

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd130.htm](#)

Sampling - My Comments

There is one major problem with sample selection at the moment: the rule at the 3 major markets (as above) that the data collectors must try to ensure that the sample is representative of the total population in terms of grade and sex means that for many market-days, then there is insufficient data for low and high weights (therefore also for low and high grades), especially for cows and bulls; thus it is difficult or impossible to get accurate unit prices for minority sexes and grades. Therefore with immediate effect, I strongly recommend that sampling techniques should be radically changed: sexes should be sampled as near as possible 33% steers, 33% cows, 33% bulls; also the extreme weights should be actively sought out for sampling (these would also be extreme grades) - about 25% of the sample should be light animals and 25% heavy animals, with about 50% in the middle weight range. If pricing for light animals proves to be a problem (because they tend more to be sold as a 'mob?'), then the requirement to record light animals can possibly be dropped (this statement applies more to the log-log data processing system proposed in this report, of which more below).

The question of total net sample size is important - in theory a greater sample size (up to some point) should ensure greater accuracy; in practice of course every increase in sample size involves more work in weighing, grading, sexing, and pricing (but refer to the self-weighing concept discussed above).

The sample size required for accuracy depends on sampling philosophy and also on the data processing technique used. If my recommendation on GSC's to be sampled is adopted, it should result in smaller sample sizes being required. If the present primitive types of data processing continue to be used, relatively large samples will continue to be required; this is because the present techniques effectively

treat the sample for a market-day as 15 separate GSC samples. But if it is possible to treat the sample for a market-day as only 3 separate sex samples, then it should be possible to greatly increase accuracy for the same sample or to significantly reduce total sample size for zero or small decrease in accuracy.

If we do continue to use the present primitive data processing techniques, but do change from population-representative sampling to GSC-representative sampling, then for a total net sample of 45 animals, there would still be only 3 data points for each of the 15 GSC's; this is really not enough to ensure a

good level of accuracy.

Given the physical constraints of labour, time and logistics for a market with a single weighing scale, then this 45:15:3 situation makes it quite important that if at all possible some good technique for data processing of future market price data is found. The log-log best-fit technique outlined below I believe is such a good technique.

The business of statistical information on trends of cattle numbers, weights, grades, sexes, ages, etc should be determined by some other means, if indeed that information is required; certainly in this respect it appears that the available trend information from the MIS program in Dar, Moshi and Arusha has been hardly used in any meaningful sense to date; so why collect it?

To get specific on sample size, I have a feeling that a net sample size of 24 animals (8 steers, 8 cows, 8 bulls) with 6 light animals, 6 heavy animals and 12 middle-weight animals, will produce the kind of accuracy we need. If as we amass data, we find that there is no longer a need to make separate curve fits for each of the 3 sexes, then the sample size can come down yet again.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd140.htm](#)

INITIAL DATA RECORDING

This covers the following:

- weighing
- sexing
- grading
- ageing
- origin of animal
- TRN'ing
- yardage
- number sold

SEXING is a very simple task involving physical viewing of the animal's rear underside. The sex is used as a category when calculating market price information. There is no error in sexing.

ORIGIN of the animal is practised for some of the 3 major markets for some time periods, but the

information is not used for the average price determination; therefore it will not be discussed in this report; indeed I recommend that the data collection of Origin information is discontinued. There is no error factor in origin determination.

AGEING is the estimation from viewing of the age of an animal in years, in the range 5 to 10 years; if the animal is apparently more than 10 years the estimator is instructed to enter 10 years. This information once again is not used in the determination of average price information and therefore will not be discussed in this report; indeed once again I recommend its discontinuation. Error in ageing is probably +/- 1.5 years.

YARDAGE is the total number of animals for sale; NUMBER SOLD is as stated. As mentioned in the introduction, there can be factors which tend to make official statements on numbers sold an underestimate of the real number. Typically, for Dar, over a period of some days, the number sold is the same as yardage. For Them, animals not sold on the Friday will typically be sold at Weruweru on the following Tuesday (the markets are within trekking distance of each other). For Weruweru the number sold should effectively usually be the same as the yardage. The data collection at Arusha and Moshi has consistently recorded both yardage and number sold at the header of the first data sheet for a market-day; the technique used at Dar however has been to add up train arrivals information from the train logs at the Pugu Station (right next to the Market) for a period of 1 week (for the weekly report) or one month (for the monthly report).

I have tried to make daily yardage figures from these train logs, but have found that this theoretical ideal is not practically possible.

Thus I strongly recommend that at Pugu Dar with immediate effect a daily yardage is kept, using a hand-

held tally counter or similar technique; The Number Sold may be recorded from the Pugu Office daily report sheet (which also contains potentially useful sex distribution information and average price), or it may be considered to be the same as the yardage figure.

The importance of yardage is to try to correlate shortages of cattle for sale with high prices, and conversely gluts of cattle for sale with low prices. This has been possible for some of the Arusha and Moshi data, but was not attempted for the Dar data, since w was lumped in 7-day tranches....

It is possible that yardage may have some determinant on whether to record or not for Dar on certain days - if it is discovered that there is a strong correlation between yardage and unit prices, then TLMP may set up some rules whereby yardage is taken at the start of every day, and a decision whether to record or not is then made according to the yardage figure (and the number of data days so far that week). For yardage, there is probably a +/- 30 possible error in counting 500 animals, i.e. +/- 6%.

TRN'ing - application of a temporary recognition number. This is done using 'cold' branding irons with the numbers 0 - 9. Usually a range of 1 to approx 80 or so is used (depending on market). Usually a fairly bright standard commercial enamel paint (red or blue) is used. As far as is known, no damage to hides is done by this branding, nor any health damage or damage to meat, but it is worthwhile checking that these angles have already been cleared. I did not actually get to see this TRN'ing process during any of the 5 market visits (and several revisits to Pugu), but I reckon the TRN'ing using this method takes a relatively longer time than it should using better techniques. I would recommend that (if we do not transfer en masse to a self-weighing system - which then probably does not need any TRN'ing) then we strongly consider using spray painting with stencils marked 1 to 99. Spray painting can be performed using special refillable spray cans recharged from a tyre footpump or similar device. As an alternative to TRN'ing, consider using cheap ear tags, depending on the economics and on the time taken.

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd140.htm](#)

WEIGHING is the central activity - each of the 3 major markets has a single weighing scale of the spring type, together with entry and exit crushes to enable the passing of a number of cattle. The following problems were observed:

- the scales are repaired when they break down, but they are not calibrated on a periodic basis by a scales servicing agency. At several sites the Project Organisers said that they calibrated the scales from time to time, but their idea of testing consisted typically of testing at 0 kg and/or at 60 kg (a man's weight); this correction (if any) would then be applied to weights in the range of 160 - 400 kg. Thus 3 procedures need to be set up:

- standard weights of whatever kind must be procured or made (sealed

 - plastic containers partially or completely filled with dry sand may suffice). These weights should make up the values 150, 250, 350 and 400 kg.

- the computer program should incorporate a correction system so that for every market-day the calibration weights and the corresponding scale readings can be entered; this information will be used in the data processing to correct weights and the unit prices.

- under no condition should the weighing recorder manually add or subtract correction quantities to the scale readings before recording information on the data sheets or in the computer (this is being done at Moshi)

- at one of the markets, for a weight of 278 kg, the recorder noted a weight of 268 kg (he accepted and corrected the mistake when I pointed it out)
- the Moshi market has scales which read to 5000 kg; one must assume that they will lose some accuracy if only used in the range 150 - 400 kg..
- in general, all the scales were of the spring type, and require that the

animal stops moving and stays still for long enough for the scale to stabilise; although more expensive, the load-cell type of scales may be preferable, since less time is required per animal to perform the weighing. A load-cell model with a digital readout would also avoid mistakes in scale reading (as above with the 268 / 278 incident). Typical prices would be in the region of US\$ 1250 for a spring model and US\$ 2500 for a load-cell model, although this should be verified.

- note that there can be significant changes in weight for animals according to their condition, and according to the availability of water and food on arrival at the market from a trek or rail trip. Typical variations can be +/- 5 kg. This can be particularly a cause of error for Arusha or Moshi when weights are normally taken on the day prior to the market itself.

Note that if there are persistent errors in weighing at a market, it may not really affect reporting for that market itself over time, but it will certainly affect inter-market comparisons.

Possible weighing errors are +/- 1 kg from direct scale reading, +/- 8 kg if scale is incorrect and/or not

calibrated, and also +/- 10 kg if the scale type makes reading difficult (e.g. scales calibrated in 2 kg marks, with numeric readings at 20 kg steps.

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd150.htm](#)

WEIGHING is the central activity - each of the 3 major markets has a single weighing scale of the spring type, together with entry and exit crushes to enable the passing of a number of cattle. The following problems were observed:

- the scales are repaired when they break down, but they are not calibrated on a periodic basis by a scales servicing agency. At several sites the Project Organisers said that they calibrated the scales from time to time, but their idea of testing consisted typically of testing at 0 kg and/or at 60 kg (a man's weight); this correction (if any) would then be applied to weights in the range of 160 - 400 kg. Thus 3 procedures need to be set up:

- standard weights of whatever kind must be procured or made (sealed

plastic containers partially or completely filled with dry sand may suffice). These weights should make up the values 150, 250, 350 and 400 kg.

- the computer program should incorporate a correction system so that for every market-day the calibration weights and the corresponding scale readings can be entered; this information will be used in the data processing to correct weights and the unit prices.

- under no condition should the weighing recorder manually add or subtract

correction quantities to the scale readings before recording information on the data sheets or in the computer (this is being done at Moshi)

- at one of the markets, for a weight of 278 kg, the recorder noted a weight of 268 kg (he accepted and corrected the mistake when I pointed it out)

- the Moshi market has scales which read to 5000 kg; one must assume that they will lose some accuracy if only used in the range 150 - 400 kg..

- in general, all the scales were of the spring type, and require that the

animal stops moving and stays still for long enough for the scale to stabilise; although more expensive, the load-cell type of scales may be preferable, since less time is required per animal to perform the weighing. A load-cell model with a digital readout would also avoid mistakes in scale reading (as above with the 268 / 278 incident). Typical prices would be in the region of US\$ 1250 for a spring model and US\$ 2500 for a load-cell model, although this should be verified.

- note that there can be significant changes in weight for animals according to their condition, and according to the availability of water and food on arrival at the market from a trek or rail trip. Typical variations can be +/- 5 kg. This can be particularly a cause of error for Arusha or Moshi when weights are normally taken on the day prior to the market itself.

Note that if there are persistent errors in weighing at a market, it may not really affect reporting for

that market itself over time, but it will certainly affect inter-market comparisons.

Possible weighing errors are +/- 1 kg from direct scale reading, +/- 8 kg if scale is incorrect and/or not calibrated, and also +/- 10 kg if the scale type makes reading difficult (e.g. scales calibrated in 2 kg marks, with numeric readings at 20 kg steps).

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd151.htm](#)

GRADING

Grading is a fairly important activity. The grading system used in Tanzania is modelled on the USA system, and on Study and Analysis by the Texas A & M University in Tanzania a few years ago. The tables are reproduced in the appendix of this report.

According to these Texas A&M Tables, for a given liveweight of animal, there is an approximately 10% variation in edible weight (muscle plus fat) for each change in grade; thus if a data recorder makes a mistake and misclassifies an animal by one grade, then there will be potentially a 10% error in that data point.

There are several ways in which grading errors can be minimised:

- try to ensure that only one person (the same person) grades all animals at a market over as long a period of time as possible
- organise a course in training for graders, and especially conduct a live blind test for all 3 or 6 graders (and for the course tutor) at a cattle market (e.g. Pugu) before the start of the course

and again at the end.

- encourage the grader to use half-grades or even quarter grades if an animal appears to fall between 2 grades; also of course modify the computer program to accept and to process using these grade decimal fractions
- on the data sheets, have a field or column for the ID of the grader, and ensure that the computer system has provision for capturing that data.
- analyse historical, recent and current data to try to ascertain the grading performance of various graders, from the above information.

Note that in the original system, the grades were used (like the sex) as a classification only for which average unit price information was calculated; in the log-log system proposed in this report, both grade and sex are used actively with the Texas A&M tables to perform curve smoothing to increase accuracy and potentially reduce the sampling requirement.

Note that it would be very desirable to access the raw data recorded during the Texas A & M study, in order to properly determine the truth of the statement above that a one point grade error results in a 10% error in edible weight. I recommend that TLMP should approach the Texas A&M or adopt other channels to get

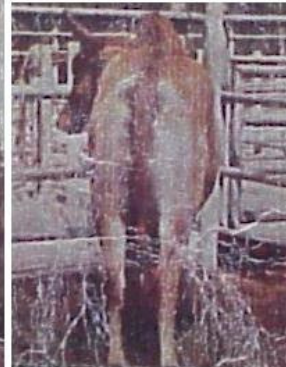
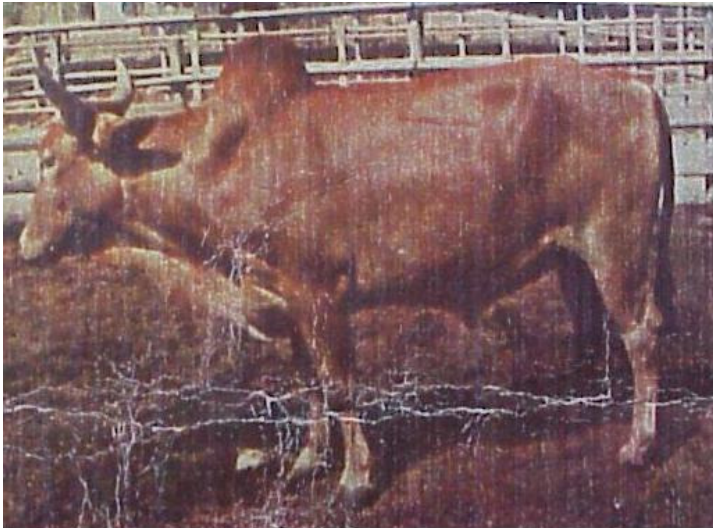
access to this data (the 10% estimate may actually be only a 5% in reality).

Grading errors can be probably up to +/- 0.5 grade, which means an possible error of up to +/- 5% on edible weight. The main problem may in fact be errors between markets, with data within markets being relatively tight.

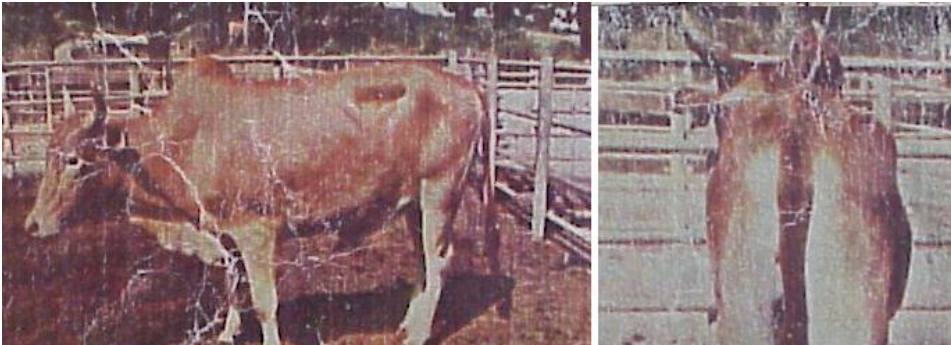
[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd152.htm](http://home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw/Misd152.htm) Grade 0



[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd153.htm](#) Grade 1



[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd154.htm](#)Grade 2

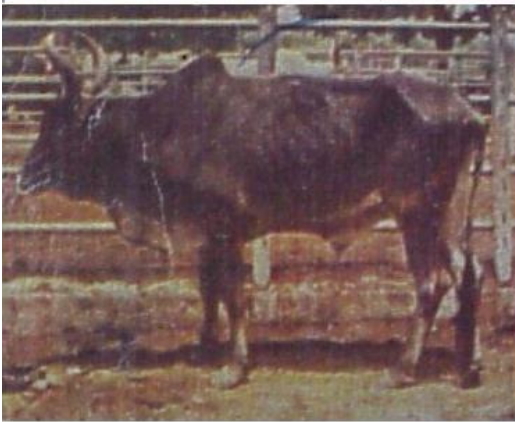




[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd155.htm](#)Grade 3







[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd170.htm](#)

SECONDARY DATA RECORDING

This covers the following data fields:

- price in Tanzanian Shillings for each animal weighed
- the ID of the buyer

I classify these 2 fields as secondary since, for conventional logistics, the Market Organiser personnel are weighing, grading, sexing and TRN'ing on the day before the market or at the start of the market, and then the price and buyer information is logged the next day or later in the day.

The ID of the buyer is only used at Dar, and as far as I know, no analysis is done on a buyer basis. Therefore I strongly recommend that we discontinue this field.

PRICING

Pricing as an area with the potential for problems and errors in several ways:

- firstly, using the conventional techniques of Market Organiser weighing (rather than self-weighing), there is a shrinkage in the data between weighing and pricing. Current conversion ratios for 1994 are 66% for Dar, 63% for Arusha, and 59% for Moshi. These percentages are net sample size to gross sample size (i.e. number weighed and priced over number weighed). These losses represent a lot of weighing and a lot of other work down the drain. Some of these losses in information are due to the use of 'MOB' prices (a bunch of cattle from one seller are sold as a bunch, on an average price basis; the buyer and seller both know or feel that they are getting prices about the same as they would have got if they bid on an individual basis); other losses are possibly due to lack of organisation in that the seller leaves the market with his cattle without being asked the price of those of his cattle with TRN's. IF self-weighing is not to be used, or if a mix of self-weighing and Market Organiser weighing is to be used, then TLMP staff should investigate in more detail this data shrinkage problem and how to improve it (possibly the allocation of more labour to capture prices will save a lot of labour at the weighing operation, by requiring a smaller gross sample size).

- MOB pricing was mentioned above. Sometimes MOB prices get on to the data sheets, instead of the price being entered as blank or zero. And then the mob prices sometimes get into the computer data. The reason could be slackness by the data recorders and pressure to get the quota of data points. I recommend that this should be investigated.

- private people, and especially private business people, are naturally suspicious of anything that smacks of government. For example, with the MDB Crop Prices Program, the staff found that market traders would always underdeclare unit prices to their data recorders; they got round this by stationing an observer permanently at the market, ostensibly to check on volumes, but actually to overhear real prices. This approach is used very largely at Arusha

cattle market, where one of the staff hovers on the edge of negotiating groups with one or more TRN'd cattle, in order to overhear the actual (OBSERVED) price instead of the STATED or DECLARED price. The Arusha staff feel that this produces improvements in data quality.

- of course an auction system would be nicer for the MIS - especially also if every animal were weighed and the grade and sex declared publicly (except of course there would be pressure on the officials to ramp up the grade allocation) - since the prices would be a matter of public record.

- in case that a combination of observed prices and declared prices is used, then the computer system should be written so as to record which of the 2 types of prices is valid for each data record line item. This can then be bulk analysed at a later time, and maybe some apparent rules can be established for the difference, if any (e.g. declared prices are usually 5% lower than observed prices for the same type of animal).

On pricing , the errors are difficult to estimate. They could be up to 5%, and probably on understating the price rather than overstating.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd180.htm](#)

THE 2 EXISTING COMPUTER SYSTEMS - DATA INPUT, DATA STORAGE AND DATA PROCESSING

The Dar system (like the MDB Dar Crop Price Monitoring System) is composed of a Lotus Symphony spreadsheet system; the Moshi system is composed of a database-type of system using the little-known Enable database product.

Both have a programming element in that 'macros' are used to build a system. The Dar system was built by Jim Airey and the Moshi system by Martin Doran.

In general terms, the following weaknesses exist:

- Data Storage is the weakest area - each month's data for each location is kept in its own quirkily-named file (this is true for both systems). The effect of this is to render comparison of data between sites and within sites over time extremely difficult.
- Data Entry Editing - there is some control but not very much over the kind of numbers and other information which can be input to the system; as a result, when I translated the data over, I had to do some data cleaning.
- User Friendliness - reporting in particular with the Symphony system was quite complicated. In particular the effect is (with both systems) that a skilled operator is required in order to run the system, and also to ensure that no errors are made or no wrong buttons are pressed. The effect is that system security and integrity are low. I always believe that any computer system should be 'idiot-proof', and should be able to be used by any secretary or even by a Managing Director with minimal training.
- Documentation - neither system had any documentation to speak of. Thus there is no transparency as to how the internal calculations are performed. For example the 'Marker' system was discovered almost by mistake when the embryonic Clipper system was run through the same data against the Symphony system, and it was found that the numbers being output were quite different.

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd190.htm](#)

THE MARKER SYSTEM - HOW IT APPEARS TO WORK

The Dar data is/was processed using the Symphony spreadsheet and the 'Marker' system, for which absolutely no documentation has been found. Verbal description and a brief look at the Symphony spreadsheets lead one to assume the following:

- approx 2 - 3 times a year a large sample is processed, and

the results of this processing are incorporated as

bogus records in with the actual data collected for each

market-day.

- this enables GSC's to be reported on which are not present

in the sample for the market-day

- they also however skew the data for all other grades and sexes from the pure calculated values

I am currently (February 1995) awaiting a written description of the Marker System from Jim Airey by request through Percy Robb of TLMP.

It appears that the Arusha data does not use any such system for quoting on non-sampled GSC's or for

otherwise altering the pure calculated values, but this possibility was not investigated to any great extent.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd200.htm](http://home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw/Misd200.htm)

DATA TRANSLATION OF EXISTING SYSTEM DATA TO NEW SYSTEMS

The Dar System

The various Symphony .wrk spreadsheets were assembled from various hard and floppy discs, and were then brought into Lotus 123 spreadsheets (type .wk3) and manually internally moved around to a column type spreadsheet.

These many (approx 70) Lotus spreadsheets were then merged together into one large Lotus spreadsheet (using Lotus).

The export to Dbase3+ facility in Lotus Translate was then used.

Dbase3+ was then used to clean up the output from the Translate Utility (which never quite works correctly).

Note that the yardage and/or number sold information was never brought over, because it was difficult to locate in the spreadsheets, and because Dar bulks yardage over 7 day and 30 day periods. The yardage as used in the previous Symphony system can always be accessed from the weekly and monthly printed reports file if required.

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd210.htm](#)

The Moshi System

The various Enable .dbf files were assembled from various hard and floppy discs.

A program in the Clipper programming language had to be written to process these files, which, although they had a .dbf suffix, were not of dbase format.

The yardage and number sold data was entered manually from the raw data sheets into a separate dbase3+ database.

There was a problem with the actual market-day date within each monthly Enable file - this market-day date was not actually stored. However, Mr Swai, the data input person, assured me that they were always entered in week sequence. Therefore a program was written which read the yardage figures from the yardage database, and which then assumed that the sample size for each week was directly proportional to the yardage (with zero sample if no data of course); this program then wrote the appropriate market-day date against each line item data record in the raw data database. Note however that because of this technique, which for time and location reasons I did NOT verify against the paper records, all the market-day records for Arusha and Moshi must be regarded as slightly suspicious, since maybe on average 5% of the records for each market-day may actually belong to the week before or the week after. I recommend that the master database be checked against the paper records for Moshi and Arusha. This would probably take me 2-4 days to complete, and must be done with the original paper records from the Moshi Office to hand (which probably comprise a 5-ream box weighing 14 kg).

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd220.htm](#)

The Integrated System

The .dbf database files from both the above systems were merged, and data cleaning was performed on this single composite file. Note that the actual filename from which each record originally came is stored in the database (known as CATDATA.dbf); this will enable cross reference back to that original Enable database file or Symphony spreadsheet file if necessary.

For Dar es Salaam, all the records with origin as 'MARKER' were deleted from the system, because they were bogus records and not raw data.

For the following databases, the price values had to be multiplied by a factor of 10, since it was very apparent that a mistake had been made. This may be due to a lack of field capacity in the Enable computer system in Moshi, or it may be due to some operator mistake. Since this problem was discovered while back in Dar, it was not possible to check at the time with Mr Swai for his comments; that should be done at some time.

Arusha Moshi

92/01 (3)

92/03 (2)

22/10/2011

Sampling - My Comments

92/12 (1)

93/08 (1)

93/10 93/10 (3)

93/12 93/12

94/01 94/01

94/06 94/06

94/07 94/07

94/08 94/08

Numbers in brackets are for cases where not all records appear to be faulty - only the quantity indicated.

For the record, the databases affected are (in sequence as above) : ARUJAN.dbf, ARUMAR.DBF,

ARUDEC.DBF, ARUAUG.DBF, AROCT93.DBF, ARDEC93.DBF, ARJAN94.DBF, ARJUN94.DBF, ARJUL94.DBF, ARAUG94.DBF, WWOCT93.DBF, MSDEC93.DBF, MSJAN94.DBF, WWJUN94.DBF, WWJUL94.DBF and WWAUG94.DBF.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd230.htm](http://home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw/Misd230.htm)

DATA QUALITY - AN EXAMINATION OF THE TRANSLATED DATA FOR DAR, ARUSHA AND MOSHI 1989 - 1994

Analysis of raw data

1. There are 19158 raw data points for 505 market-days for the 3 major sites over the period 1989-94.
2. Ideally, for each market day, there will be at least one data point for each of the 15 GSC's, i.e. information for 15 GSC's for each market-day; in reality the average is 7 GSC's per market-day.
3. An examination of the frequencies for the 15 GSC's show that Bull 4, Cow 4, Bull 0, Steer 4, Cow 0, Bull3, Cow 3, Steer 3, Steer 0, Cow 1, Bull 1, Bull 2, Cow 2, Steer 1 and Steer 2 is the sequence of increasing occurrence (Bull 4 is least represented, and Steer 2 is most represented in the data).

	Average sample size per market day (for market days with sample size > 0)	Number of market-days with sample size > 0 (out of 505 total market-days).	Number of data points (out of 19158 total data points with weight and price).	%age of total population
Steer grade 0	3	270	912	4.8%
Steer grade 1	9	464	4167	21.8%
Steer grade 2	11	481	5340	27.9%
Steer grade 3	4	270	1009	5.3%
Steer grade 4	4	98	412	2.2%
Cow grade 0	2	107	177	0.9%
Cow grade 1	3	316	952	5.0%
Cow grade 2	6	418	2332	12.2%
Cow grade 3	3	227	610	3.2%

Cow grade 4	2	71	115	0.6%
Bull grade 0	2	85	145	0.8%
Bull grade 1	3	323	936	4.9%
Bull grade 2	4	384	1608	8.4%
Bull grade 3	2	161	364	1.9%
Bull grade 4	2	48	77	0.4%
All	Avg = 4		Total=19158	

Table: Sample and Population by Grade-Sex Combination for Dar, Arusha and Moshi 1989 - 1994 inclusive.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd240.htm](http://home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw/Misd240.htm)

4. In fact, for the 19158 data points, Bull Grade 4 is only 0.4% of the total sampled population. This implies that to get even just one reading on an average market-day, our sample needs to be 250 animals (using the normal technique of trying to ensure that the sample is cross-representative of the total population); sampling 250 animals per market-day would be very expensive and probably logistically impossible.

5. Now the fact that not every GSC is represented means that in order to produce tabular data for every

GSC, then we have to resort to interpolation and/or extrapolation. Because the extreme grades are the least represented among the sample, the odds are that in most cases we will have to extrapolate.

As we all know, extrapolation can be inaccurate.

6. Let us also now examine the data quality of the raw data.

This can be done in two ways -

- examine how the 15 (or usually less - average 7) GSC average values compare with each other - i.e. are their relationships consistent... This is examined in (7) through (9) below...

- compare the average for each GSC with the various values from which that average is calculated, e.g. some kind of standard deviation measure. This is examined in (10) below...

7. Testing inter-GSC relationships for each market-day.

The usual relationship is that for each sex, as grade number decreases (and animal quality rises), then cost/liveweight kg increases (this is because there is more carcass and more edible meat per liveweight kg for better quality animals, and also possibly because there is a higher proportion of high quality high-value meat).

However there are some times when for whatever reason, there appears to be a distortion, inasmuch as higher grades fetch a lower price per liveweight kg.; our analysis has taken this also into account.

Each market-day was analysed as follows:

The average price per liveweight kg for each of the 15 GSC's was calculated (obviously zero if no data sample for any GSC). These up to 15 values were compared with each other and the market day classified as follows:

0 the variation of unit price within at least 1 of the 3 sexes was internally inconsistent - e.g. Steer Grade 0 greater than Steer Grade 1 BUT Steer Grade 1 LESS than Steer Grade 2. A classification of 0 should indicate that the data is suspect without some kind of data smoothing being applied (and even then may be unacceptably inaccurate).

9 The variation within each of the 3 sexes is internally consistent, but whereas at least one of the 3 sexes has a normal behaviour (ascending unit value as grade number decreases), then also at least one other of the 3 sexes has an inverse behaviour (DESCENDING unit value as grade number decreases). A classification of 9 should probably indicate also that the data for this market-day is suspect; it may also however indicate peculiar market conditions.

3 There is only data for 1 GSC within each sex (and even 1 or 2 sexes may have no data for any GSC). A classification of 3 means that it will be difficult or impossible to perform interpolation or extrapolation to other GSC's within those sexes for which data is available.

1 Data is available for all 3 sexes. Data within each of the sexes for which data is available is internally consistent, and is normal (i.e. ascending unit value for descending grade number). A classification of 1 is a pre-requisite to indicate that the data may be good, but is no guarantee that the data is in fact good.

4 Data for more than 1 GSC is available for only 2 of the 3 sexes. Data within each of the sexes for which data is available is internally consistent, and is normal (i.e. ascending unit value for descending grade number). A classification of 4 is a pre-requisite to indicate that the data may be good, but is no guarantee that the data is in fact good.

5 Data for more than 1 GSC is available for only 1 of the 3 sexes. Data within each of the sexes for which data is available is internally consistent, and is normal (i.e. ascending unit value for descending grade number). A classification of 5 is a pre-requisite to indicate that the data may be good, but is no guarantee that the data is in fact good.

2 Data is available for all 3 sexes. Data within each of the sexes for which data is available is internally consistent, and is INVERSE (i.e. DESCENDING unit value for descending grade number). A classification of 2 may indicate that the data is of poor quality, or it may just indicate that market conditions on that market-day were peculiar.

6 Data for more than 1 GSC is available for only 2 of the 3 sexes. Data within each of the sexes for which data is available is internally consistent, and is INVERSE (i.e. DESCENDING unit value for descending grade number). A classification of 6 may indicate that the data is of poor quality, or it may just indicate that market conditions on that market-day were peculiar.

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd250.htm

7 Data for more than 1 GSC is available for only 1 of the 3 sexes. Data within each of the sexes for which data is available is internally consistent, and is INVERSE (i.e. DESCENDING unit value for descending grade number). A classification of 7 may indicate that the data is of poor quality, or it may just indicate that market conditions on that market-day were peculiar.

8. Data from the test(7) is shown below:

Test Cat.	All	Arusha	Moshi	Dar	Arusha 94	Moshi 94	Dar 94
0	205	15	32	153	0	4	41
1	106	36	21	48	12	11	13
4	75	28	27	20	12	6	7

5	45	8	19	18	1	1	8
2	2	0	0	2	0	0	0
6	4	0	1	3	0	0	0
7	8	2	3	3	0	0	1
3	14	2	0	11	0	0	2
9	46	6	15	24	0	0	8
Totals	505	97	118	282	25	22	80

Table: Results, data integrity test number (7).

9. Conclusions from test (7) :

For all 505 market-days:

- 40% (205) failed the quality test with classification of 0

- 20% (106) passed the quality test with classification of 1

- another 15% (75) passed the quality test with a classification of 4 but can only be used for 2 of the 3 sexes, since data is lacking

- another 9% (45) passed the quality test with a classification of 5 but can only be used for 1 of the 3 sexes, since data is lacking

- 9% (46) have contradictory normal/inverse relationships among different sexes (classification of 9)

- 3% (14) have only single GSC's and therefore could not be used for interpolation or extrapolation (classification of 3)

- 3% (2 plus 4 plus 8) have inverse GSC intra-sex relationships and must be considered dubious (classification of 2, 6 or 7)

For the 3 major sites and by date:

- the Arusha data performs the best, with 37% class 1, plus 28% class 4 plus 8% class 5. This increases to 48% class 1 plus 48% class 4 in 1994.

Total score 96%.

- the Moshi data also performs quite well, with 20% class 1, plus 23% class 4 plus 16% class 5. This increases to 50% class 1 plus 27% class 4 plus 5% class 5 in 1994. Total score 82%.

- the Dar es Salaam data performs quite badly, with 16% class 1, plus 7% class 4 plus 6% class 5. This increases only marginally to 16% class 1 plus 9% class 4 plus 10% class 5 in 1994. Total score 35%.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd260.htm](#)

10. Testing Deviation of unit price values from average for each GSC. (see item (6) above).

A value for each market-day was calculated using the following procedure:

Each of the 15 GSC's was examined in turn.

If there were more than 1 data point for the GSC, then the average for those points was calculated; the percentage variation (+ or -) of each of the points from this average value was calculated, and put into a general calculation for that market-day.

The standard deviation of these percentage variations was calculated using conventional standard

deviation (SD) formulae.

This SD will give an indication of how the data points vary from the average values, i.e. 0.10 value means that approx 68% of the data points are within +/- 10% of the average values (+/- 1.0 standard deviations); or that 87% of the data points are within +/- 15% of the average values (+/- 1.5 standard deviations).

Thus a low value of SD indicates that the data is relatively tight and probably of good quality; conversely a high SD value probably indicates that the data is of poor quality.

11. The data is presented below:

	Standard Deviation	Nr of market-days
All	0.115	505
Arusha	0.155	97

Moshi	0.131	118
Dar	0.094	282
Arusha 94	0.132	25
Moshi 94	0.133	22
Dar 94	0.085	80
Test 7 class = 1	0.113	106
Test 7 class = 0	0.116	205
Test 7 class = 2	0.150	2
Test 7 class = 3	0.052	14
Sample Cats > 8	0.099	156
Sample Cats > 4	0.117	428
Sample Cats > 12	0.073	22
Sample Cats 4-8	0.126	314
Sample Cats 4-8 & Arusha	0.158	81

Sample Cats 4-8 & Arusha	0.126	102
Sample Cats 4-8 & Moshi	0.126	102
Sample Cats 4-8 & Dar	0.106	127

Table: Average Standard Deviations of data within Grade-Sex Combinations (for GSC's with sample size > 1) - 3 major markets, 1989 through 1994.

12. Conclusions from test (10):

- Average SD from 505 market-days is 0.115
- there appears to be no real difference in SD values between 'passed' and 'failed' data points as per the intra-GSC and intra-sex data integrity tests
- Dar scores the best, with Moshi second and Arusha last
- Dar shows slight improvement for 1994, with a moderate improvement for Arusha (Moshi is steady).
- because of the calculation technique, market-days with lots of GSC's show better results than those with few GSC's (many GSC's also mean more single-point GSC's, with zero variation). However, restricting reporting to market-days with 4-8 GSC's gives the same results

as stated above.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd270.htm](#)

13. Conclusions from both tests (item (7) and item (10):

Arusha and Moshi perform well on the intra-sex and inter-sex GSC integrity tests and less well on the SD of actual data points to average values within the GSC tests. Dar performed badly on the GSC integrity and quite well on the variability.

In general, and particularly for Dar, it appears that some improvement of data collection practices may be required. Also some changes in sampling procedure may be required.

It also appears that the use of relatively basic data processing techniques may be resulting in a loss of accuracy, i.e. better data smoothing and or data averaging techniques are required.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd280.htm](#)

THE SEARCH FOR SOUND ALTERNATIVE TECHNIQUES FOR DATA PROCESSING

1. It was decided to graph the data points for each market day for the 3 major markets for the period 1989 - 1994. Firstly the price was graphed against liveweight. Viewing the graphs showed a lot of

variation, and of course the graphs did not take into account the differences in grade of animal, which is bound to have an effect on value and price.

2. Because of this, the graphs were re-produced showing the price against carcass weight (carcass weight was calculated from liveweight, sex and grade using the Texas A&M tables).

A 3rd Variation was also done - showing the price against edible weight (muscle plus fat - again using percentages from the Texas A&M Study).

Note that these graphs (about 40,000 combinations of them in total) can be viewed by running the MIS Computer System and choosing option SCREEN GRAF - which is present in Column 1 Row 9, and also in Column 10 Row 1. A full explanation of how to use this option is given in the help screen - press F1 key to show....

3. MANY of these graphs showed good apparent data point groupings and coherent patterns emerging (SOME of these graphs were however extremely poor); there appeared to be little difference in pattern between the carcass weight and the edible weight graphs for any and every market-day.

The main findings were:

- the graphs would either be straightline with the origin, or would curve upwards to some extent, or would curve downwards to some extent, but still appearing to head through the

origin.

On looking at these patterns theoretically, it was reckoned that the straightline with the origin pattern indicates a linear price vs. weight relationship, i.e. an approximately uniform price/carcase kg or price/edible kg independent of animal weight and animal grade; an upcurving line indicates a premium for heavier carcasses - i.e. a premium for heavier animals and for higher grades; a downcurving line indicates a penalty against heavier animals and higher grades - which actually get a lower price per kg of carcase (!).

Out of interest, Dar appeared to be a market which was relatively flat or even penalising heavier and higher quality animals, with Moshi favouring better quality animals to some extent, and Arusha the most. i.e. Dar was generally straight line or downcurving, whereas Moshi was usually upcurving, and Arusha even more so.

4. These graphs of price vs carcase weight or price vs edible weight were now reworked splitting out steers, cows and bulls. For those graphs which had a good initial profile (i.e. most of the graphs), the following findings resulted -

- cows tend to come at the lower range of the carcase weights for the total population (no surprise)
- bulls tend to come at average or above-average on the carcase weight range (no surprise)
- cows seem to come in at above-average price for their weight

- bulls seem to come in at average price for their weight

Because of these findings, it was decided that each sex should be treated as a separate group for data analysis - any ideal wish to amalgamate all sexes for data processing would not appear to be justifiable; although from viewing the data such a move might be gotten away with for these 3 terminal markets, an amalgamating approach would probably not work at primary or intermediate markets, where for example cows are often bought and sold for breeding or milking and not for their meat value (it is uppermost when trying to explore a workable methodology to get one which will work anywhere worldwide for any time period).

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd290.htm](#)

5. It was now decided to use numerical methods to produce the best fits to these groups of data points on the price vs. carcase weight and price vs edible weight graphs, one for each sex for each market-day, i.e. 3 graphs per market day.

We were ideally looking for a straight line fit, but of course many of the data point groupings were curving upwards or downwards. Since we should probably assume that in theory a zero weight animal would have zero value, then it was decided to look for a straight line fit on a log-log graph, (logarithm of price vs. logarithm of carcase weight), which gives

$$\log(\text{price}) = k + (b * \log(\text{carc.weight}))$$

These straight line fits were calculated using standard statistical formulae, which also incidentally

produce values of r or r^2 as measures of goodness of fit.

6. The graphs were then redrawn with the best fit line also represented as well as the data points.

As a general rule, such graphs with less than 5 data points and/or with a slope (b) of less than 0.5 were unsatisfactory (some negative slopes were also encountered - they too were unsatisfactory).

Moreover, it was seen that on some of the graphs, there appeared to be rogue data points (which may have been due to 'mob' pricing or to measuring error or due to recording error).

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd300.htm](http://home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw/Misd300.htm)

7. The following strategy was adopted to cope with these rogue data points:

- calculate the best-fit line as above
- run back through all the data points used in the calculation and work out the deviation from the best-fit line for each data point pair
- calculate the standard deviation of these deviations

- also make a note when doing this calculation of which of the data points has the largest deviation

- now check the ratio of largest deviation to standard deviation - if it is less than 2.5 (i.e. all data points within +/- 2.5 standard deviations), then assume that there are no rogue data points; but if the largest deviation is greater than or equal to 2.5 SD's, then mark that data point as a rogue data point not to be used during the best-fit process. Note as a proviso that if there are less than 5 data points for this market-day-sex best-fit line, then the 2.5 SD rule is NOT however applied - the iteration procedure is ended.

- if the 2.5 SD rule HAS been applied, then loop back round and recalculate the best fit as above. The whole process is repeated until the worst point is within the 2.5 SD envelope (with the proviso that a maximum of 33% of the data points are discarded in this manner).

8. Working on the historical data, the results of this discarding process were that out of 19158 total data points, then 250 (approx 1.3%) were discarded; of these 250, 181 were steers, 49 cows and 20 bulls, i.e. approximately proportional to population sex distribution.

Note that this rogue point process does not however appear to deal with all cases of apparent mob pricing inaccuracy.

9. Note that a by-product of this rogue point processing is that we have a SD measure of accuracy for our process - which incidentally appears to give a much better indication of accuracy than the R values, as can be seen from the following table:

	Edible	Carcase	Liveweight	Nr of Market-Days (out of 505 total)
SD - Steers	0.123	0.148	0.661	443
SD - Cows	0.098	0.139	0.562	329
SD - Bulls	0.080	0.142	0.485	296
R - Steers	0.877	0.891	0.851	443
R - Cows	0.856	0.853	0.782	329
R - Bulls	0.908	0.910	0.857	296

Table - comparison of log-log best-fit curve fitting for market-day graphs of animal price vs. animal weight between edible, carcass and liveweight standards; comparison being by both standard deviation (SD) and normal correlation coefficient (R) techniques; for Dar, Moshi and Arusha Markets, 1989

through 1994. Note: only market-day sexes for which the LLBF slope B was greater than 0.5 were included in the above analysis; also only when the sample size was greater than 2.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd310.htm](#)

10. The graphs were then redrawn with the best fit line represented as well as the data points, with rogue points processed out.

As per above, such graphs with less than 5 data points and/or with a slope (b) of less than 0.5 were almost always unsatisfactory.

11. When the suitability of the price vs carcass weight graphs was compared with the suitability of the price vs edible weight graphs, the results were an almost imperceptible difference in r values but a significant improvement in SD values when using edible weight on the x axis - i.e. using best fits on $\log(\text{price})$ vs. $\log(\text{edible weight})$ appears to produce the closest correlation with recorded data.

This table clearly also shows that liveweight is an unsuitable standard upon which to base a log-log best-fit method (entirely to be expected).

12. Incidentally, this SD measure (rather than the r measure) could enable us to compare these best fit log-log techniques with more primitive averaging techniques (e.g. average cost per live kg, average cost per carcass kg, average cost per edible kg).

13. Our conclusion from the above is that best-fit straight line techniques on $\log(\text{price})$ vs. $\log(\text{edible weight})$, for each market-day-sex combination, gives us an accurate technique to eliminate rogue data and to average out the remaining non-rogue data. It also gives us a measure of our accuracy (with the SD parameter).

The task was then to incorporate this data smoothing technique into the computer system.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd320.htm](#)

ANALYSIS OF THE HISTORICAL DATA

The data was analysed using programs written within the Clipper Computer MIS System. For most categories of data, the output was sent to file and imported to Harvard Graphics version 2.3 (DOS) using the ASCII Delimited File Import Facility. All graphs cover the 3 major markets for the period 1989 through 1994 unless otherwise stated. Data was normally smoothed on a 42 day period around the date.

GRAPHS [Mis8001.htm](#) THROUGH MIS8005.htm - AVERAGE EDIBLE WEIGHT PER ANIMAL.

This graph is really a combination of animal liveweight and animal grade or quality, and is a good indication of animal quality variation.

All 3 locations show a strong annual cycle, with a peak of condition in June/July and a low in December/January. This variation is strongest for Arusha and Moshi, being approx 27%; it is only about 15% for Dar. The Dar peak and trough appear to be June and December, with Arusha and Moshi slightly later with July and January.

The pattern for Dar is a slight decline (3%) in both maximum and minimum over the period 1989 through 1994; Moshi has a slight increase per annum in the minimum values (2.5% p.a.) and a pronounced and accelerating increase per annum in the maximum values (5-11% p.a.); Arusha is making the most dramatic average quality increases with a jump of 12% p.a. from 1993 to 1994.

Current values for max and min are: Dar 100 and 85; Moshi 117 and 82; Arusha 127 and 100: Arusha has the highest quality animals, with Moshi second and Dar last.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd330.htm](#)

GRAPHS [Mis8121.htm](#) THROUGH MIS8135.htm - B FACTORS (SLOPE OF LOG-LOG GRAPH PRICE VS. EDIBLE WEIGHT)

It is my theory that this graph explains the behaviour of producers and traders for the graph MIS8001.htm above: The Graphs show that for Dar es Salaam, for all 3 sexes, the B values remain pretty constant over time at a value for B of 1.0. This in effect means that there is no price premium for better quality animals. Compare this with the graphs for Moshi and especially for Arusha: both were at 1.0 in

1992, but Moshi is now in 1994 at 1.6 for steers, 1.2 for cows and 1.5 for bulls; Arusha is now in 1994 at 1.7 for steers and bulls, and at 1.5 for cows. These are significant incentives to producers and traders to produce higher quality animals. For example, a B factor of 1.7 means that if an animal is fattened so as to have 10% more edible meat on its frame, then it will fetch a 17% higher price.

It is of interest that Moshi figures for 1991 appear to indicate that the factor for steers was then 1.3 (as compared with 1.0 for Moshi for 1992). This may imply that the pattern for these 2 northern markets is traditionally one of producing premiums for better quality cattle, and that 1992 saw a temporary fall-off in that situation...

These average edible weight per animal graphs plus the B factor graphs between them really encapsulate the most exciting findings of the MIS Project - that given a market which awards premiums for higher quality cattle, then producers and traders will rise to the occasion. This is truly a triumph for market forces. What remains to be done is to examine what are the factors which produce this quality market (we assume the informal exports to Kenya), examine how the producers and traders provide these quality animals (e.g. feedlots?), and consider whether it is desirable and/or possible that this experience be transferred to Dar or to other markets.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd340.htm](#)

GRAPHS [Mis8021.htm](#) THROUGH MIS8030.htm - AVERAGE PRICE/EDIBLE KG AND AVERAGE PRICE/CARCASE KG.

Dar shows a slow decline in prices from US\$ 1.4/edible kg in 1989 to US\$ 1.25/edible kg in 1994. There is a strong cycle with prices peaking in December and troughing in June. These seasonal cycles used to be

+/- 20% but now appear to be +/- 15%. The above edible prices correspond on the graph to US\$ 1/carcase kg in 1989 and to US\$ 0.9/carcase kg in 1994. Note that the 1994 Government-fixed retail price of mixed beef is US\$ 1.4 approximately (depending on exchange rate), giving butchers an average gross margin of 35% on sales.

Arusha shows a strong decline from US\$ 1.5/kg edible in 1992 to US\$ 0.85/kg edible in 1994. There used to be an annual December/June peak and trough but average prices now appear constant throughout the year. Equivalent prices are US\$ 1.1/carcase kg and US\$ 0.7/carcase kg..

Moshi shows a moderate decline from US\$ 1.25/edible kg in 1992 to US\$ 1.0/edible kg in 1994. Like Arusha, previous annual December/June extremes are now flat. The equivalent prices are US\$ 0.95/carcase kg and US\$ 0.75/carcase kg..

Note that for Dar es Salaam the August 1994 peak was due to a severe problem with rail arrivals which caused a shortage of saleable cattle and resultant high prices.

Arusha now appears to be a very attractive market for buyers, in view of high quality and low prices; analysis of prices for the higher grades and weights of animals may however slightly lessen this advantage (see below).

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd350.htm](#)

GRAPHS [Mis8041.htm](#) THROUGH MIS8046.htm - AVERAGE GRADE PER ANIMAL

This graph is similar in some ways to MIS8001.htm (which graphed average edible weight/animal). For all 3 sites there are pronounced seasonal fluctuations, with top grade in June and lowest grade in

December.

Arusha is the highest quality, with a peak of 1.05 grade average and a trough of 1.75 in December; Moshi is next with 1.6 peak and 2.1 trough; Dar is last with 1.7 peak and 2.1 trough.

Arusha and Dar are steady over the period 1989 - 1994, but Moshi has made a spurt in 1994, breaking out of its normal 1.6 - 2.1 annual cycle to hit a peak of 1.3.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd360.htm](#)

GRAPHS [Mis8091.htm](#) THROUGH MIS8094.htm - 0% OF TOTAL ANIMALS WHICH ARE GRADE 0 OR GRADE 1

This is very much like the last graph MIS8041.htm - it looks for the annual grade cycle and the variation with years.

For all 3 sites, the annual cycle is strong, with highest proportion of good grades in June and lowest in December. Arusha is top of course, with a cycle of 30% to 70% top grades, and in 1994 the situation improved to 43% to 72%; Moshi is next with 10% to 36% normal pattern and 8% to 50% in 1994; Dar is last with a regular 20% to 40% cycle.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd370.htm](#)

GRAPHS [Mis8031.htm](#) THROUGH MIS8034.htm - AVERAGE AGE PER ANIMAL

For Arusha, we see an average age for the period of 9-10 years, with no seasonal cycle or change with

time.

For Moshi, we see a move from 8 years average age to 9.5 years average age over the period 1992 - 1994, with no apparent seasonal cycle.

For Dar, we see average age move from 6.5 years in 1989 to 8 years in 1994; in the first few years we seem to see a double cycle each year, with an age peak at June and December. This could in fact be an unloading of older animals in June when the general condition of almost all animals is good, and again an unloading of older animals in December when there is a serious shortage.

Remember however that ageing is a very difficult and subjective process (possibly worse than grading); therefore data between markets is probably not comparable, and even within a market with the passing of time and the changing of ageing personnel or the drifting of standards....

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd380.htm](#)

GRAPHS [Mis8051.htm](#) THROUGH [MIS8059.htm](#) - PERCENTAGES OF ANIMALS WHICH ARE STEERS, COWS AND BULLS.

These graphs show a fairly constant distribution of sexes with the years: Arusha 65:30:5, Moshi 60:30:10, Dar 60:20:20 (steers:cows:bulls).

Regarding seasonal variations, in general the proportions of cows and bulls peaks in December and troughs in July: Arusha with an average of 30% cows peaks at 37% in December and troughs at 15% in

July; Moshi exactly the same; but Dar has no discernable pattern on cows. For bulls, Arusha with an average of 5% bulls peaks at 10% in December and troughs with 3% in July; Moshi with an average of 10% peaks at 20% in December and troughs with 5% in July; Dar with an average of 20% bulls peaks with 30% in December and troughs with 15% in July.

Once again, it looks like the cows and bulls are pulled out of the bag for the high prices prevalent at December.

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd390.htm](#)

GRAPHS [Mis8111.htm](#) THROUGH MIS8118.htm - YARDAGE, NUMBER SOLD, AND RATIO NR SOLD/YARDAGE.

These graphs unfortunately only cover Arusha and Moshi; for Dar the information will be available from the processed output sheets from the Symphony system (for gross yardage from the rail station) and from the daily data sheets in the office at Pugu (for numbers sold).

An interesting pattern emerges: both Arusha and Moshi have peaks in yardage and in sold in June, with a 'trough with an upwards blip' at December - i.e. there is a downward trend towards December with a mini-peak at the bottom of that trough for Christmas itself.

For example, Arusha has a peak average yardage of 1600 per market-day in June, with a trough of 300 on either side of Christmas and an actual Christmas blip of 800 animals; similarly, Moshi has a peak yardage of approx 1000 per market-day, with a double-minimum of 300 around Christmas and a Christmas blip of 600.

For NUMBER SOLD, Arusha is 950/100/480 and Moshi is 700/150/400.

Looking at the ratio of number sold to yardage, Arusha in general has an average of sold/yarded of 50% (in the range 40% to 70%), while Moshi has an average of sold/yarded of 70% (in the range 60% to 80%). Arusha has risen appreciably since 1991, when average sold/yarded was 35%; whereas Moshi has dropped since 1992, when average sold/yarded was 90%.

Looking at the trend lines, we see that for yardage, figures are remarkably constant over the years - Arusha has risen just slightly from an average 1000 animals per market day in 1991 to 1050 in 1994; Moshi has remained constant at 600 animals per market day.

Also looking at trend lines, for number sold, we see that Arusha on average has risen from 350 animals sold per market-day in 1991 to 550 animals sold per market day in 1994; Moshi meanwhile has supposedly dropped from 550 in 1991 to 400 animals sold per market-day in 1994, according to the market records.

As background information, I am reliably informed that Arusha and Moshi are effectively twin markets. Lower grades not sold at Arusha on the Friday are then trekked to Moshi for sale the following Tuesday.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd400.htm](http://home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw/Misd400.htm)

ORIGIN DATA ANALYSIS

There is origin data for all 3 major markets. This was analysed using a menu option in the MIS Computer System, which calculates average edible weight per animal, average grade per animal, and sex distribution. The data was then imported to Harvard and graphed as before:

GRAPH [Mis9003.htm](#) - ARUSHA - SUPPLY REGIONS - MARKET SHARE.

These graphs shows that, pre-June 93, Meatu supplied 20% of the animals to Arusha, Mbulu 18%, Shinyanga 13% etc.; post-June 1993, Meatu jumped to 53% of the market, and all others fell back, except Kondoa, which registered a gain from 8% to 10% of the market. Of these falls in market share, Shinyanga, Iramba and Singida fared the worst, with the biggest drops.

GRAPH MIS9004.htm - ARUSHA - SUPPLY REGIONS - AVERAGE EDIBLE WEIGHT.

As we know, average edible weight is a good measure of animal quality, being a combination of liveweight and grade information (the only drawback is that a big shift in the percentage of cows in a population also affects the average edible weight, even without any real change in animal quality).

This graph shows that after June 1993, there were significant gains in animal quality for animals coming from Meatu, Iramba, Kondoa, Igunga, and Karatu; there was a static situation for animals from Shinyanga, Hanang, Singida and Maswa (but Hanang already had a very high animal quality).

Kondoa stands out as not only registering a very high percentage gain in animal quality, but also in getting to top value for animal quality. Combine this with the gain in market share in MIS9003.htm as above, and we have a very interesting situation in Kondoa. I very strongly recommend that the cattle production business in Kondoa is investigated as possibly being a model for other regions (as is of

course Meatu).

GRAPH MIS9005.htm - ARUSHA - SUPPLY REGIONS - AVERAGE GRADE.

This is really effectively just another way of presenting the information which is present in MIS9004.htm as above. It says the same, but is a cruder measure in some ways.

Note that for these 3 graphs, the accuracy of the market share information may be suspect, since it is based on sampling accuracy (or luck), but that the average edible weight information should be treated as quite accurate.

GRAPH MIS9013.htm - MOSHI - SUPPLY REGIONS - MARKET SHARE.

The information for Moshi is not so exciting as for Arusha above, since (as we know) the animal quality gains for Moshi are not quite so outstanding. Also of course Moshi is very much a second market to Arusha, and mainly deals in the lower quality animals which were unsold at Arusha on the previous week.

This graph shows that Kiteto's market share fell from 26% to 18%, Mbulu from 24% to 18%, and Kondoa from 13% to 10%; Singida rose from 7% to 10%, Babati from 4% to 11%, and Hanang from 2% to 4%.

GRAPH MIS9014.htm - MOSHI - SUPPLY REGIONS - AVERAGE EDIBLE WEIGHT.

This graph shows data similar to that of MIS9004.htm: that after June 1993, there were significant gains in animal quality for animals coming from Kondoa and Iramba; there was a static situation for animals from Shinyanga, Hanang, and Singida (but Hanang already had a very high animal quality).

GRAPH MIS9015.htm - MOSHI - SUPPLY REGIONS - AVERAGE GRADE.

This is really effectively just another way of presenting the information which is present in MIS9014.htm as above. It says the same, but is a cruder measure in some ways.

GRAPH MIS9023.htm - DAR - SUPPLY REGIONS - MARKET SHARE.

The information for Dar is the least exciting, since (as we know) there were effectively zero animal quality gains for Dar.

This graph shows that Shinyanga gained from 27% to 34% of the market, and Dodoma gained from 17% to 21% of the market; Tabora fell from 20% to 13%, and Singida from 17% to 12%.

GRAPH MIS9024.htm - DAR - SUPPLY REGIONS - AVERAGE EDIBLE WEIGHT.

This graph shows that only Mbeya (a fairly minor player by market share) gained in animal quality

terms (from 93 kg to 104 kg); the other supply regions were either static or falling in animal quality terms.

GRAPH MIS9025.htm - DAR - SUPPLY REGIONS - AVERAGE GRADE.

This is really effectively just another way of presenting the information which is present in MIS9024.htm as above. It says the same, but is a cruder measure in some ways.

GRAPH MIS9031.htm through MIS9033.htm - SUPPLY REGIONS - SEX DISTRIBUTION.

These graphs show the sex distributions coming from the various regions to the 3 major markets, both before and after June 1993. There is nothing very startling about the information, but like all other information, it may reveal something useful to the cattle specialists on the TLMP Team.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd410.htm](#)

BUYER DATA ANALYSIS

There is only buyer ID data for Dar es Salaam. This was analysed using a menu option in the MIS Computer System, which calculates average edible weight per animal, average grade per animal, and sex distribution. It was found that:

There were 225 active buyers in Dar Pugu market. Of these, 32 buyers bought 67% of the animals, 12 buyers bought 41%, 8 buyers bought 31%, and 4 buyers bought 23% of the animals.

The larger the buyer, the heavier the average animal purchased, the better grade the average animal

purchased, and the more bulls and less cows purchased (though not to any great extent - average 21% bulls for all buyers and 25% for the top 4; also 21% cows for all buyers and 17.5% for the top 4). The weight thing came out at 95 kg average edible weight for all buyers and 102.5 kg average

edible weight for the top 4 buyers.

MIS9041.htm through MIS9044.htm

The buyer information was graphed on MIS9041.htm through MIS9044.htm inclusive. The top 33 buyers by buying numbers were included.

Mis9041 (market share) shows that the top Dar buyer - Emil - purchases approximately 9% of all animals arriving; David is next with 5%, Elias with 4%, Yusuf with 3%, Emma with 2% etc..

Mis9042 (Edible Weight) shows that David (the second largest buyer) goes for top quality with an average edible weight purchase of 120 kg; Daudi (a much smaller operator near the bottom of the 'Top 33') also goes for quality with an average purchase of 122 kg.. I recommend that if or when TLMP researches the existence of a quality market in Dar, then they interview these 2 buyers. Mis9042 also shows that both Madambi and Mambo buy at the bottom end of the quality spectrum - I recommend that these 2 buyers are also interviewed.

Mis 9043 (grade) just really repeats and confirms the findings of Mis9042.

Mis9044 (sex distribution of buying) shows that Emma buys about 90% bulls, and that Aidan buys

about 65% cows. Finding out why could be interesting.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd420.htm](#)

GRAPHS [Mis9221.htm](#) THROUGH MIS9226.htm INCLUSIVE

These graphs compare the average price per edible kg for the 3 major markets, but subselected according to high and low quality animals. These graphs show the following:

- that the average price per edible kg for Dar is very much independent of the animal quality band examined
- that the average price per edible kg for Arusha and Moshi is much higher for better animal qualities. This is the B factor being higher than 1.0, i.e. a non-linear relationship between price and edible weight, which encourages producers to supply higher quality animals to market.

The following table summarises the current (1994) values from these graphs:

	Arusha	Moshi	Dar
>140kg edible wt	US\$ 1.0/kg edible	US\$ 1.1/kg edible	US\$ 1.25/kg edib
>120 kg edible wt	US\$ 1.0/kg edible	US\$ 1.0/kg edible	US\$ 1.2/kg edib

<120 kg edible wt	US\$ 0.7/kg edible	US\$ 0.9/kg edible	US\$ 1.2/kg edib
<80 kg edible wt	US\$ 0.6/kg edible	US\$ 0.8/kg edible	US\$ 1.1/kg edib

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd430.htm

ANALYSIS OF THE HISTORICAL DATA - SUMMARY

The summary is best done by the following tables, which cover seasonal variations in markets and also cover inter-market comparisons:

	June/July	December/January
Volume of Sales	High	Low
Animal Condition	High	Low
Unit Price/Animal	High	Low
Unit Price/kg edible	Low	High

Table: Seasonal Variations in Cattle Markets

	Arusha	Moshi	Dar
Edible Kg/animal	120 kg	117 kg	98 kg
Seasonal Var.EKA	+/- 12%	+/- 12%	+/- 8%
B Factor	1.7	1.5	1.0
Price/kg edible	US\$ 0.85	US\$ 1.00	US\$ 1.25
Seas.Var.PKE	+/- 7%	+/- 7%	+/- 20%
Price/Animal	US\$ 100	US\$ 100	US\$ 120
Avg.Grade	1.3	1.5	1.8
Var.Grade	+/- 8%	+/- 8%	+/- 5%
Age	9.5 years	9.5 years	8 years
Steers %age	65%	65%	60%
Cows %age	28%	25%	20%
Bulls %age	7%	10%	20%

	17%	10%	20%
Yardage/year	50,000 animals	28,000 animals	140,000 animals
Sold/year	30,000 animals	28,000 animals	140,000 animals

Table - Macro Characteristics of Major Markets, 1994 readings.

In addition to the above simplified tables, the following trends are active:

Condition - Arusha and Moshi have been improving animal quality/ animal condition rapidly over the last 2 years; Dar animal conditions appear static. The 2 indicators Average Edible Weight/Animal and Average Grade/Animal both illustrate animal condition - a higher edible weight /animal and a lower grade per animal both indicate better condition.

B Factor - the Condition improvements as above seem to be mirrored by a change in the way that Arusha and Moshi now apply healthy price incentives to their markets - B factors are now significantly above 1.0.

Unit Prices - prices per edible kg - the average prices per edible kilo have been declining slowly over the years for all 3 markets.

Age - Arusha and Dar ages have remained quite constant; Moshi ages have been increasing over the last 2 years (but judging of age is difficult and subjective).

Yardage and Sold - Arusha and Moshi yardages have been relatively constant over the years, but Arusha sales have been rising strongly. Since we must accept that most of the Moshi yardage is in fact sold, then total sales in these 2 Northern markets have been increasing modestly in number terms. Data on Dar yardages has not been analysed for this report, since the information is not at present to hand.

Overall Turnover or Revenue - for the 2 northern markets, it appears that the following present trends are producing an increase in turnover after some years of slow decline; these trends are: an apparent flattening off in the falling unit price per edible kg in US\$ terms, appreciable and impressive gains in the average animal quality, an appreciable price incentive for better quality animals, and a rise in sales volumes.

I recommend that these definite and impressive improvements in the average quality of cattle in the 2 northern markets should and must be investigated in order to determine:

- how the producer and/or trekker animal quality increases were effected
- whether the experience in this respect of the 'successful' regions can be transferred to other less successful regions feeding these northern markets
- whether these experiences can also be transferred to producers feeding the Dar market

- whether the price structure and price incentives prevalent in the 2 northern markets may somehow also institute themselves at the Dar es Salaam market, without which any improvements in the quality of animals destined for the Dar market may prove to be uneconomic

In connection with the above, by analysis of the Origin information, the successful cattle producing regions were identified (i.e. Meatu, Kondoa and others). Furthermore, by analysis of the Buyer information for Dar, buyers of high quality animals were identified (i.e. David, Daudi and others); interviews with these high quality buyers (and conversely with the 2 identified low-quality buyers) may shed light on the possibility of developing quality premiums for the Dar market.

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd440.htm](#)

THE BENCHMARK SYSTEM - SOME GRAPHS AND COMMENTS

We have in the Analysis of Historical Data compared average unit prices between the 3 major markets (i.e. average price / edible kg and average price/carcase kg). The general findings were that Dar has the highest unit prices, with Moshi second and Arusha close behind.

We also saw that for the higher grades, the Arusha and Moshi unit prices are very close to those of Dar, whereas for the lower grades the Dar prices are usually much higher than Moshi, which in turn is higher than Arusha.

Note that for the historical analysis graphs, all data points are based on actual values or the averaging of average values.

I have proposed in the section on Information Presentation above that instead of producing tables which give average price per kilo for the various grade-sex combinations, then we produce a table with real average prices for benchmark animals. I propose this for 2 reasons:

- for all 3 markets, the price vs. weight relationship is rarely exactly linear; therefore from a theoretical and practical viewpoint, to present average price/kg to cover a range of animal weights is not accurate; it also of course implies that the relationship IS linear.
- the presentation of typical animals with average prices is easier to understand by market traders who are certainly intelligent, but many of whom are not particularly mathematical or statistical.
- the presentation method is very easy to compare without calculation to one's own personal experience of animals and prices (unless of course the benchmarks selected are non-typical); thus if our information is accurate it will be recognised as such relatively easily (and the converse applies).

The graphs MIS9201.htm through MIS9207.htm inclusive and MIS9211.htm through MIS9218.htm inclusive show average benchmark prices corresponding to real data for the 3 markets 1989 through 1994. For each sex and market, the shape will be the same over the same period, but the values will be higher or lower depending on the weight and grade used. These graphs are composed in the following way:

- for each market day, the data points for each sex are analysed to get a best fit straight line on graph of the $\log(\text{price obtained})$ vs. $\log(\text{animal edible weight})$. This is done using mathematical formulae and also discounting up to 33% data points which are outside the envelope of ± 2.5 standard deviations (to discount stray or erroneous measurements).
- if for this market-day and each of the 3 sexes, the value of the slope of this best fit straight line is between 0.5 and 3.0, then the slope value (B) and the y intercept value (K) are used in a formula to calculate the price for the 7 benchmark weights and grades which I chose from averaging historical data.
- thus for every market day there may be 0, 7, 14 or 21 values of benchmark prices corresponding to the 21 benchmark weights and grades.
- each of the graphs above chooses only 2 of these 21 benchmark prices and shows them for 2 or all 3 of the 3 major markets.

The graphs themselves show what we are getting used to seeing:

- mis9201 to mis9003 - for the top steer benchmark - 350 kg grade 0 - show that prices between the 3 markets are in general very close to each other.
- mis9204 to mis9207 - for the lowest steer benchmark - 160 kg grade 4 - show that Dar is rather higher than Moshi which in turn is higher than Arusha. Note that when comparing Arusha in particular with the real data points it appears that the theoretical curve fit understates the prices at low weights and grades for high B values. I recognise as a legitimate

weakness of the log-log approach, but am totally convinced that the benefits of the approach easily outweigh this weakness, which only shows at this kind of benchmark.

- mis9211 to 9214 - for steer 275 kg grade 1 - show that Dar and Moshi are pretty much on par, but with a Dar bulge upwards in August 1994 due to the rail disruption mentioned above; Moshi is generally a bit above Arusha, but with a significant bulge upwards during the period December 1993 through May 1994 (reason unknown).

- mis9215 through mis9218 - for steer 240 kg grade 2 - shows similar behaviour to the 275 kg graphs above, but with Dar prices spacing out above Moshi and Arusha numbers.

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd450.htm](http://home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw/Misd450.htm)

HARDWARE RECOMMENDATIONS

The COMPUTERS

The PRINTERS

SOFTWARE

This section is eliminated in the 1999 re-release since all recommendations are now totally out of date

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd460.htm](#)

SUMMARY OF RECOMMENDATIONS

Recommendations are included throughout this report, and are repeated here in brief. A few items or sub-items below appear for the first time in this report. Presentation here is to a great extent in activity sequence:

1. Make use of the findings from the historical data to determine the workings of good trends, such as the animal quality improvements in certain regions feeding Arusha and Moshi, and to try to extend those good practices to other regions and to other markets.
2. Change from a sampling system which tries to be population representative to one which is sex-weight-grade combination representative; this will give more accurate pricing for smaller sample sizes, i.e. better results for less work. The resulting potential loss of data for the analysis of certain trends in the cattle business should be countered if felt necessary by a selective program or programs, building on the historical data and the historical analysis now available. Note that some markets do keep daily summaries (e.g. on numbers and total values by sex; maximum, minimum and average prices by sex, etc..) which may be useful to researchers and which may compensate for the loss of representative sampling.

3. Ensure that all scales used are calibrated regularly, adjusted when required, and repaired if required; calibration weights should be present full-time at all 3 major markets; the weight correction facilities of the computer program should be utilised; consider the replacement at some time of these conventional spring scales by load-cell scales for faster weighing with digital readout which will reduce operator or recorder error. If necessary, discuss the concept with market staff to inculcate the need for proper calibration and correction (instead of the dubious practices I observed).

4. Although the grading data appears remarkably good (even between markets), do organise periodic grading tests and courses if then required whose function will be to set absolute standards but also (probably more important) to ensure homogenous standards between the 3 major markets and among all personnel at these 3 major markets.

5. Adopt practices to ensure that price information is accurate, as discussed above (including possibly more observed pricing); try to research the practice of mob pricing and effect sampling so as to try to avoid being landed with mob price information; give disincentive to data collectors to pass off mob prices as real prices; investigate any and all other factors which produce a ratio of weighings-plus-pricings to total-weighings of less than 100%, since each weighing without a (useable and accurate) pricing is a loss of man-hours and useable sample size.

6. Adopt the log-log best-fit (LLBF) data processing technique to process the data for all 3 major markets (and for other markets if and when required); this will require the reinput or the data translation of data input into the 2 old systems during the period October 1994 through February 1995; use the standard deviation measure for each market day from the

LLBF system as an indicator of (price variability + data inaccuracy) - keep an eye on this number - if it gets too high there is something wrong.

7. Change the presentation formats to ones which use benchmark sex-weight-grade combinations, with common values between the 3 major markets to permit easy comparison; also discontinue the presentation of much spurious information on the makeup of the animal population (i.e. average weight, average price and percentage of total population for each grade-sex combination); note that this discontinuation will anyway be necessary if my recommendation on sampling is adopted, since the sampling will thereafter no longer be representative.

8. Integrate the presentation of information from all 3 markets, on radio, in the newspaper, and for the export reports; eliminate the present practice of ignoring Arusha and Moshi markets. Especially revamp the export report with the presentation of price data in US Dollars and/or in the currency of the target country; keep a file of press cuttings, radio transcripts, dates and channels, etc..

9. Reactivate the presentation of information at the markets themselves; ensure that there is zero time lag between data collection and information reporting, by the use of notebook computers onsite at the markets; this will anyhow be useful in the case of the possible privatisation of the organisation of these markets.

10. Encourage self-weighing by buyers and/or sellers as a means of reducing the cost and logistical load of the MIS program, and again as an aid in the possible privatisation of the organisation of these markets.

11. Consider whether to effect a check between the data-translated Moshi and Arusha data and the paper raw data for accuracy of the date of the market-day (as discussed above in the section Data Translation).
12. Investigate the raw data from the Tanzanian Texas A&M study (if it can be located) to better determine the effect on edible weight of varying liveweight within each grade-sex combination; apply this refinement to the computer system if such variation exists and can be quantified; with the aim of making the data processing slightly more accurate. Examine also whether the physical characteristics of the different breeds of cattle can or should be taken into account.
13. Institute a yardage count at Pugu (as is done at Moshi and Arusha) in addition to the present railage numbers collection (discussed in (15) immediately below).
14. If the TLMP Project Funding of Cattle Wagon Bodies for Tanzania Railways goes ahead, then consider producing a Management Information System to report on demand and supply of cattle movement by rail, and particularly on variation in supply of cattle to terminal markets and its effect on unit price; regardless of this, modify the present railage data collection system at Pugu Station to note date and railage, instead of totalling by week.
15. Consider strongly to eliminate the collection of data on age, buyer ID and origin, since these are additional work, and since no real analysis of these parameters appears to have been conducted for years; in this respect consider whether the analysis conducted in this report may be sufficient for some time to come, and/or may pinpoint some aspect of one or more of the above 3 fields which should be investigated in some detail. Note incidentally that

the Dar railage information (as in (15) and (17) can and could give origin information on 100% of the population (at least from railhead).

16. Consider quickly recapturing the Dar weekly railage numbers for graphical analysis over the 5 year period, from the weekly reports from the Symphony System. This is one aspect which is missing from this report, in which quite detailed yardage and sold information is given for Arusha and Moshi markets.

17. As a very minor item, consider improving the present apparently cumbersome and labour-intensive cattle identification (TRN'ing) process, as discussed above.

18. For computer hardware, I strongly recommend that the TLMP Project procures 3 or more notebook IBM-compatible computers with 2 sets of spare batteries and external battery rechargers. Also with cigar-lighter adaptors. These notebooks should NOT ever be plugged directly into mains supply for use or even for charging.

One Hewlett-Packard Laserjet 4 Plus and 3 or more Hewlett Packard Deskjet 320 portable monochrome/colour printers should be procured (together with rechargeable batteries and spare cartridges). A high quality surge protector should protect the Laserjet. The bubblejet printers should if possible run from battery only, not from mains.

Software for Statistical Analysis, Backup, and AntiVirus should be procured. Windows 3.1, WFWG 3.11, or Windows 95 should be the operating system.

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd470.htm](#)

Addendum to above Recommendations:

Some of the above recommendations may be considered radical by the TLMP Team, e.g. (2) on sampling, (6) on the adoption of the LLBF data processing technique, and (7) on the presentation of prices for benchmark sex-weight-grade combinations. Note that these 3 recommendations are NOT mutually interdependent, e.g. LLBF can still work without sex-weight-grade based sampling; SWGB sampling can be adopted without adopting LLBF processing (and will improve information accuracy over PR sampling); Benchmark SWG price presentation can be adopted without changes in sampling and with primitive data processing techniques. But do note that SWG Based Sampling and LLBF Data Processing will make significant improvements in accuracy and that Benchmark SWG Price Presentation should make a big improvement in the understandability and acceptance of the MIS by the target audience; note also that the adage GIGO (garbage in garbage out) applies to the computer system - the information output from the computer MIS system is only as good as the data being supplied to it; as a general judgement, the data collected in Dar, Moshi and Arusha so far appears to have been generally of a reasonably good quality, with the main weaknesses being due to the population-representative sampling employed.

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd480.htm

FURTHER WORK

The recommendations items (1) through (18) above inclusive all involve further work by members of the TLMP Team, but the following in particular relate to my sphere of operation:

6 - Data translation of the data input into the Dar and Moshi systems October 1994 through February 1995.

11 - The checking and cleaning of the historical Arusha and Moshi data (as regards date of market).

12 - Locating and checking the raw data from the Texas A&M Tanzania Grading Study, to search for variation within each grade-sex combination of the ratio of edible weight to liveweight.

14 - Making an MIS for the monitoring of the railage of cattle, at both dispatch and arrival points.

16 - The capture or recapture of Dar Pugu historical cattle rail arrivals.

18 - Hardware and software installation and software training.

There is significant scope also within the MDB (Marketing Development Bureau) to replace the present spreadsheet macro system for Crops MIS with a proper database type system; this will (as per the Livestock MIS) result in a system which is easier to use and for which analysis between markets and over time will be simple.

One additional item in the Computer MIS System should be checked - the exchange rates for the Tanzanian Shilling against the US Dollar for the period October 1994 onwards have been 'guesstimated' by me in light of the trends up to that date. The actual projections by the Bank of Tanzania should be obtained (these are usually easily available as public domain information) and input into the system;

this exercise should be done every year as the Bank of Tanzania publishes new projections, and of course should be checked also on a monthly basis for current values....

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd490.htm](http://home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw/Misd490.htm)

APPENDIX A - RAW DATA TRANSLATED FROM 2 SEPARATE PREVIOUS COMPUTER SYSTEMS

Raw data was found for the following periods for the following sites:

Dar 89/04-92/06,93/05-93/07,94/01-94/09; 17388 weighings, of which 10345 are priced, 279 market days; 37 average sample size.

Arusha 90/11,91/03,91/09-92/03,92/12-93/03,93/06-94/09; 9499 weighings, of which 4863 are priced, 97 market days; 50 average sample size.

Moshi 91/08-94/09 with small gaps; 8011 weighings, of which 3676 are priced, 118 market days, 31 average sample size.

Korogwe 94/05 only; 136 weighings, of which 131 are priced, 4 market days, 33 average sample size.

Haneti 93/06 only, 67 weighings, of which 63 are priced, 2 market days, 31 average sample size.

Fufu 93/06 only, 40 weighings, of which 40 are priced, 1 market day, 40 average sample size.

Kigwe 93/06 only, 41 weighings, of which 41 are priced, 1 market day, 41 average sample size.

Total database records as of October 1994 is approximately 35,000.

Many or most of the gaps could or can be filled by re-referring and re-inputting from the paper raw data sheets; however whether this type of exercise is either required, or whether any cost-benefit is justifiable, are both dubious...

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd500.htm](#)

APPENDIX B - TERMS OF REFERENCE

COMPARISON OF ACTIVITIES AND ACHIEVEMENTS WITH TOR

1.1 Assess existing MIS

1.2 Develop new MIS, with improved data collection, analysis and reporting, ease of operation, cost minimisation

1.3 Prepare spec for hardware and software for new MIS to run on several sites

2.1 Setup hardware procured from 1.3, and install software required to run the new system

2.2 Develop and test an appropriate menu-driven computer program

2.3 Train TLMP staff in use of the new MIS

2.4 Develop a training manual for new MIS system

2.5 Develop action plan for expansion of the MIS

2.6 Develop a project management, accounting and budget system with which to run the TLMP project

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd510.htm](#)

APPENDIX C - ACCOUNT OF VISITS AND DISCUSSIONS

Visit to Pugu Market 7/9/94

1. Animals come from railhead to holding grounds
2. Some days official sale is not held - then buyers and sellers will conduct private sales
3. Volume of sales is approx 200 animals /day, 7 days per week.
4. Sampling for weighing and costing purposes is approx 20%
5. This amounts to 100 sampled animals per week, 400 per month
6. Each official sale is recorded in a ledger - with buyer, seller, number of each sex (bull, cow, steer or mixed), and price.
7. The settlement is done directly between buyer and seller; the charges are levied by the auction on

the buyer

8. These charges are::

- Tsh 500 - market fee
- Tsh 200 - movement permit (checked at road block)
- Tsh 10 - stock route fee

Unlike many markets, the fees are NOT a percentage of selling price - they are a flat fee per head. As a footnote, this of course penalises low-value cattle.

9. The monies from these charges are channelled to the Treasury; Pugu market must then request a budget, which is usually of some magnitude smaller than monies collected

10. Blank item

11. The 20% sampling involves paint branding, grading, aging, sexing, and weighbridge weighing; the price is then recorded against sampled animals. This is done on the standard 30-line sheets mentioned in the Bokella interview....

12. Without yet doing timings, it is felt that sampling all animals would slow down the auctioning process - this should be checked on revisit 8/9/94 for working auction

13. Cattle arriving in Dar by road do not generally come to this market - they may go direct for slaughter

at the government-run City Slaughter House - which handles approx 50 cattle per day plus 150 sheep and goats. Estimated 400 cattle /day total arrive Dar by rail + road + driving (if any). This corresponds to 12 kg per person per year for the approx 1.5 million Dar residents

J.Bokella comment 8/9/94 - some animals do in fact come into

Pugu by road

14. Some animals are slaughtered directly at the Pugu Market on the slaughter slab, which is privately run

15. A blackboard is on display at the auction ring - this displays market info as per the reports produced - for each grade and sex, nr sold per day , average price, average weight, and average price/kg

Bokella states that this info is changed weekly.

16. The market does daily return sheets (one /day), which indicate number of animals and price information, but with no weight data. I forget whether these daily sheets give breakdown by class and/or sex - to be rechecked

on second visit...

17. Carboned receipt books exist for payment of the Tsh 500-00

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd520.htm](#)

Visit to Pugu Market 8/9/94 - Weir & Sophie

1. Purpose - to complete business not yet done.
2. weighing takes 30 seconds per animal, but 60 seconds due to lack of organisation; in many cases there are problems - i.e. weighing crush badly designed? - too much width/ no variable width... ; also cattle come from both ends - front for sampling, back for post-buy weighing
3. I did not observe grading, sexing, marking due to lack of time - my decision -- they were going to do a special show/ demo for me; did not regard it as immediately important - TLMP can do timings if reqd and comment organisation or logistics / improvements
4. Discussions were held with interpretation with approx 5 buyers and sellers, mostly Somalis, lasting 30 minutes
5. They were adamant that the greatest problem was cattle transport by rail from anywhere upcountry; some had cattle waiting there 3 months.
6. None of them use the price and grade information - they know what price they want to buy and sell for.
7. Pre-sale weighing would not be of any benefit to them - they can tell to +/- 3 kg by sighting.
8. Some buyers DO do post-buying weighing; also they use calculators to work out carcase weight, apparently without lookup tables

9. Tied in with the cattle wagon problem is that of big price fluctuations due to surplus or shortage of cattle on some days
10. There was some agreement that they may use price summaries if the wagon/supply situation stabilises; but I think they were just being polite
11. Very few cattle (if any) are actually auctioned in the ring - most are done by private deals. The buyer must then come to get the "Fixed Receipt for Secondary Market" at Tsh 500-00. This quotes Buyer, price, date and gender; approx 58 of these were issued (1/animal) up to 1100 hrs on 8/9/94; in theory you the buyer cannot leave the market without that FRSM.
12. That info is also entered effectively into the Counter Book - which lists date, buyer, seller, bull, steer, cow, mixed, and total value; thus the ledger has seller info which is NOT on the FRSM
13. There is also a Traders Livestock Permit for transit to outside the city limits - on 7/9/94 there were 5 permits for 79 animals, and another samples was 26/8/94 - 37 animals
14. Daily summary sheets (for submission to Treasury - fees paid) - have date, and daily total number, average value , lowest value, highest value by gender; no grade info is included (may be contentious). Total market fees and tock route fees are listed.
15. We visited Pugu Station. Every Friday info is collected - total number arrivals per week;; BUT the

following info is also easily available:

- date of invoice (on or before date of departure - may indicate waiting time)
- invoice nr
- from Station (indicates origin)
- consignee (indicates owner)
- number of animals
- charges
- time arrived
- date arrived
- time unloaded
- date unloaded

Between 20/8/94 and 5/9/94 I counted 86 records (arrival consignments)

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd530.htm](#)

Visit to Korogwe Market 12/9/94

1. Volumes 50-400 per day, 1 market per week (Mondays);
400 at end of month; 150 per week average
2. Very few post-buying weighings
3. sample 30/150 or 45/400
4. Grading is easy; aging is difficult
5. No market at Tanga, much buying is for Tanga meat "market"; 30 butchers buy for Tanga
6. Some animals come from as far as 500 km
7. Handeni, Mbulu, Kiteto, Same and Kondoa primary markets feed Korogwe
8. Buyers comments - prices too high; problem may be high Kenyan prices - Ksh 120/kg vs Tsh 200/kg for meat
9. Sampling weigh one in 5, same as Dar/Pugu system - march 5 thru crush, weigh one..
10. Weighbridge is calibrated by weighing one (sic) person in town, typically 50 kg..
11. No dipping or spraying

12. Fees are:

- market fee Tsh 500-00 levied if sold -

e.g. 50 of 150 are sold on average

- stock route fee and grazing fee - Tsh 70-00 per animal, typically 150 per week

- movement permit - Tsh 200/permit

13. Improvements -- no water ; river is nearby but crocodile infested

- no fencing - for 500 ha site

- stock route - e,g, to Tanga there is none

- no budget for protective clothing, boots, raincoats etc

14. Sellers are mainly Masai, buyers usually not Masai, often Arabic

15. Korogwe seem not to grade hardly any 3 and 4...

16. No market info board like Pugu

17. Everyone agrees prices are high these days, infer it has to do with border/Kenyan trade

18. Buyer/seller stated:

- in the old days, stock routes, night bomas every 20 miles, water, etc, now nothing

- driving on road bad for animals' feet

- no water, no toilets, no hotel/lodge at market site

- market info and sample weighings is a "waste of time"

- meat price is controlled; cattle price is not - butchers margins are getting squeezed

- some were in favour of auction system, but doubts about speed of selling by auction for single cattle; I suggested also "MOB" auctions - some interest

* I feel that some thought should be given to free competition between

auction (single and MOB) and private deals; one Masai said - " yes, if the price on auction is too low, I

use my reserve price and do not sell..."

- many buyers buy on credit -- this was given as reason by LMO for not to have auction

19. Some buyers do want to know weight; most can estimate very well

20. Weighbridge is J.W Baumann, D-8591 Thiersheim, Germany, model 826.1.5.1.322 ;

Range 100 - 1000 kg (see testing method in (10) above!

I can see advantages in an electronic conversion to give date time and weight printout

21. recorder noted 268 instead of 278 while I was observing; when I commented he corrected himself

22. Weighing business takes 5 people 3 minutes /beast

23. They have no mark for MOB (group) deal, e.g. 194 kg and 240 kg same price of 56,000; we should have a column for that (also for weather, other factors, scale corrections etc)

24. After sale, buyers may hot brand onsite

25. The office and market do have electricity (unlike Pugu)

26. No feedback reporting to Market/LMO - only to RDD

27. LMO is Chongmo, LFO is Mkwiti

28. Train to Tanga from Korogwe for animals is too expensive - 2000/head vs trekking at 500/head

29. Jan 94 had 1000 cattle total value Tsh 50 Million

30. Some buyers like the idea of market info, most sellers not

31. The ledger has number of cattle, seller name, buyer name, average cost of bulls, cows and steers.

* on typing this - it is a bit unclear - whether good breakdown by numbers also by sex or not....

From 18/4/94 till 12/9/94 - NO LEDGER RECORDS - excuse is that staff member was ill!

32. There is NO carbon of the Fixed receipt secondary market! which normally has good price, sex, date , buyer etc info

33. The movement permits are stencil duplicated, have no prenumbering, have no carbon kept; also stock route fees

34. Monthly report has also for Mombo, Mkoma, and Korogwe by sex, number, value average, min and max (but how do they get the info?)

They also do weekly report

35. As we know, Korogwe mail the original of the sample data to MDB and keep the carbon

36. Stock route fee 70-00; market fee 500-00; meat inspection fee 300-00

37. Areas of Revenue Collection Monthly report may be interesting/useful

38. Compared results of 2 different above reports; - one gave 661 animals, other gave 562.71 animals!

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd540.htm](#)

Visit to Moshi Market 13/9/94

1. Interview with Swai at Office -

2. Spontaneous problems -

- funds for stationery, power problems (generators but no fuel), communications (workplan etc), transport (no motorcycle)

3. Weekly and monthly reports on Moshi (Weruweru) and Arusha (Temi/ Themi) markets processed in Moshi by Swai, sent to Dar

4. Process Wed and Thurs after Tuesday market Moshi, post Thursday EMS - reaches Dar Saturday; Tsh 1000-00 per EMS; Kilimo Moshi has telex, so has Dar

5. Monthly processed before 10th; floppy disc never sent, raw data never sent

6. Printer problems - bubble jet Canon has dead main board, Epson wide carriage dot matrix has quality

problem - needs new head

7. Moshi market once per week -- Tuesdays -- 800 average, sample 50; Arusha 1/week Friday - 750 average sample 100/1100 or 120/1500

8. Collection and input are separate; Mr Ali does Arusha, David Kilimba does Moshi, Swai enters data for both, his work is approx 2-3 days /week on this

9. Arusha data appears to have no MOB deal data

10. Beef price local is Tsh 500-600 /kg for mixed

11. Number sold is low %age of yarded - approx 50% for Arusha and 67% for Moshi (according to Swai)

12. As per other sites, there appears to be no backup policy for data

13. 2 PCs - one 8086 IBM xt with 2 disc drives, 5.25 giving trouble -- needs paper under clip; other Olivetti M280 286; both 20 meg hard discs only, both 99% full.

Data stored mainly on floppy.

14. Office does also summary table report - gives %age changes over previous month for weight, cost/beast, cost/kg; as per other processing site, no basic stats are used, e.g. standard deviation (but of course max and min prices appear in some places, e.g. daily summary report at Pugu Market)

15. Records go back to approx Sept 91 - approx 3 years

16. A lot of the written summary compares with last week/ previous tables - MY COMMENT -- better to eliminate and replace with comparison %ages as per (14) above
17. MOB deals DO occur - there is no special mark on the paper for this
18. Kilimba samples Monday, collects prices Tuesday, thus samples from approx 50% of population; problem also with this possibly - closeby and therefore short-treked cattle arrive Tuesday - and are unsampled; sampling is done on the long-distance cattle, e.g. from Singida
19. Weight difference from just arrived, unwatered cattle and 24 hour later watered and rested cattle is approx 10 - 20 kg; even watering can add 5kg instantly
20. Goats and sheep are sold at Moshi, but data is not captured - why?
21. Moshi get little feedback from Dar
22. Getting price is the most difficult part; Kilimba reckons ' approx 30% lie on price
23. Timing is 2 hours to sample 50 cattle, involving 5 people
24. Cattle are separated at pens and only 20% sample is brought to weighbridge
25. Scales are Asta (Indian) - old, 100 - 1000 kg I think; have not calibrated since Martin Doran left December 1993 - he used to use an expert (fundi) but who charges a lot to bring his 200 kg weight; they add 10 kg to he figures because the zero is at -10 kg.

Sophie and Weir checked the scale at 156 kg - we think it is correct at this weight

26. Interviews :

- radio price for Moshi is too low- question of carcase vs live weight price; butcher buys mainly 0 and 1 grades - easier to sell and more profit;

prices fluctuate.

- 2nd buyer/seller - does not use the market info

-

- 3rd - masai - does not use - radio broken.

27. post sales weighing - none is done

28. Moshi has 2 different people who grade - mainly Kilimba, but sometimes another

29. Paperwork -

- FRSM -- fixed receipt secondary market - has date, buyer, price, no sex; used for goats at Tsh 210 (500 figure is scored out and rewritten) and Tsh 500 for cattle

- movement permit is Tsh 10-00 per head

- local permit is free
- no ledger is kept (as at Pugu)
- Moshi market totals info is from combination of total beasts with sex distribution taken as per sample data
- totals info yarded and sold is available from FRSM, local permit and movement permit info

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd550.htm](#)

Visit to Uchira Primary Market, near Moshi 13/9/94

1. approx 50-60 cattle yarded, 30-45 sold; market every

Tuesday; runs 0700 - 1300 hrs

2. Buyers mostly butchers

3. Receipt book for local government fees has :

- date
- buyer
- seller

- sex
- number
- total price

The small receipt book has no carbon - only a left and right leaf like a raffle ticket; the large receipt book has the useful info

4. Fees are Tsh 200-00 /head + Tsh 200-00 head (local and district)

5. No movement permits are issued

6. Prices are climbing - were low before

7. A woman came and strongly accused the young market administrator of stealing from the market system; it was obvious from his response that she was correct

This type of fiddling appears fairly endemic to varying degrees throughout the existing market systems; it should NOT actually affect price info or weight info, but must affect declared selling volumes - i.e. actual sales volumes must be underdeclared;

therefore many cattle which are declared as unsold are actually sold; if the %age of this type of fiddling is kept fairly constant at a given market, it may still enable valid correlation of SALES volumes with prices, OTHERWISE that exercise is invalid, BUT yardage vs prices may still be valid

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd560.htm](#)

Visit to Themis Market, near Arusha 16/9/94

1. Mr Ali Semjaila, from Arusha RDD
2. volume is 500-600 per market, every Friday; this represents 52% of yardage being sold
3. Weigh one day before, but 95% of cattle arrive on Thursday and are there for sampling
they get 60% - 70% of prices for sampled cattle
4. Ali suspects some cheating insomuch as people get permit to take on to Weruweru as unsold when in fact they are sold - thus the Tsh 500 fee is avoided
5. They use an arrival ledger which states losses from trekking, also a sales ledger which appears to record only movement permit numbers;
6. They have a nice info display board which is unused - they used to display at one time
7. Lister diesel and pump from river no longer work; most of pipe is present but not all
8. Scales are Asta (Indian) 0-5000 kg, model 121-W5D, 1977 year
these scales weigh 66 kg as 68, and make 68 kg + 90kg = 162 kg - need some calibration system..... Also to use 5000 kg scales for weighing 180-350 kg

must involve inaccuracy

We must have some correction factor on the sheet - the recorders must NOT do any correction calculation....

Sampling is done using the pre-separating technique as per Moshi; 1/5 or 1/10 sampling is done

Weighing rate is 115 animals / 2 hours using 5-10 people

Comment - "ageing is difficult, grading is easy"

For fun, we estimated weight of beast number 65 sample data - Ali guessed 180 kg, Swai 200, Robb 175; actual came out at 210 kg as weighed the day before; we did not however recheck this weight (maybe we should have!)

9. Buyer/seller interviews

- train cost is Tsh 5000/head Shinyanga->Dar

- we asked if a buyer would like to weigh after buying - he said he would like to weigh BEFORE buying; I said - but you can guess the weight - he replied that he would like to weigh for accuracy

- prices are low months 4-7 then high months 8-3 - low prices per kg after rains when lots of good condition cattle are on offer

- young buyer listens to radio broadcast, but says our prices are much too low - typically we say 300 /kg when it is 450-500/kg; key phrase is "prices not realistic"

So we identify 2 areas -- confusion price / live weight vs price/carcase weight -- a move to a carcase weight info release might improve info acceptability; also they admit to underdeclaring value - we tell them if we get garbage info in, then we give out garbage info

10. Paperwork:

- movement permit 200 flat fee + 30 / animal + 10/animal/day X 7 days

- local permit - unnumbered - date, buyer, price, number of beasts , sex; Tsh 70-00

- FRSM - date, average price, number of beasts, buyer on first FRSM only, then for each beast date only or blank; no sex - ""sex is on the movement permit""

- Arusha has monthly report - nr animals, nr sold , value of revenue collected; every month they also add up from FRSM data for the 4 or 5 weeks to make figures for total beasts sold and total value

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd570.htm](#)

DISCUSSIONS

Discussion James Bokella 6/9/94

1. Arusha & Moshi data was captured and processed by Martin Dollar using a Dbase3 system, now taken over by David Kilimba and Mr Swai (data entry person)
2. Dsm office handles Pugu and Korogwe data; Korogwe is received approx weekly, Pugu is collected 3 times/week. Pugu auction is run by Kilimo - their staff collect the data.
3. Total number data is collected by staff counting at railhead station, NOT from counting or paper records at Pugu market
4. Data is collected on standard line-item paper sheets with approx 30 lines/sheet; fields are:
 - origin ; this field is used for region/district/primary- secondary market in the Pugu data, unused in the Korogwe data; largely also this field is used to record the branded animal number
 - class - e.g.. m/s mature steer - all data for both sites I can find uses M for mature steer; sometimes I or IMS is used for immature steer
 - gender - steer, bull, cow - used for all sites
 - age - estimated by recording person - usually aged 6-9 years;

above 11 years is impossible to estimate

- grade - 0,1,2,3,4 - estimated by recording personnel
- weight - approx 20% of animals are weighed and entered into

these data sheets --

- price - in TSH
- buyer - entered at Pugu but not at Korogwe

5. The sample weighings at Pugu take place 3 days/week;

thus the average sample size is probably 33 cattle (100/week sampled)

6. Butcher prices are noted/recorded (to be clarified/expanded)

7. All buyers are registered

8. Some buyers are fairly wealthy and influential, e.g. a Mr Ali buys for UAE and exports live cattle by airfreight

9. Symphony spreadsheet/database data collected (filecopies taken) , also Pugu Market June 1994 report taken and Tanzanian Cattle Buyers Deadweight Estimation Guide.

Discussion James Bokella 9/9/94 - 2nd meeting

1. Started with unprompted responses to question - general improvements/problems?
2. program is too complicated - too many files - too much file maintenance
3. a problem with field staff doing weighing, grading, pricing and recording may arise - it is not in their job specs, i.e. they are not getting paid for doing it
4. The grading estimation requires a lot of skill - Bokella only has probably 4 people who he reckons do it correctly; e.g. of the Arusha and Moshi data, almost all fall in category 0-2 - nothing in 3 and 4;; " this is certainly a mistake".

I proposed visual/ visual recognition systems for weight and grade estimation. James explained that age is a function of tail length, and that Shinyanga cattle are longer, therefore a uniform length system would not work

5. We discussed export from Tanga by sea and from Arusha by airfreight to lucrative markets
6. Holding ground security for fixed assets (e.g. weighing scale) and for cattle, consisting of guards, night guards and fencing
7. I questioned weighing scale accuracy

8. James discussed revolving funds for the markets being required; also land tenure and encroachment of market lands by human settlement and even permanent housing

9. End of unprompted responses.

10. I asked who if any is duplicating our data collection or analysis? - answer - noone

11. I asked where is the "missing" data :

- data falls into detail / line-item data - raw data, and reports/processed data

- with the Symphony spreadsheet system, sometimes spreadsheets were deliberately overwritten once their immediacy was over

- there is a lot of older data on 5.25 inch diskettes in a diskette box

- there are always the paper sources - raw data and reports

- there is some data on the IBM PS2 machine (faulty since a few months with motherboard problem),

- some /all of that data on the PS2 is now in compressed form on the Toshiba - no time yet for me to locate it

- of course there will also be data by David Kilimba in Arusha - copies to be collected on field trip next week

12. We ran through my other reports on discussions, interviews, findings to date, making corrections
13. I questioned the MOB prices - bulk sales -- which sometimes appear on the sheets - these are not input to the computer, appearing as zero prices, OR maybe even the grade etc info is not input at all. I proposed that a new system could use weighting to allocate suitable prices to the various component animals of the MOB average price.
14. I commented that there appears to be no check between the sampled data and the daily summaries (with numbers and Tsh)

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd580.htm](#)

Data Collection at Moshi Office - Weir + Swai, 15/9/94

1. Approx 68 files collected from hard discs and from various floppies - these are raw data files - .dbf database Files but NOT in dbase3+/dbase4/clipper format -- will have to write extraction program to process these into useable files; my comments and feelings on this data confirmed independently by Kilimanjaro computers of Moshi, who looked at the system for Martin Doran at one time; the system is ENABLE - a database system written I believe by the makers of Ability Integrated package
2. These files are valid for Arusha Sept 91 thru Aug 94 with gaps at 94/04 (no data collected?), 92/04 - 92/11, 93/04 -- 93/05, and 93/07.

Also for Moshi 91/08 thru 84/08 with gaps at 93/04, 93/06, 93/07, and 94/04.

All most gaps filled by photocopying 240/ 250 original data sheets

3. The sheets also had on the header the number of beasts yarded and the number sold for each week; this info was input by me manually for 300 data points (3 years x 52 weeks/year x 2 locations)

4. Problem - these files each contain data for location and month, but within each file the week is NOT specified. Thus we may need to recapture that info from the original paper info; in fact, we can assume that data is entered in week sequence, with sample size proportional to yardage.....

Data Collection at Moshi Office - Weir + Swai, 17/9/94

1. Crosschecked on missing data - April 94 Moshi and Arusha still missing - people on leave etc.. - was not collected...

Arusha 30/4/93, 8/10/92 and 18/9/92 all missing - no great problem

2. Read Technical End of Mission Report, Martin Doran , Dec 1993

- Korogwe data quality poor

- Doran stated that Swai was good (data processor),

Ali good (data collector Temi) but Kilimba poor (data of erratic quality for

Weruweru)

- Doran referred to weight and price data analysis from Trekking report

- 1990 report FAO referred to 140 single-beast weighing units being donated to Tanzania; Swai had no knowledge of their whereabouts

3 - Read URT - Minag "Northern Trekking Routes and Terminal Markets" 1991 FAO/MDB - WP1 /1991 February 1992

pps 24 & 25 give graphs of price vs yardage

4. Read accompanying/later report: ""Volume 2 -- Livestock Production and Trekking Route Surveys - policy Implications and Recommendations" FAO/MDB

Nov 1993

pps 37-47 and pps 85-88 all highly relevant to MIS project.

- volumes at Themis and WW fluctuate with season - single annual cycle peaking May-Aug, troughing Oct-Jan

- good correlation (inverse of course) yardage vs. price /kg

- price /kg fairly independent of grade, but report not specific as to whether live weight or carcass weight (I guess carcass weight price more constant across grades)

- high quality cattle mainly sell at Themis, unsold go to WW

- unofficial exports to Kenya discussed, sometimes Kenya butchers will buy OUTSIDE Themis to avoid permits/detection

- price/kg in US dollars is declining slightly with time (actually report examined price in constant Tsh corrected by official retail price index; which may be skewed?)

- Themis is underreporting yardage and sales; irregularities are suspected as one reason for this....

-- detail on various fees is given in some detail on footnote page 37

5. This volume 2 report refers on page 42 to the 1991 report Appendix A Section 1 number 9 for some data - cannot find this Appendix or data, which should be quite relevant -- must find this through MDB.

6. Checked data structure of the .dbf files copied -

Header approx 1014 bytes,

1- 10 origin

11-15 steer/bull/cow

16-17 age in years

22/10/2011

Sampling - My Comments

18-18 grade

19-21 weight in kg

22-27 price in Tsh

28-28 blank

next record starts on byte 29

7. Contact data -

Mr Swai, Livestock Field Officer, Mifugo REO, Moshi, tel/fax Moshi 51229, telex 43005 KAIDC TZ

8. Helped make space on hard discs of both PC's; chkdsk'd both PC's (lost clusters found on 8086), ran NDD on both, Speedisk on 286, tried to install mouse - 8086 has no com port, mouse eventually found to be inoperational; generally set up both PC's using autoexec.bat and config.sys to be ready for the new MIS system, so can be installed by Swai from disc without site visit by Weir

Strongly recommend that both machines be upgraded - at least replace 20 meg hard discs with 100 meg+; also consider main board upgrade to 386DX 40 Mhz or similar with 1 Meg Ram (US\$ 300-00 approx duty paid price per machine); hard disc upgrade I guess at also in region of US\$ 300-00 per machine. As afterthought of course compare costs with replacements.....

9. Copy of Volume 2 report as above borrowed - to be returned by TLMP at earliest

home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw [Misd590.htm](#)

APPENDIX D - THE CLIPPER SYSTEM

The new MIS computer system is written in Clipper 5.01.

Clipper is an Xbase computer programming language, currently supported and developed by Computer Associates, one of the largest computer software companies in the world (after Microsoft, Novell etc..).

There is local support for Clipper at ICS (office opposite MDB, contact John Fernandes); also at AT&T Dar es Salaam; and at CCTL (Computer Corporation Tanzania Ltd) near the Sheraton Dar.

Source code for the system comprises approx 650,000 bytes, and would take approx 900 pages of A4 if printed landscape.

The source code is compiled and linked using clipper.exe and blinker.exe, using only clipper.lib and extend.lib, with no special custom or other libraries.

The source code is contained in the file misprg95.zip; when unzipped, it constitutes the files mis*.prg. It is linked in overlay form using the file test2.lnk. The whole compiling and linking process is done by the blink.bat batch file.

In terms of labour productivity for data input, I timed myself inputting from data sheets in Dar at MDB with TLMP staff at 60 minutes to input, check and correct 100

data records; from this I would expect an average skilled computer operator to operate at at least 1 record input per minute.

The help screens are printed out in this Report.

The field list of major databases and their description is found below; it would be required in the event that any users or researchers cannot utilise the system in its present form to extract the information they require; do not forget that the live system must never be used directly with dbase or any other program - only a copy of the system should be used.....

Structure for database: C:catdata.dbf

Number of data records: 35188

Date of last update : 10/14/94

Field Field Name Type Width Dec

1 CMARKET Character 2 code for market

2 DDATE Date 8 date data was collected

3 CORIGIN Character 2 code for origin, e.g. Kondo

4 CSEX Character 1 sex

5 CCLASS Character 1 class

6 CAGE Character 2 age

7 CGRADE Character 1 grade

8 WWEIGHT Numeric 4 weight in kg uncorrected

9 PRICTSH Numeric 8 price in Tsh

10 CBUYER Character 2 code for buyer

11 CPRMOB Character 1 M if price is MOB price

12 CWTMOB Character 1 not used

13 PROBSIV Character 1 O if price observed, S if
stated

14 PRICUSD Numeric 7 2 price in US \$

15 WTCORR Numeric 6 1 corrected weight in kg

16 WTCARC Numeric 5 1 carcass weight from TAM

17 WTEDIB Numeric 5 1 edible weight from TAM

18 PRUSCARC Numeric 6 3 US\$/carcass kg

19 PRUSEDIB Numeric 6 3 US\$/edible kg

20 PRUSEDICR Numeric 6 3 US\$/edible kg corrected

21 CGRADER Character 2 code for grader

22 CWEIGHER Character 2 code for weigher

23 CPRICER Character 2 code for pricer

24 PRICEXP Numeric 8 expected price in Tsh

25 PREXPRES Character 1 E=expected, R=reserve

26 ORIGIN Character 10 original entry for origin

27 FILNAM Character 12 filename, from Symphony

or Enable

28 LOCATION Character 1 W=Weruweru,A=Arusha

29 MULT10 Character 1 1=price multiplied by factor

of 10 from raw data

30 SEQ Numeric 5 sequence number in raw data

31 DDATNR Numeric 5 original date format number

Structure for database: C:\markday.dbf

Number of data records: 790

Date of last update : 10/19/94

Field Field Name Type Width Dec

1 DDATE Date 8 market day date

2 CMARKET Character 2 code for market

3 YARDAGE Numeric 6 yardage input

4 SOLD Numeric 6 nr sold input

5 SOLDCOW Numeric 6 nr of cows sold

6 SOLDBULL Numeric 6 nr of bulls sold

7 SOLDSTEER Numeric 6 nr of steers sold

8 SOLDCVAL Numeric 13 cow value sold

9 SOLDBVAL Numeric 13 bull value sold

10 SOLDSVAL Numeric 13 steer value sold

11 DATEND Date 8 end date for market (may be same as ddate...)

12 SAMPSIZE Numeric 4 sample size

13 USKGEDIB Numeric 6 3 avg US\$/kg edible

14 USKGEDCR Numeric 6 3 avg US\$/kg edible corrected

15 CKGECSDPC Numeric 8 3 Std deviation %age on edible kg corrected value

16 TSKGEDCR Numeric 13 1 avg Tsh/kg edible corrected

17 MOBSIM Numeric 6 3

18 MOBPC Numeric 6 3

19 SCAL1CAL Numeric 4 scale calibration reading 1

20 SCAL1ACT Numeric 4 scale actual reading 1

21 SCAL2CAL Numeric 4 "

22 SCAL2ACT Numeric 4 "

23 SCAL3CAL Numeric 4 "

24 SCAL3ACT Numeric 4 "

25 SCAL4CAL Numeric 4 "

26 SCAL4ACT Numeric 4 "

27 SAMPCOW Numeric 4

28 SAMPBULL Numeric 4

29 SAMPSTEER Numeric 4

30 SAMPC0 Numeric 6 3

31 SAMPC1 Numeric 6 3

32 SAMPC2 Numeric 6 3

33 SAMPC3 Numeric 6 3

34 SAMPC4 Numeric 6 3

35 SAMPB0 Numeric 6 3

36 SAMPB1 Numeric 6 3

37 SAMPB2 Numeric 6 3

38 SAMPB3 Numeric 6 3

39 SAMPB4 Numeric 6 3

40 SAMPS0 Numeric 6 3

41 SAMPS1 Numeric 6 3

42 SAMPS2 Numeric 6 3

43 SAMPS3 Numeric 6 3

44 SAMPS4 Numeric 6 3

45 FFLAG Character 1

46 USKGCARC Numeric 6 3 US\$/kg carcass

47 USKGLIVE Numeric 6 3 US\$/kg liveweight average

48 CKGEDSDPC Numeric 7 3 SD% on price/edible kg

49 CKGCASDPC Numeric 7 3 SD% on price/carcass kg

50 CKGLISDPC Numeric 7 3 SD% on price/liveweight kg

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Misd600.htm](http://home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw/Misd600.htm)

APPENDIX E - WORKED EXAMPLE - RAW DATA INPUT, BENCHMARK REPORT, SCREEN GRAPHS

PUGU DAR 4 AUGUST 1994

This example considers data only for Dar Pugu Market for 4 August 1994. It is chosen at random, and in fact the data turns out not to be particularly good; in this respect it may be representative of the historical data, and the faults are probably largely due to the sampling technique applied so far. The pages below show the raw data input, the Benchmark Report 1, and various of the screen graphs for the data. Commentary is omitted mainly for reasons of time.

RAW DATA INPUT:

Market: Pugu (Dar) Date: 04/08/94

Yardage: 0 Sold: 0

Market Date Origin Sex Age Grade Weight Price MOB? Corr.Wt

Pugu (04/08/94 SHINYANGA M S 08 3 218 0 218.0

Pugu (04/08/94 DODOMA M C 08 1 218 56000 218.0

Pugu (04/08/94 DODOMA M B 07 3 230 53000 230.0

Pugu (04/08/94 SHINYANGA M S 08 2 250 0 250.0

Pugu (04/08/94 SHINYANGA M S 08 2 240 0 240.0

Pugu (04/08/94 DODOMA M S 10 4 242 56000 242.0

Pugu (04/08/94 DODOMA M S 08 3 188 53000 188.0

Pugu (04/08/94 DODOMA M S 06 1 182 0 182.0

Pugu (04/08/94 SHINYANGA M S 09 2 260 68000 260.0

Pugu (04/08/94 DODOMA M S 07 2 230 0 230.0

Pugu (04/08/94 DODOMA M S 09 2 256 0 256.0

Pugu (04/08/94 SHINYANGA M S 08 2 228 64000 228.0

Pugu (04/08/94 SINGIDA M S 07 2 188 56000 188.0

Pugu (04/08/94 DODOMA M S 07 0 254 77000 254.0

Pugu (04/08/94 SINGIDA M B 06 1 194 57000 194.0

Pugu (04/08/94 SHINYANGA M S 08 2 250 0 250.0

Pugu (04/08/94 DODOMA M S 08 3 188 53000 188.0

Pugu (04/08/94 DODOMA M C 07 2 192 50000 192.0

Pugu (04/08/94 DODOMA M S 09 2 256 0 256.0

Pugu (04/08/94 SHINYANGA M S 09 2 240 0 240.0

Pugu (04/08/94 SHINYANGA M S 07 2 244 64000 244.0

Pugu (04/08/94 SHINYANGA M S 08 0 270 75000 270.0

Pugu (04/08/94 SINGIDA M S 08 3 180 50000 180.0

Pugu (04/08/94 DODOMA M S 09 2 256 0 256.0

Pugu (04/08/94 DODOMA M B 08 2 244 0 244.0

Pugu (04/08/94 DODOMA M C 07 2 200 51000 200.0

Pugu (04/08/94 DODOMA M B 08 2 262 63000 262.0

Pugu (04/08/94 SINGIDA M S 08 4 204 46000 204.0

Pugu (04/08/94 SHINYANGA M S 08 2 258 0 258.0

Pugu (04/08/94 DODOMA M S 07 1 252 72000 252.0

Pugu (04/08/94 SHINYANGA M S 09 4 232 54000 232.0

Pugu (04/08/94 SHINYANGA M S 07 2 244 64000 244.0

Pugu (04/08/94 SHINYANGA M S 08 0 270 75000 270.0

Pugu (04/08/94 DODOMA M S 10 4 242 56000 242.0

Pugu (04/08/94 DODOMA M S 08 3 230 70000 230.0

Pugu (04/08/94 SHINYANGA M S 10 3 230 62000 230.0

Pugu (04/08/94 SHINYANGA M S 09 4 232 54000 232.0

Pugu (04/08/94 SINGIDA M C 07 1 160 49000 160.0

Pugu (04/08/94 SINGIDA M S 07 2 200 0 200.0

Pugu (04/08/94 DODOMA M S 07 2 240 63000 240.0

Pugu (04/08/94 DODOMA M S 08 2 240 66000 240.0

Pugu (04/08/94 SINGIDA M S 08 3 208 51000 208.0

Pugu (04/08/94 SINGIDA M B 06 2 176 49000 176.0

Pugu (04/08/94 SHINYANGA M S 08 2 240 0 240.0

Pugu (04/08/94 SINGIDA M S 06 2 170 0 170.0

Pugu (04/08/94 SINGIDA M C 07 1 160 49000 160.0

Pugu (04/08/94 DODOMA M S 08 2 240 66000 240.0

Pugu (04/08/94 SHINYANGA M S 09 2 240 0 240.0

Pugu (04/08/94 SINGIDA M S 07 1 224 0 224.0

Pugu (04/08/94 SHINYANGA M S 08 2 240 0 240.0

Pugu (04/08/94 DODOMA M S 07 2 240 63000 240.0

Pugu (04/08/94 DODOMA M S 08 2 252 63000 252.0

Pugu (04/08/94 DODOMA M C 07 2 200 51000 200.0

Pugu (04/08/94 SINGIDA M S 07 2 188 56000 188.0

Pugu (04/08/94 SHINYANGA M S 07 1 260 74000 260.0

Pugu (04/08/94 SINGIDA M S 06 2 170 0 170.0

Pugu (04/08/94 DODOMA M S 08 2 252 63000 252.0

Pugu (04/08/94 DODOMA M S 07 2 230 0 230.0

Pugu (04/08/94 DODOMA M C 08 1 218 56000 218.0

Pugu (04/08/94 SHINYANGA M S 09 4 232 54000 232.0

Pugu (04/08/94 SINGIDA M C 06 0 168 55000 168.0

Pugu (04/08/94 SINGIDA M S 07 2 200 0 200.0

Pugu (04/08/94 DODOMA M B 08 2 262 63000 262.0

Pugu (04/08/94 DODOMA M B 08 2 244 0 244.0

Pugu (04/08/94 DODOMA M B 07 3 230 53000 230.0

Pugu (04/08/94 SINGIDA M B 06 2 176 49000 176.0

Pugu (04/08/94 SINGIDA M S 08 4 204 46000 204.0

Pugu (04/08/94 SINGIDA M S 07 2 188 56000 188.0

Pugu (04/08/94 DODOMA M S 07 2 240 63000 240.0

Pugu (04/08/94 SINGIDA M B 06 1 194 57000 194.0

Pugu (04/08/94 SINGIDA M C 07 2 172 44000 172.0

Pugu (04/08/94 SHINYANGA M S 08 2 258 0 258.0

Pugu (04/08/94 DODOMA M C 07 2 192 50000 192.0

Pugu (04/08/94 SINGIDA M S 07 1 224 0 224.0

Pugu (04/08/94 SHINYANGA M S 08 2 250 0 250.0

Pugu (04/08/94 SHINYANGA M S 07 1 260 74000 260.0

Pugu (04/08/94 DODOMA M S 08 3 230 70000 230.0

Pugu (04/08/94 DODOMA M S 07 2 230 0 230.0

Pugu (04/08/94 SHINYANGA M S 08 2 228 64000 228.0

Pugu (04/08/94 SHINYANGA M S 09 2 260 68000 260.0

Pugu (04/08/94 SHINYANGA M S 08 3 218 0 218.0

Pugu (04/08/94 DODOMA M S 07 0 254 77000 254.0

Pugu (04/08/94 SINGIDA M S 07 0 248 70000 248.0

Pugu (04/08/94 DODOMA M S 08 3 224 57000 224.0

Pugu (04/08/94 SHINYANGA M S 07 2 244 64000 244.0

Pugu (04/08/94 DODOMA M S 08 2 240 66000 240.0

Pugu (04/08/94 SHINYANGA M S 09 2 260 68000 260.0

Pugu (04/08/94 SINGIDA M C 07 2 172 44000 172.0

Pugu (04/08/94 DODOMA M S 08 2 252 63000 252.0

Pugu (04/08/94 SHINYANGA M S 08 2 258 0 258.0

Pugu (04/08/94 DODOMA M S 08 3 224 57000 224.0

Pugu (04/08/94 SINGIDA M S 07 0 248 70000 248.0

Pugu (04/08/94 SINGIDA M C 06 0 168 55000 168.0

Pugu (04/08/94 SINGIDA M S 07 2 200 0 200.0

Pugu (04/08/94 SHINYANGA M S 09 2 240 0 240.0

Pugu (04/08/94 DODOMA M S 07 1 252 72000 252.0

Pugu (04/08/94 SINGIDA M S 06 2 170 0 170.0

Pugu (04/08/94 SINGIDA M S 08 4 204 46000 204.0

Pugu (04/08/94 DODOMA M S 06 1 182 0 182.0

Pugu (04/08/94 SINGIDA M S 08 3 180 50000 180.0

Pugu (04/08/94 SINGIDA M S 08 3 208 51000 208.0

Pugu (04/08/94 SHINYANGA M S 08 2 228 64000 228.0

Pugu (04/08/94 DODOMA M S 10 4 242 56000 242.0

Pugu (04/08/94 SHINYANGA M S 10 3 230 62000 230.0

BENCHMARK REPORT

KILIMO/MDB/TLMP 21/02/95 09:12:22 Page Nr: 1

Benchmark Prices by Markets and Time, 04/08/94 to 04/08/94,

22/10/2011

Sampling - My Comments

Prices in Tanzanian Shilling

MARKET PUGU (DAR)

04/08/94

Thursday

Steer 0 375 98100

Steer 0 310 85900

Steer 1 275 76000

Steer 2 240 64000

Steer 3 230 58600

Steer 4 220 53300

Steer 4 160 42700

Cow 0 275 68600

Cow 0 230 61600

Cow 1 220 58000

22/10/2011

Sampling - My Comments

Cow 2 200 51200

Cow 3 190 45800

Cow 4 180 41600

Cow 4 160 38700

Bull 0 375 88700

Bull 0 310 78600

Bull 1 275 70000

Bull 2 240 59900

Bull 3 230 53300

Bull 4 220 48000

Bull 4 160 39100

B Steers 0.697

B Cows 0.604

B Bulls 0.640

SD Steers 0.056

SD Cows 0.046

SD Bulls 0.010

[home.cd3wd.ar.cn.de.en.es.fr.id.it.ph.po.ru.sw Mis8001.htm](#)

The following 3 appendices are left empty or with one example only, since they are not relevant for this 1999 re-release version

SCREEN GRAPHS

APPENDIX F - THE HELP SCREENS and MANUAL FOR THE MIS COMPUTER SYSTEM

APPENDIX G - THE HARVARD GRAPHICS GRAPHS