 By the Lake + by the River
- 5 PA + by the Lake

Table IV.2.11 Grazing Management of Cattle in the Dry Season

PA Code	Grazing Conditions	Feeding in Rainy Season		Grazing Pattern in Rainiy Season (%)				
		Grazing Only	Grazing+Supple	1	2	3	4	5
Near Lake								
8	Poor	40	60	80	0	0	35	0
40	Poor	35	10	95	0	0	80	0
9	Medium	50	50	95	0	0	35	0
30	Medium	5	50	0	0	100	100	0
7	Good	85	10	95	0	0	50	0
29	Good	70	30	50	0	50	75	0
31	Good	15	55	95	0	0	95	0
Far from Lake								
23	Poor	5	75	100	0	0	35	0
36	Poor	10	45	0	0	100	0	0
22	Medium	15	60	20	0	30	25	50
24	Medium	10	50	25	0	75	75	0
25	Good	10	90	0	0	100	100	0
42	Good	5	45	0	0	0	0	0
26	Good	30	70	0	0	100	100	0

Note:

- 1 Near PA
- 2 By the Lake
- 3 By the River
- 4 By the Lake + by the River
- 5 PA + by the Lake

Table 2.12 Distribution of Cattle

GROUP	MEAN (HEAD)	MIN (HEAD)	MAX (HEAD)
1) GGNL			
Tuchi Denbel	3	0	20
Bekele Givisa	10.7	1	29
Tepho Choroka	30	10	65
Average	14.5	3.6	38
2) GGFL			
Gusa dongorata	15.7	4	40
Berta sami	18.7	1	60
Beyimo Gusa	23	4	70
Average	19.1	3	56.6
3) MGNL			
Givabe korke adi	22.6	6	60
Aboro Gabriel	5.9	0	26
Dodoti Dembel	7.3	1	24
Average	11.9	2.3	36.6
4) MGFL			
Weldia hafa	15.4	0	40
Koye Jojoba	9.8	3	15
Doyo Laman	13.2	1	29
Average	12.8	1.3	28
5) PGNL			
Wayo Gabriel	4	0	30
Burka Debrebeg	6.5	0	20
Hate Leman	6	1	27
Average	5.5	0.5	25.6
6) PGFL			
Hafe Kemale	14.9	3	53
Jawe Bofa	10.2	3	25
Birbirsu Guda Sabole	13.1	2	40
Average	12.7	3	39.3

Remarks : Category of grazing sources

- 7) Good grazing, near the lake (code GGNL)
- 8) Good grazing, far from the lake (code GGFL)
- 9) Medium grazing, near the lake (code MGNL)
- 10) Medium grazing, far from the lake (code MGFL)
- 11) Poor grazing, near the lake (code PGNL)
- 12) Poor grazing, far from the lake (code PGFL)

Table 2.13 Distribution of Oxen

GROUP	MEAN (HEAD)	MIN (HEAD)	MAX (HEAD)
1) GGNL			
Tuchi Denbel	1.65	0	4
Bekele Givisa	2.26	0	9
Tepho Choroka	5.5	2	12
Average	3.13	0.6	8.3
2) GGFL			
Gusa dongorata	2.4	0	6
Berta sami	6.1	1	25
Beyimo Gusa	4.1	0	10
Average	4.2	0.3	14
3) MGNL			
Givabe korke adi	3.4	2	8
Aboro Gabriel	1.7	0	4
Dodoti Dembel	2.9	1	5
Average	2.6	1	6
4) MGFL			
Weldia hafa	4.7	0	10
Koye Jojoba	4	2	10
Doyo Laman	4.2	0	8
Average	4.3	0.6	9.3
5) PGNL			
Wayo Gabriel	2.1	0	10
Burka Debrebeg	1.9	0	4
Hate Leman	2.5	0	6
Average	2.2	0	6.6
6) PGFL			
Hafe Kemale	3.2	0	8
Jawe Bofa	2.5	1	8
Birbirsu Guda Sabole	2.8	0	9
Average	2.8	0.3	8.3

Remarks : Category of grazing sources

- 7) Good grazing, near the lake (code GGNL)
- 8) Good grazing, far from the lake (code GGFL)
- 9) Medium grazing, near the lake (code MGNL)
- 10) Medium grazing, far from the lake (code MGFL)
- 11) Poor grazing, near the lake (code PGNL)
- 12) Poor grazing, far from the lake (code PGFL)

Table 2.14 Distribution of Cow

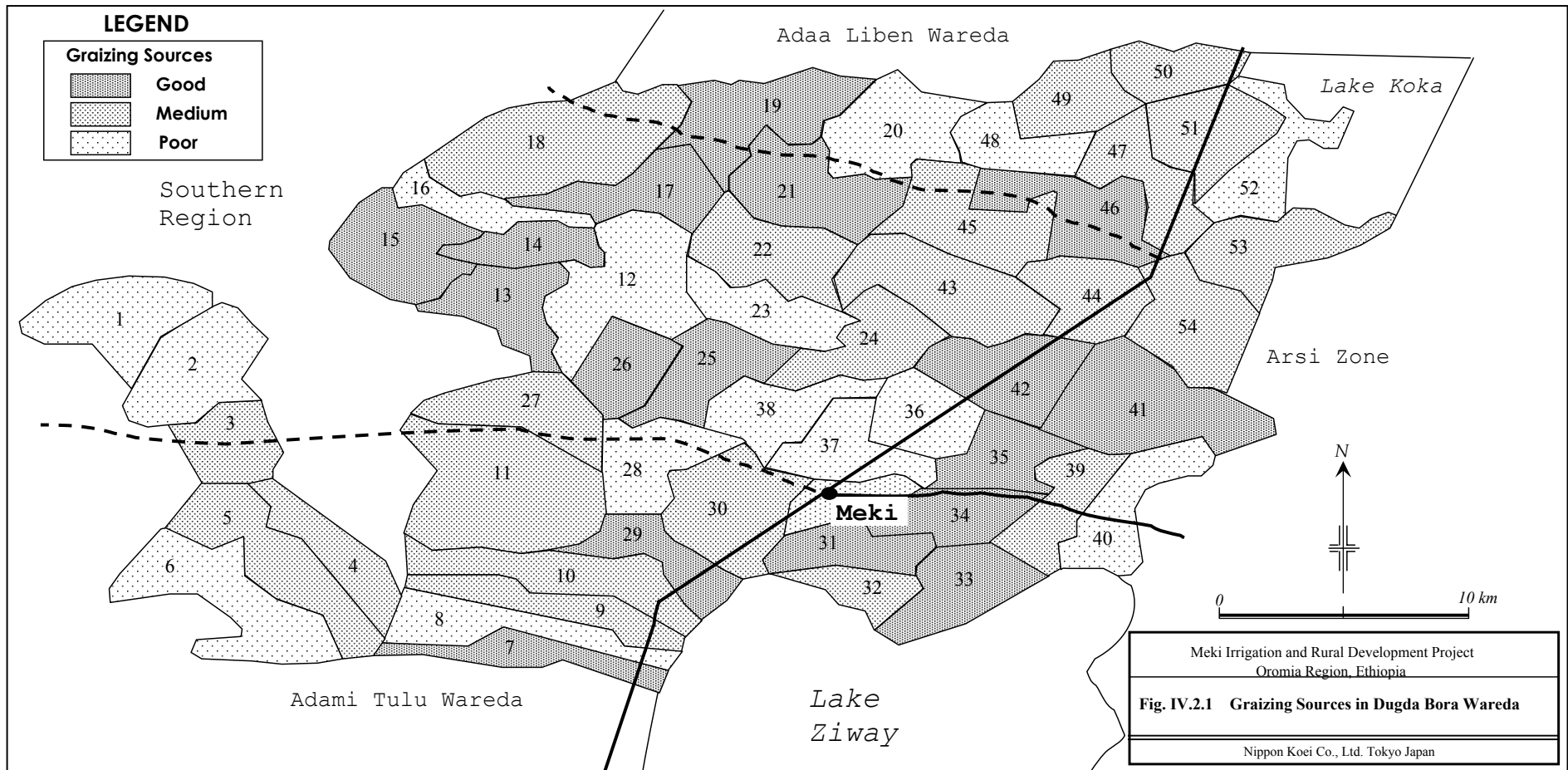
GROUP	MEAN (HEAD)	MIN (HEAD)	MAX (HEAD)
1) GGNL			
Tuchi Denbel	3.7	0	10
Bekele Givisa	3.7	0	10
Tepho Choroka	6.3	1	16
Average	4.6	0.3	12
2) GGFL			
Gusa dongorata	2.45	0	8
Berta sami	4.8	0	22
Beyimo Gusa	3.7	0	15
Average	3.6	0	15
3) MGNL			
Givabe korke adi	4.4	1	10
Aboro Gabriel	0.95	0	4
Dodoti Dembel	2.8	1	8
Average	2.7	0.6	6.6
4) MGFL			
Weldia hafa	3.47	0	7
Koye Jojoba	2.15	0	4
Doyo Laman	2.9	1	6
Average	2.84	0.3	5.6
5) PGNL			
Wayo Gabriel	1.35	0	6
Burka Debrebeg	1.8	0	5
Hate Leman	1.45	0	5
Average	1.5	0	5.5
6) PGFL			
Hafe Kemale	3.36	1	10
Jawe Bofa	2.9	1	6
Birbirsu Guda Sabole	2.85	1	7
Average	3	1	7.6

Remarks : Category of grazing sources

- 7) Good grazing, near the lake (code GGNL)
- 8) Good grazing, far from the lake (code GGFL)
- 9) Medium grazing, near the lake (code MGNL)
- 10) Medium grazing, far from the lake (code MGFL)
- 11) Poor grazing, near the lake (code PGNL)
- 12) Poor grazing, far from the lake (code PGFL)

APPENDIX IV
ANIMAL HUSBANDRY

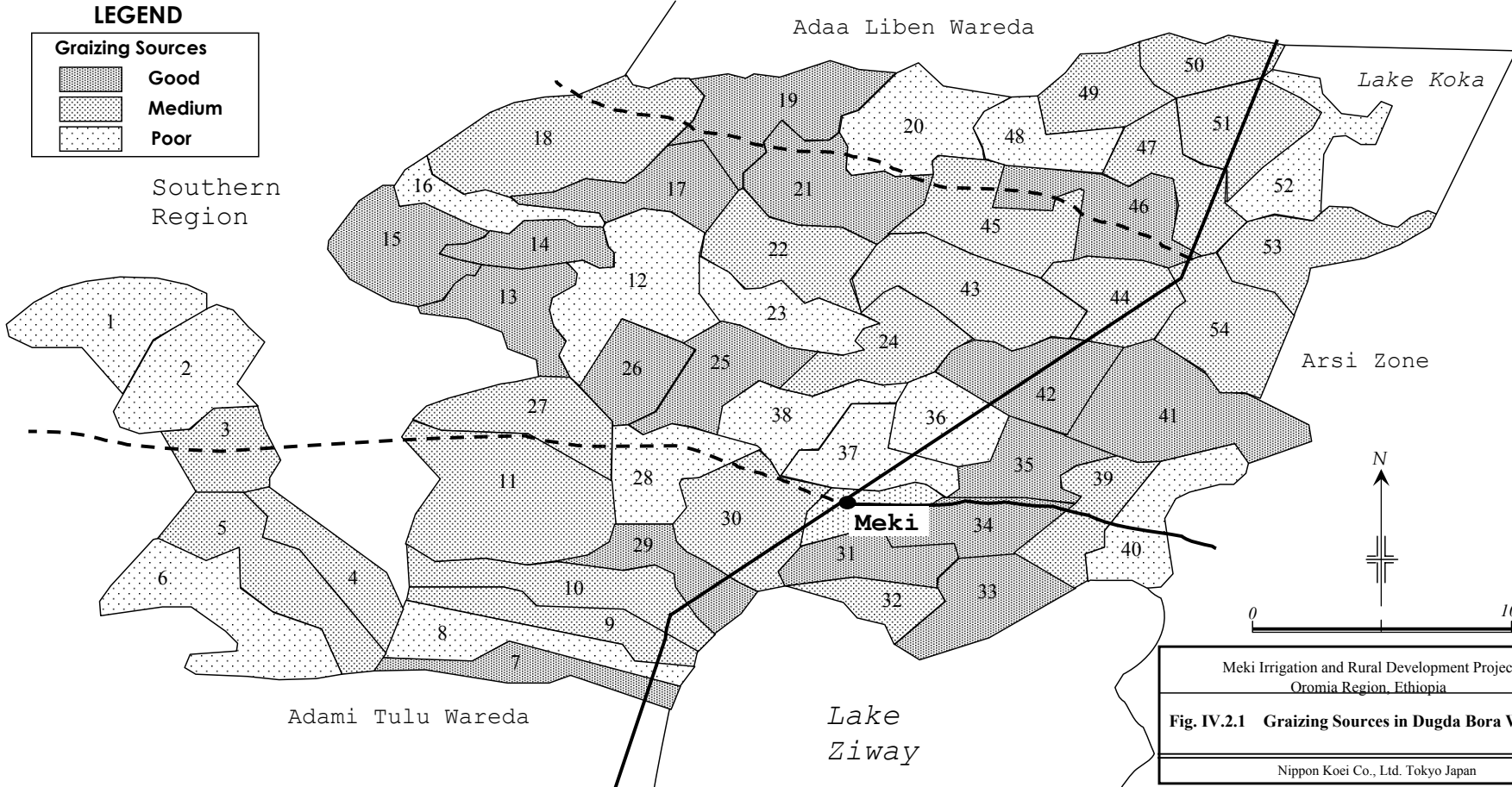
Figures



LEGEND

Grazing Sources

- Good
- Medium
- Poor



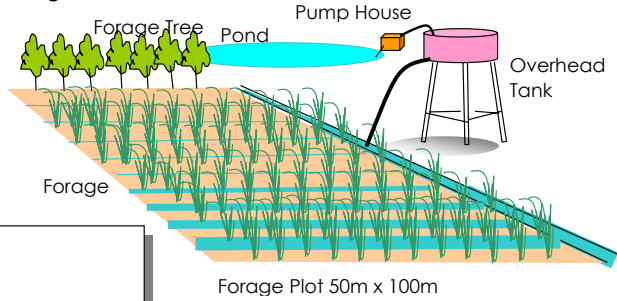
Meki Irrigation and Rural Development Project
Oromia Region, Ethiopia

Fig. IV.2.1 Grazing Sources in Dugda Bora Wereda

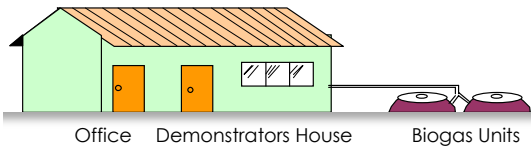
Nippon Koei Co., Ltd. Tokyo Japan

**Animal Husbandry
Modernization Program
under
Meki Irrigation and Rural
Development Project**

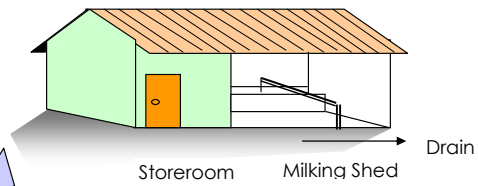
Forage Plot



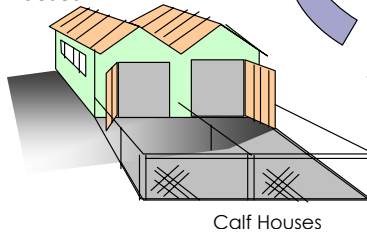
Biogas Units



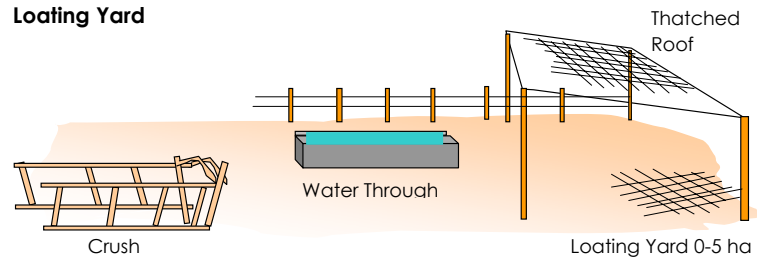
Cowshed



Calf Houses



Loading Yard



The Study for
Meki Irrigation and Rural Development Project
in Oromia Region, Ethiopia

Japan International Cooperation Agency

Figure IV.4.1

Model Demonstration Unit

APPENDIX IV
ANIMAL HUSBANDRY

Attachments

MEKI IRRIGATION AND RURAL DEVELOPMENT PROJECT

LIVESTOCK DEVELOPMENT PROGRAMME

PRELIMINARY RURAL APPRAISAL ON LIVESTOCK ISSUES

GENERAL INFORMATION

- a. Name of Peasant Association
- b. Name of Development Agent
- c. No. of Households in your PA
- d. Households No. in the list
- e. No. of adults in the household
- f. No. of children in the household

QUESTIONS

1. How many cattle do you own?
2. How many are oxen?
3. If you do not own any oxen, how do you plough your land?
4. If you own one ox, do you use a donkey as well to plough?
5. If you don't use a donkey, do you pay rent for another ox for ploughing?
6. How much rent do you pay for one ox for the whole ploughing period?
7. Do you ever use a milking cow to plough?
8. How much land do you plough?
9. How long does it take to plough?
10. Do you fatten the oxen after harvesting to sell them?
11. What do you feed the oxen every day?
12. Are they very fat or a little fat when you sell them?
13. How much money will you sell them for? (approximate)
14. How much does it cost you to buy new oxen for the next season?
15. Are any of them crossbred cows?
16. If so, how many of these do you have?
17. Are they thin when you buy them? Are they strong enough for work?
18. If not, what do you feed them to make them strong?
19. How many cattle are milking cows?
20. List their lactation ages (how many calves each one has had)
21. How many cattle are young females, which are older than suckling calves?
22. How many are young males, which are older than suckling calves?
23. Do you keep all your young females for milking cows?
24. If not, do you sell any?
25. If so, how many do you sell in one year?
26. How much money can you get for a young cow?
27. Do you sell any of your milking cows?
28. If so, how many do you sell in one year?
29. Do you rear the males?
30. If you do, why?
31. If you don't, what do you do with them?
32. If you sell them, how much money can you get for a young ox or bull?
33. If you sell them, how many do you sell in one year?
34. Do you have a bull?
35. If you do not have a bull, is there a village bull?
36. If you do not use a bull, do you use AI?
37. Why do you use AI?

38. How much does it cost to AI one cow?
39. What time of year do the cows usually calve?
40. Are there any other times of the year that the cows calve?
41. How many calves were born to your cows last year? (Between January and December?)
42. How many were born the year before?
43. Did any calves die last year? How many?
44. Did any calves die the year before? How many?
45. Do you milk all your cows, which have calves?
46. How many times a day do you milk your cow or cows?
47. How much milk every day does each cow give one month after she calves?
48. How much milk every day does each cow give four months after she calves?
49. How long (months) does each cow give you milk before she goes dry?
50. Do you milk any goats?
51. If yes, how many?
52. How much milk does a goat give you?
53. What do you do with the goat's milk?
54. How much milk every day does the family drink?
55. How much milk do you use to make sour milk/yogurt? Do you sell any? If so, how much?
56. How much milk do you use to make cheese?
57. How much milk do you use to make butter?
58. How much cheese and butter do you sell every week?
59. What price do you charge for yogurt, cheese and butter? (Try and make it as price per kg)
60. Would you like to sell more cheese and butter to make more money?
61. How do you think you could get more milk to make cheese and butter-
 - a) Would it be by owning more cows? If it is, how much does a cow cost to buy?
 - b) Would it be by feeding your cows more food such as crop residue or forages? If you think you could feed forages, would you want to use some of your land (about 0.3 ha) to grow them?
62. Would you want to treat your crop residue with urea and molasses to make it better food?
63. Would you do both?
 - c) Would it be by cross breeding your cows with exotic breeds (Holstein, Jersey)? If you do, you will need to feed them more anyway. Are you still prepared to grow forages and treat your crop residues?
64. What do you feed your cattle in May to September? Only grazing or grazing and some supplement?
65. Where are they grazing- near the PA, by the river, by the lake? Where?
66. If they graze by the lake or river, how long does it take for them to walk there and to walk back?
67. How long do they graze for in one day?
68. How are they herded? Many cattle together or just those belonging to one household?
69. Are they kept in a pen at night?
70. Do you use all the manure for the crops?
71. What do you feed your cattle from September to May, in the dry season?
72. What else are you feeding them in the dry season?
73. If you are feeding them straw and stover from your crop residues, do you treat them with anything like urea or molasses? Or do you feed them as they are?
74. Do you graze the cattle in the crop residues after harvesting?
75. When they are finished, what do you do with the crop residues? Do you cut them and store them somewhere?
76. How do you store the crop residues- on a platform, with a roof? Or on the ground?
77. How long do your crop residues last from the time you start letting the cattle eat them?
78. Are you also feeding crop residues to your sheep, goats and donkeys?

79. Where are the animals grazing- near the PA, by the river, by the lake, where?
80. Where are they getting their drinking water during the rains?
81. Where are they getting their drinking water during the dry season?
82. Are you growing leucaena trees on your land or by your house?
83. How many trees do you grow?
84. How much do you cut from your trees each day to feed the oxen or cows?
85. Do you grow any napier or elephant grass or any other forages to feed your cattle?
86. If so, how much? Which of your cattle do you feed?
87. If not, would you like to grow some if you knew it could help to get more milk or make your oxen fatter?
88. Do you spray your cattle for ticks?
89. Which months do you spray?
90. How often do you spray your cattle in those months?
91. What do you use to spray them with?
92. Do you find it helps to keep the ticks away?
93. How much does it cost to spray your cattle at one time?
94. Do you vaccinate the cattle against any disease? Which ones?
95. When do you vaccinate?
96. Do you have a good crush to hold your animals when the vet comes or when the livestock expert comes?
97. Do you dose your animals against worms?
98. When do you dose?
99. Do you dose the sheep or goats as well as the cattle?
100. How much does it cost to dose the animals at one time?
101. Did any of your oxen, cows or bulls die this year?
102. If so, how many?
103. Do you know why they died?
104. List the reasons.
105. Did any die last year?
106. If so, how many?
107. Do you know why they died?
108. List the reasons.
109. How many sheep do you have?
110. How many goats do you have?
111. Why do you keep sheep and goats?
112. Do you sell any?
113. If so, how many in one year?
114. How much money can you get for one sheep or one goat?
115. How many donkeys do you have?
116. Do you ever sell any donkeys?
117. How many do you sell in one year?
118. How much money can you get for one donkey?
119. Do you have any horses?
120. Do you ever sell any horses?
121. If so, how much money can you get for a horse?
122. How many chickens do you have?
123. How many eggs do you collect in one day?
124. Does the family eat any of the eggs, or are any used for cooking?
125. If so, how many eggs are eaten by the family in one day?
126. Do you sell any eggs?
127. How many do you sell every week?
128. How much money can you get for one egg?
129. Would you like to make more money out of eggs?
130. How do you think you could get more eggs to sell-
 - a) Buy more hens? If so, would you be able to feed them?
 - b) Use a better breed of hen? Would they be able to resist disease?
 - c) Feed your hens with more grain? Do you have enough grain?

ANSWER SHEET - LIVESTOCK

a. PA _____

d. HH number in the list _____

b. Name of DA _____

e. No. of adults _____

c. No. of HH _____

f. No. of children _____

1.		heads	49.		months	89.	
2.		heads	50.	Yes No		90.	times
3.			51.		heads	91.	
4.	Yes No		52.		liters	92.	Yes No
5.	Yes No		53.			93.	Birr
6.	Birr		54.		liters	94.	Yes No
7.	Yes No		55.		liters		
8.		ha		Yes No		95.	Yes No
9.		hrs.		Birr		96.	Yes No
10.	Yes No		56.		liters	97.	Yes No
11.			57.		liters	98.	
12.	Yes No		58.		kg	99.	Yes No
13.	Birr		59.	Yogurt Birr	per kg	100.	Birr
14.	Birr			Cheese Birr	per kg	101.	Yes No
15.	Yes No			Butter Birr	per kg	102.	heads
16.		heads	60.	Yes No		103.	Yes No
17.	Yes No		61.	Yes No		104.	
	Yes No			Birr		105.	Yes No
18.				Yes No		106.	heads
19.		heads		Yes No		107.	Yes No
20.		heads	62.	Yes No		108.	
21.		heads	63.	Yes No		109.	heads
22.		heads		Yes No		110.	heads
23.	Yes No		64.	Only Grazing	Grazing+Supple	111.	
24.	Yes No		65.	River Lake ()		112.	Yes No
25.		heads	66.		hrs.	113.	heads
26.	Birr		67.		hrs.	114.	Birr
27.	Yes No		68.	Together	Not together	115.	heads
28.		heads	69.	Yes No		116.	Yes No
29.	Yes No		70.	Yes No		117.	heads
30.			71.			118.	Birr
31.			72.			119.	Yes No
32.	Birr		73.	Yes No		120.	Yes No
33.		heads	74.	Yes No		121.	Birr
34.	Yes No		75.			122.	heads
35.	Yes No					123.	pcs.
36.	Yes No		76.			124.	Yes No
37.			77.		months	125.	pcs.
38.	Birr		78.	Yes No		126.	Yes No
39.			79.			127.	pcs.
40.	Yes No		80.			128.	Birr
41.			81.			129.	Yes No
42.			82.	Yes No		130.	a. Yes No
43.	Yes No		83.		trees		Yes No
		heads	84.				b. Yes No
44.	Yes No		85.	Yes No			Yes No
45.		heads	86.				c. Yes No
46.		heads					Yes No
47.		liters	87.	Yes No			
48.		liters	88.	Yes No			

**QUESTIONNAIRE FOR
LIVESTOCK EXPERTS IN DUGDA BORA WAREDA.**

1. Background

- 1.1 What is the type of climate of each of the PA's- using the map of PA's, shade in those areas that are the most drought prone (poor rains), the ones that have the most rains, the ones that have medium rains. State under the map what you mean in terms of rainfall (mm per annum) for drought prone, medium, high.
- 1.2 What are the type of soils of each of the PA's- Using the map of PA's shade in the areas that are generally fertile soils, generally poor soils, waterlogged soils. State under the map what you mean by poor soils, waterlogged soils, fertile soils (e.g. clay sandy loam, black or red).
- 1.3 What is the vegetation of each of the PA's. Give a list of all the PA's, stating for each one the type of grass, shrubs and trees that are predominate there.

2. Purposes for rearing livestock.

- 2.1 Fill in table 1 of what you know about why people are rearing livestock in each PA- cattle, sheep, goats, donkeys, horses.
- 2.2 Which PA's have cross bred cattle? List them and as far as you know, the number of cross bred cattle in those PA's and the number of farmers who own them .How much milk do those cross bred cattle give? How are they being fed to give that milk?

3. Availability of feed resources.**3.1 Grazing**

- 1) Give a list of PA's with your opinion for each of them on what you think of the grazing good, medium and poor.
- 2) Give a list of PA's that send their cattle to graze a lake (state which lake) or by a river, as well as use the grazing in their PA.
- 3) Give a list of PA's that have plenty of trees and shrubs that the goats can browse.
- 4) How do the farmers herd their livestock for grazing? If it is done by the men, how do they do it (in rotation, one men or several men?) When do they take the cattle out? How long do they take on their own grazing lands, and on the lake grazing lands? Do the children take the livestock out to graze? When? How ling does it take to get to the lake and back again? If there is a great variation by the PA's on cattle herding management, list the PA's and to the best of your knowledge, state how each one does it.
- 5) For each PA, state whether you think the rangelands are deteriorating and if so, Why? E.g. overgrazing (state your estimate of the stocking rate) or tree cutting?
- 6) For PA state where there are rules of management by the villagers. Also state if there is any attempt in that PA to conserve feed resources.

3.2 Forages.

- 1) How many farmers grow forage legume trees? Which ones (leucaena, sesbania?) and how many farmers are growing them in each PA. Give a list.
- 2) How many farmers are growing forages such as legumes (e.g. vetch, cowpea), elephant grass, napiers in their crop land? In their gardens?. Give a list of PA's showing, to the best of your knowledge, the numbers farmers growing each type of forage and where they are grown in each PA.

3.3 Crop residues.

- 1) Fill in Table 2 what you know of how farmers feed their livestock the crop

residues, in order of importance (e.g. do the oxen get the most residues because they are the most important? Then they would be number one. Do the cows get the same amount of residue- then they would be number 1 also, but if they get less than the oxen but more than the other livestock, then they would be number 2. If all the livestock get the same, they would all be number one).

- 2) Do any farmers treat their crop residues with urea or molasses to improve the nutritional quality? If there are, estimate how many you know about.
- 3) How long are the livestock in the field eating the leaves off the crop residue? Given an estimate.
- 4) What do the farmers do with the rest of the crop residue from the field? Do they store it? If so, where do they feed it to the animals

3.4 Any other feed

- 1) Give a list of any other feeds you know about that the farmers feed their livestock e.g. do they cut any grass early to feed as hay?
- 2) Do they buy concentrates to feed for fattening or for milk or eggs?
- 3) Do they use any other food residues like brewery waste?

3.5 Water

- 1) Give an estimate of when the livestock generally get access to water in the rainy season and in the dry season.
- 2) For each PA, state the main source of water and how it is managed by the villagers.

4. Marketing

- 1) Fill in Table 3, giving an estimate of the number of each species livestock generally sold per farmer per year and the reasons for selling them
- 2) Where are the most popular marketing places for livestock and for livestock products (butter, cheese, eggs)? If there are more than one, give a list of PAs which generally favor each market place.
- 3) Do the farmers use middle men to market their livestock or livestock products? If so, are they happy with this arrangement or do they feel they are being cheated out of the real values of their livestock?
- 4) What are the major problems with livestock and livestock product marketing?

5. Livestock development

- 1) List any credit facilities that the farmer may use if he needs capital for development or improvement.
- 2) List any NGO's working in the wareda who are assisting the farmers. If there are any, how are they assisting them?
- 3) What are the major problems of improvement of livestock production for the farmer?
- 4) Give your opinion on how you think improvement can be carried out in a feasible way.

TABLE 1 : REASONS FOR KEEPING LIVESTOCK

Put the number, which indicates the greatest importance of the reason for each species of livestock in each PA. Put in more than one number if they have equal importance.

1. Drought power
2. Milk and dairy products
3. Insurance against drought.
4. Fattening for sale
5. Manure
6. Wealth or status
7. Meat for household consumption
8. Eggs
9. Slaughtering for religious or holiday occasions.

TABLE 2 : FEEDING CROP RESIDUES

Give with a number, the order of important in each PA, you estimate the class of livestock has in feeding on the crop residue that is stored for the dry season. If two classed (e.g. oxen and cows have the same important

1. Most important
2. Second in importance
3. Third in importance
4. Fourth in importance
5. Fifth in importance
6. Sixth in importance

TABLE 3 : NUMBER AND REASONS FOR SELLING LIVESTOCK

In each square, provide an estimate of the number sold of each class of livestock and the reason with a letter provided below. If there are more than one reason, put in each important letter.

Reasons for selling livestock.

- a. Cash for household requirements
- b. Cash for important occasions (wedding, funeral)
- c. Commercial transaction-part of the planned farm income
- d. To reduce livestock population during the dry season.
- e. Fear of death through disease or drought.
- f. To buy other animals
- g. To buy implements or farm inputs (fertilizer, pesticides, etc)

FAO – Background Information

Visit : Food and Agricultural Organization

Consultant : Mr Gehre Mariam, National Program Officer

The mandate of FAO is to monitor and assist with global food security. To this end, their two major activities are:

- 1) To monitor the situation, collect, analyze and disseminate data on food security in a designated region logistically, this is carried out by government or parastatal employees.
- 2) To create fora for discussion and interaction among relevant institutions concerned with food security in a region.

FAO is thus in a good position to provide an objective assessment of the agricultural industry of a country.

Overview of the livestock industry in Ethiopia

Ethiopia is not self sufficient in food, particularly in livestock products and is a net importer of agricultural produces. The latter situation is largely due to little importance attached to livestock as a primary agricultural industry; in fact, it could be classified as a secondary industry, meeting only 30% of the country's requirements. This is exacerbated by

- 1) Prevalent of drought resulting in persistent loss of animals
- 2) Large herds or flocks kept as insurance against drought of disease yet with little input in management or nutrition and especially in conservation of grazing resources. This results in poor output per livestock unit: 7 kg choice beef compared with 50kg from a commercially produced steer, with average dressed weights of 110 and 240kg respectively. Average dressed weight of sheep only 10 kg from a 25kg mature animal compared with 20 kg from a 50kg commercially produced lamb.
- 3) Lack of infrastructure of transport, distribution and marketing of livestock products outside a radius of 150km around Addis Ababa There are no large commercial abattoirs, only small butcheries which buy animals on the open market and a municipal abattoirs, in Addis Ababa which handles 700 animals a day when it has capacity for only 150 a day. Transport and distribution of milk is provided largely by the Dairy Development Enterprise to a small number of small-scale commercial farms which have cross bred dairy cattle and use AI. These are concentrated largely in Selale to the north of the city.
- 4) Little or no investment in commercialized livestock farming, while the prevalence of household supply of meat and milk in small urban and rural areas is still high There, most consumers of meat still prefer to slaughter an animal in their own back

yard, keep their own layers and milk their own cows. There are no longer any large beef feed lots and only a few large broiler and layer enterprise. Cultural strictures have prevented any development of the pig industry.

- 5) Inadequate state support for upgrading of cattle in the small-holder livestock sector, Where cattle are raised mainly for draught power (cattle breeds are predominantly Zebu or Borana, neither of which are good milk producers.) Accordingly, on a national basis, veterinary and animal husbandry extension services are poor compared to that of crop and horticultural extension. National average crop yields with local varieties of seed are:
- 6) Wheat, 12-14qts (1qt=100kg)/ha; teff 7-8qts/ha; sorghum 14-16qts/ha; maize 14-16qts/ha. However, a two year scheme where farmers are provided with "packages" of upgraded varieties of seed and fertilizer has increased to 40qts/ha. This should allow surpluses of grain over family consumption which will increase farmer income from crops. Four million farmers have joined this scheme.
- 7) No farm tenure and natural pastures grazed on a communal basis, hence no collective will to care for, or improve, grazing lands, for improved productivity of animals. Most livestock owners are pastoralists to more or less degree. Land is given by Peasant Associations, under government administration, to the farmer. However, he cannot sell it or borrow capital, using land as collateral (although there are a small number of credit schemes which allow livestock as collateral or have been established among groups of women using their own funds). Generally, there are serious constraints on investment in farm improvements even if the will is there.

Norwithstanding these limitations to livestock development, local demand is high for meat and milk and livestock commodities fetch good prices on free market: -

Broiler chicken, 18Br/kg; beef, 12-25Br/kg (prices dependent on fat coverage); milk 2.50 Br/lit There is also a good market for both cattle and sheep in the Middle East, with 42,600 sheep exported to Saudi Arabia so far in 2000 (before the ban)(ref. The Daily Monitor, 4th October 2000). 60% of the all exported sheep and cattle from Berbar to the Middle East comes from Ethiopia. Beef is the preferred meat over mutton or chicken in Ethiopia. In addition, hides are highly valued for thriving industries in tanneries, shoe and leather coat manufacturing. Leather is exported to Europe and Japan. Appropriate slaughtering technology is therefore being encouraged in abattoirs and butcheries in order to preserve hides. There is also a good market for milk and milk products in Addis Ababa (pop. 2.5 million) and the large towns (pop. av. 250,000) where no more than 30% of the demand is being met. (This suggests that Meki close to Ziway and Debra Zeyit has potential for meeting part of that demand)

Potential for livestock development

Feed is the major constraint to development of the livestock industry. Concentrates and hay are very expensive, yet molasses and urea, both essential ingredients in many commercial

feeds, are cheap and readily available. Improved pastures and absence of responsibility for natural pasture part of the arable land, alley cropping with legume forage trees and uptake of low-cost conservation technology of treated crop residues and high-quality forage crops.

Estimation of Nutrient Intake of Livestock

There is no research data for estimation of grazing capacity of the natural vegetation in the Meki area. It is assumed that the grazing capacity of the Meki area is equivalent to Natural Region 4 in Zimbabwe, which is categorized in to semi-arid climatic zone with middle veldt (African savanna), of which grazing capacity is defined to be 8 ha per TLU (Tropical Livestock Unit : 270 kg of live-weight) (Oliver and Topps, 1990).

The total land under grazing animals in the Meki area is 75,335.33 ha. The total grazing capacity amounts to 9,416.9 TLU.

On the other hand, the total TLU in the Meki area is estimated to be 155,462 on the basis of animal population and the average live-weight as summarized below.

Livestock Species	Population (Heads)	TLU	Total TLU	ha per animal
Cattle	206,300	0.70	144,410	0.33
Sheep	28,473	0.08	2,278	0.044
Goats	60,772	0.06	3,646	0.044
Donkeys	12,164	0.40	4,866	0.2
Horses	525	0.50	262	0.2
Total			155,462	

Since actual grazing is 0.48 ha per TLU (75,335ha / 155,462 TLU), the stocking rate 16.5 times as much as grazing capacity (8ha / 0.48ha). The actual stocking rate for each animal is also summarized in the table.

Total number of households = 52 PA x 417 (av) households =22,516.

Average number of LU per household = 5.9 (6)

Typical farm has 0.45 ha of grazing land giving 4500 kg dry matter production per ha. (Bekele, 1991). However, available consumption forage produced annually from pastureland is assumed to be 50% of gross production because of cattle selectivity and trampling, use by wildlife and loss due to fire (Houerou and Hoste, 1977). Therefore, work on 2,250 kg per ha. 0.33 ha for cattle =742.5 kg dry matter/ cow or ox

Crop residue

Tons per household of crop residue = 2.65 tons.

Crop residue per TLU= 0.44 tons of 440 kg (amount per cow).

0.7 TLU = 308 kg crop residue per ox =277.2 dry matter

Nutrient supplied:	DM	ME (MJ)/kg	DCP (g/kg).
Pasture	45	8.0	56
Residue	90	6.0	40
Treated residue	90	9.0	80

Cross-bred cow = 1 TLU. Have to assume cow gets at least 0.5 ha of paddock (leased) At 2,250 kg per ha, this amounts to 1,125 kg DM and crop residue of 440 kg crop residue.

Nutrient intake per cow per annum:

Forage	DM	ME	DCP
Grass	1,125	9,000	63,000
Treated Residue	440	3,960	35,200
Total	1,565	12,960	98,200
Per day:	4.28	35.5	269
Need	12.0	115	948
Balance	7.7	79.5	679

Nutrients supplied by pennisetum / lablab: 32% DM, 9.5 MJ/kg DM ME, 125 g/kg DCP

Need to feed per cow: 7.7kg DM: 24 kg silage (2 bags a day)

This provides 73.15 MJ ME, and 962.5g DCP, which cover the deficit.

Nutrient intake per ox per annum:

Forage	DM	ME	DCP
Grass	742	5,940	41,580
Treated residue	277	2,493	22,160
Total	1,019	8,433	63,740
Per day	2.79	23.10	174.6
Need	7.0	63	405
Balance	4.21	39.9	230.4
12 kg silage (1 bag/day)	3.84	36.48	480

This would be adequate. So, to feed two cows and two oxen per day, need 6 bags/day silage = 72 kg silage. This would require a total production per annum of 26.3 tons or 2,190 bags.

Under irrigation, one hectare can produce 90 tons as fresh matters. So, 0.3 ha can produce 27 tons or 27,000 kg silage (2,250 bags). This allows supplement of silage for 2.6 TLU of 60 bags or 23 bags/ TLU. This provides 0.1 kg per day for sheep and goats. Under minimal irrigation, one hectare can produce 60 tons as fresh matters. This condition would need more land, say, 0.5 ha. So, 0.5 ha can produce 30 tons or 30,000 kg (2,500 bags). This allows supplement of silage for 2.6 TLU of 310 bags or 119 bags/ TLU. This would be one bag a day per TLU for about 4 months in the dry period.

What's left of crop residue? Two cows take 880 kg and two oxen take 554 kg, a total of 1,434 kg. Balance from 2,650 kg is 1,216 kg of treated residue. This is for 2.6 TLU (balance from 6 TLU) giving 467.6 kg /TLU or 3.89 kg /day for 4 months dry period.

Conclusion:

It is possible to milk two cross-bred cows and fatten two oxen on (i) one (1) ha of fertilized paddock to graze cows, (ii) crop residues treated with urea and molasses and (iii) 0.3 ha of full irrigation or 0.5 ha minimal irrigation for cows and oxen with a small supplement of silage for the sheep and goats.

Other notes: Veld management in Zimbabwe (Clatworthy, 1998)

Veld grass has 6.0 MJ/kg. Cow eats 1.2 –1.5 % of body mass with no supplement. Forage has protein content of 30 g/kg. In Zimbabwe communal areas: estimated that average live-weight of animals are 167 kg (0.53 TLU) for cattle and 30 kg (0.10 LU) for sheep and goats.

Average weight of Zebu ox = 295 kg (1.09 TLU)

Average weight cow = 230kg (0.85 TLU)

Sheep male = 35kg, female = 25 kg

Goats male = 30 kg, female = 25kg

Horses = 150 kg

Donkeys = 97kg

References:

- 1) Bekele, S. 1991. Crop-livestock interaction in the Ethiopian highlands and its effects on sustainability of mixed farming: A case study from Ada district. Unpublished Msc these is, Agricultural University of Norway, Oslo.
- 2) Clatworthy, 1998. veld management in Zimbabwe. 1998 Beef Handbook. Publ. Zimbabwe Cattle producers Association.
- 3) Houerou, Le H.N. and H.C. Hoste. 1977. Rangeland production and annual rainfall relations in the Mediterranean Basin and in the Africa Shahelo- Sudanian zone. J. Range Management 30(3): 181-189.
- 4) Topps, J.H. and Oliver, J.1993. Animal foods of Central Africa. Technical Handbook No. 2. Zimbabwe Agricultural Journal. Harare, Zimbabwe.

Large Scale Dairy Farm in Mojo

Mojo dairy farm is the state farm, which supplies milk to the Dairy Development Enterprise in Addis Ababa. It is operated by one manager and his assistants with a number of workers.

General : The farm is 90 ha in size and milks 70 cows. The cows are the cross-bred of 3/4 Holstein and 1/4 Zebu. Average daily yield is 15 liters a cow, ranging from 20 liters at peak to 10 liters mid-late lactation. There are 215 cows in total, of which 13 are dry, 9 are pregnant heifers, 50 are over 18 months old, 30 are 6-18 months and 3 are 3-6 months. There were 7 male calves- all get sold to the butcher in Mojo - and 6 female calves. It doesn't add up to a 12 month calving interval- should be 35 heifers under one year. Milk price 1.50 birr/liter. No premium for butterfat or protein, although milk is tested. Average butterfat percent is 4.8. No national milk recording scheme.

Feed : Feed is forage based with supplement. There is irrigation for 5 ha and this is rotated. Forages include maize, vetch and oats. Maize and oats are intercropped under irrigation and ensiled in a pit. Maize is also fed green together with vetch to cows twice a day while they are being milked. They are also fed a basal supplement of 0.5 kg meal going up to 1 kg for those giving more than 15 liters. The meal consists of wheat, bran, salt, chapped straw and crushed haricot bean. They used to get bone meal but that has become expensive and is no longer supplied. At night, after milking the cows are fed ad-lib hay (straw?) and in the morning after milking they are sent out to graze-grass appeared to be mostly paspalum. Apparently it was not considered worth planting with improved pastures- management requirements too high.

Reproductive management: Heifers are bred at 18 months- calve at 2 years. Calving interval of 12 months (rather amazing- considering the number of non-pregnant heifers). Breeding done with AI. No worry about disease resistance in pure bred Holstein- with proper nutrition and prophylaxis, they are apparently as hardy as the cross-breeds. The cows looked in reasonable body condition- milkers around 2.25 BCS.

Calf rearing: Calves are fed colostrums for first nine days, then go on to milk. Incredibly, fed milk for 18 months before weaning! Calf mortality is 10%.

Milking routine: There are seven milkers- 10 cows each- and only take about 30 minutes to milk all cows. This suggests only 3 minutes per cow which is very fast (average hand milking time is 10 minutes) However, preparation minimal- udders washed with a sponge (amazing so little mastitis), no drying, and teat dipping afterwards with an iodophor. Milk is stored in cans, which are kept in a cold room (this means about 1050 liters a day, about 23 cans, must be large cold room). The cans are delivered to Mojo chilling center where every two days, they are emptied in to the tankers which comes from Addis Ababa.

General notes: Manager thinks dairying is profitable provided forage is the basal diet. Protein concentrates are too expensive, destroy viability. Pregnant heifers can sell for 3000br, while cull cows (even pregnant) sell for 2.50 br. /kg. The cows looked to be about 400 kg – this puts the price at 1000 br. The sugar factory is 25 kms from Mojo and sells molasses at 9 br. for 250 kg.

Dairy Development Enterprise and Dairy Marketing

The factory is state owned and was built equipped fifty-three years ago. The machinery is very old and is only kept going through resourceful engineers. The farms that supply milk to this factory are also state owned and there are ten of them, situated around Addis Ababa with in a radius of 120 km. The factory thus has chilling centers within this radius, to which the farms send their milk. Trucks are provided to collect cans from the farms- one truck per 50-60km. There are three tankers, one of 12000 It and two of 5000 it capacity, which collect milk from the chilling centers and deliver to the factory every second day. The factory can take more milk- it is working under capacity- and if Meki were to become a milk producing center, milk could be delivered to the Mojo or Nazaret chilling centers (*possible to install a chilling center in Meki through project*) However, it is expected that the farms cool their own milk first before transporting it to the chilling center. (*Use flowing irrigation water through immersion tank in which to immerse cans?*)

The milk is given sensory evaluation tests as well as alcohol and lactometer tests before acceptance at the chilling center. Milk is further tested at the factory for methylene blue test, specific gravity (total solids) and butter fat. Antibiotics and water are only tested for if cheese or yogurt production has failed. Pasteurized milk and dairy products are all tested by the quality and standards Authority. BF% average 3.8-4.0. The milk is standardized to 2.8% and the cream used to make butter, cream, yogurt and cheese. Milk is pasteurized at 70°C for 15 seconds, cooled to 4°C. Cream, yoghurt and butter sold under the name of sholo products. Mostly the cheese is the local variety- Ibe cheese (made from any sour milk that is delivered. Milk is soured when the chilling centers break down) but during the fasting season, (70 days fasting season per year, also every Wednesday and Friday) When demand for dairy products is low, the milk is used to make Gouda cheese instead (8000-9000 kg/year). This is sold to supermarkets and hotels largely for consumption by the wealthy local populace and foreigners. Milk is not delivered door-to-door but is delivered to hospitals, supermarkets, hotels, other institutes. Also, there are four sales depots, including one at the factory, and five kiosks in Addis where milk and dairy products are sold. Consumer price of their milk is 3br/ liter (but 4.50br./liter in the supermarket). There is no quality premium scheme for raw milk.

The reason milk and dairy products to houses is that there are many households who still have cows which are actually kept in the houses. The owners buy concentrates from a commercial stock feed supplier and hay from farmers who bring in their hay by donkey. Some householders have two or three cross bred cows which can give up to 10 liters a day and sell their own. Milk Consumers boil the milk they buy from this source. The cross-bred cows are bought directly from private farms- quite often they are cull cows. The milk is sold for between 1.75 br./ liter up to 3 br. Per liter. This is a major constraint to development of commercial dairy processing.

There are three farms on Selale road (100 km), one on Holator(?) road, one on Hshata road, three on Nazaet road (one near Mojo, one near Addis, one near Nazaret but the latter is not yet operational Average production per farm is 750 liters- range 600 to 1000 liters- per day. Average 90 milking cows, all crossbred Zebu x Holstein. Many are now $\frac{3}{4}$ Holstein. Only one farm has Jersey breed and cross breed. All hand milked-machine milking not possible due to poor supply of spare parts and tendency to mastitis.

There are also small holder dairy farms on the way to Selale and they process their own milk for sale.

Dairy farming is not viable without supply of farm-grown forage. Hay costs 6br./bale in the rains and up to 8 br/ bale in the dry season. However, only three of the farms produce silage, most of them produce hay using balers (*forages, pastures-check?-especially on those farms with irrigation*)

Farmer price only 1.25 br./ liter-less than half of the consumer price.

Good herd health programs on the farms. Cows and workers tested for TB and CA.

Factory and farms (all of Dairy Development Enterprise) is up for sale to the private sector. Only one business man has shown interest so far but the concern of the manager is that he has many enterprise and may not spend the time and commitment needed for sustainability of this operation.

Site Inspection by Dr. M. Titterton-Livestock Expert, JICA Study Team

Persons Contacted

Mr. Tamirat , Head for Bureau of Agriculture for Dagda Bora Wareda of Oromia

Mr. Teshoma Amare, livestock development expert.

Mr. Brehanu Gibre Medin, agronomist expert.

The experts report to the East Shewa Agricultural Office in Nazareth. They have thirty-five extension officers, called here, development agents (DA's), who live in the peasant associations (PA) and are trained by the experts.

We requested the names of five PA's deemed to be representatives of the wareda and were taken to visit one, Bekela Givisa. However, on inspection of the map of the PA's it appeared that the PA's were all grouped around Meki and did not represent the wareda as a whole.

We also met two veterinary assistants (probably equivalent to the DA's) under the Veterinary Officer, one of the experts in the Bureau of Agriculture.

These were: Messrs Kebchew Ayalew and Mengestu Feyissu.

Mr. Teshoma and Mr. Ayalew (or his superior, the vet.) could be my counterparts as they are based at the project site and should benefit the most from training and/or interaction with the team.

The Study Area

Dugda Bora Wareda is nearly the same as the Meki study area and is therefore a useful area from which to extract data for PRA's There are 54 PA's in this wareda, each of which have an average of 400 households (ha?- check, because Bekela Givisa had 876 households) on about 1300ha. Each PA is administered by a management committee consisting of the Chairman, Secretary and five farmers.) Is DA co-opted on to this committee?)

Visit to Bekela Givissa

There are 876 households here, with an average arable cropping area of 1.5 ha each, a total of approximately 1300ha. However, land is not equally apportioned, it depends on family size initially. The families comprise the initial two adults, five grown children (of about eight children, this number cannot get employment and are forced to stay with their parents). Of these, three may be married and have children of their own-generally there are about five young children in the family at any one time. Hence there is a total of 10 adults and five children on average per household. This has led to an over dependence on the land for food and income.

The grazing land totals 300ha. There are no grazing schemes and much of the grazing is near the lake. There is a well in the PA, from which clean well water is available at about 10 liters

per household (apportioned by water committee, depending on size of family.) 500 liters of water costs 1br. Lake water is not used as it is apparently contaminated and has bilharzias (many of the children have bilharzia). Lake water can be boiled but firewood is valuable and scarce. The wood is taken from the Amark bofufu (local name) tree which is found by the lake. Thatching for house roofing is reed, taken from around the lake. The houses we saw were not representative of the typical housing-they were made from brick, and were apparently built by the previous government. Most houses are made from poles plastered with mud.

Livestock

Oxen : Approximately 40% of the households have two oxen, while 60% have one. Those with one ox either use a donkey to plough with the ox pay rent of 300br. to hire and ox. The total number of oxen in this PA is therefore about 1400. Some households (wasn't told the actual number) fatten their oxen on crop residues and cut leukaena (from the start of harvesting for three months) and sell them to the butcheries (price?- at a guess, around 12br./kg dressed weight, or 1300br. pre ox), buying cheaper (thinner younger?) oxen (average price 600-700br. per ox) on the market for ploughing, so making a profit of about 1400br. (Check)

Milking cows : There are an average of 6 milking cows per household giving total average of about 8 liters a day. Of this, about 0.5 of a liter (1/2 a cup each) is consumed by the children. The remainder is made into yogurt, butter and cheese (local name Ibe cheese). The milk is skimmed for butter making and the skim milk is fermented for yogurt. Most of the yogurt is consumed by the family as part of their staple diet. The butter and cheese is sold in Meki The cheese sells for 10br. a pot. One pot looked as though it contained about 750gm, so cheese must sell for about 13br.-14br./kg (price of butter?) Note: if milk price to farmers is 2.50br./liter, and it takes 10 liters to make 1 kg of cheese, farmer is not profiting through cheese, which is normally a value-added product. The income from butter and cheese is used to obtain salt, sugar, oil and other household necessities. Total number if milking cows: 5300 for this PA. Cows are not supplemented on summer grazing but do get come residues in the dry season (wasn't told how much-check). Some farmers have a bull, some depend on a wandering bull, some use AI (cross-breeding) One-bull costs 2000-3000br.

Sheep and Goats : Average number per household-2 sheep, 2goats. Total-approx. 3500 sheep and goats for this PA. Sold for special occasions and one slaughtered for family consumption once a year on a religious holiday but not generally eaten by the family. No school fees (children schooled from 7-20 years of age), so no need to sell them for this.

Donkeys : Average number per household is 2. Total 1750 for this PA. Value: 300-350br. Used for carting, assisting with ploughing.

Chickens : Average number per household: 6 layers. No broilers, chicken normally not eaten by the family except on special occasions. Two- therr eggs a day, hence one dozen a week. Eggs are sold in Meki for about 4.50br. dozen. (How many eggs consumed by family-check)

Note 1: apparently most of the protein consumed by the family comes from yogurt, eaten with the *Injira*. Only 5% of the households grow vegetables. Seems a very unbalanced diet, yet the children looked strong and healthy.

Note 2: the cattle were in generally poor condition- around BCS 1.5-2.0, which was surprising to some extent considering it was just after the rains and if they were grazing by the lake, there should be a reasonable amount of vegetation (need to check this). The donkeys, sheep and goats, on the other hand, looked in good condition, around BCS 3.5-4, indicating that the grazing met their maintenance requirements, being much lower than cattle.

Cropping:

- 1) maize: 1200kg/ha (range 1000-1600kg/ha) Price 125 br./100kg (qt)
- 2) teff: 800kg/ha (range 600-1000kg/ha) Price 235br./100kg(qt)
- 3) wheat: 600kg/ha (range 600-2000kg/ha) 160br/100kg(qt)
- 4) barley 600kg/ha
- 5) sorghum 800kg/ha
- 6) haricot bean 1200kg/ha (range 1000-2000kg/ha)

All used (haricot bean) in the making of *Injira* - with the size of the families, not much if any, to sell. Some maize is milled to make beer, which is sold.