

**THE 2003 PASTORAL AREAS LIVESTOCK CENSUS AND THE DATA NEEDS
IN THE NATIONAL STRATEGY FOR THE DEVELOPMENT OF STATISTICS
(NSDS) IN ETHIOPIA.**

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Acronyms

ADLI	Agriculture Development Led Industrialization
CSA	Central Statistical Agency
EA	Enumeration Area
EASE	Ethiopia Agricultural Sample Enumeration
FAO	Food and Agriculture Organization
FSO	Front seat observer
GDP	Grosse Domestic Product
NSDS	National Strategy for the Development of Statistics
NSS	National Statistical System
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PPLPI	Pro – Poor Livestock Policy Initiative
RSO	Rear Seat Observer
SNNP	Southern Nations Nationalities Peoples
SRF	Systematic Reconnaissance Flight

1. Introduction

Agriculture has very significant influence on Ethiopian economy. It is the dominant sector in the economy of the country. Agriculture contributes about 50 % to the over all GDP, generates 90 % of export earnings, provides employment for 80 % of the population and supplies about 70 % of the countries raw material to the secondary activities (NSDS, CSA, June 2009).

Ethiopia follows Agriculture Development Led Industrialization (ADLI) strategy that has been under implementation since 1994, as reflected in the PASDEP (2005/6 – 2009/10) and also on the new Growth and Transformation Plan (GTP) (2010/11 – 2015/16).

Ethiopia is believed to have largest livestock population in Africa. This livestock sector has been contributing considerable portion to the economy of the country. However there is paucity of data on the livestock economy (Country information brief, FAO Ethiopia- draft June 1995)

The low lands, which are commonly reflected to as “pastoral areas “are found in the Eastern, South Eastern and Southern parts of the country. In reference to the administrative structure, these are largely the Affar , Somalie, Borena in Oromiya Region and Omo Vally in the SNNP Region.

The Ethiopian pastoral areas are estimated to occupy about 61 – 65 % of the total area of the country and are home to 12 – 13 % of the total population. In addition, out of the total estimated livestock population of the country, the pastoral areas constitute approximately 30 % of the cattle, 52 % of the sheep, 45 % of the goats and 100 % of the camels (Food security situation in the pastoral areas of Ethiopia, Beruk Yemane, 2003).

The livestock resources are the main subsistence base for the people (Livestock resource potentials: constraints and opportunities for intervention by the private sector, Addis Ababa chamber of commerce, 2008). Livestock in the pastoral areas are the major source of food (milk and meat) and income, as well as a source of employment (Food security situation in the pastoral areas of Ethiopia, Beruk Yemane, 2003). Pastoralists rely more on livestock than any other population category in Ethiopia (PPLPI working paper no. 19).

There are very large populations of various livestock species in the pastoral areas of Ethiopia, but there are only rough estimates of the size of these populations (PPLPI working paper no. 19). The nomadic livestock production system is vulnerable to even slight environmental hazards. Appropriate livestock policies need to be designed for the nomadic areas as the pastoralists rely on the livestock population and due to vulnerability to hazards. Policy design needs reliable data. But there are no quantitative and updated data on livestock population in the pastoral areas (Food security situation in the pastoral areas of Ethiopia, Beruk Yemane, 2003).

Export of live animals and also animal skins has a significant contribution to the country's economy. It is believed to be a major source of foreign currency second to coffee. But lack of reliable statistical data (livestock number) is one of the constraints facing the hides/skins and leather industry (livestock development master plan study phase 1 report, ministry of agriculture and rural development of Ethiopia, November 2007).

There is insufficient information available on the livestock sector to support its promotion in poverty reduction strategies and for policy formulation. Countries included the following areas as requiring further research: livestock populations, species and breeds of livestock present, disease status, rearing systems, type and yield of products, marketing data, resource and infrastructure used for production, service providers and natural resource availability and management

(issues emerging from the IGAD LPI national stake holder consultative forum: Djibouti, Ethiopia, Kenya, Sudan and Uganda, IGAD livestock policy initiative).

CSA has been conducting annual agricultural sample survey in sedentary areas of the country since 1980. The annual agricultural survey follows a household approach and does not include the nomadic area since the nomadic area needs different methodology. Due to lack of qualified information, the livestock potential was not properly utilized.

To produce a bench marking agricultural data in greater detail and coverage, the first agricultural census in Ethiopia was conducted in 2001/2 in the sedentary area and the livestock census in the pastoral areas was carried out during the year 2003 as part of the agricultural census to make livestock data available. The two major regions which were covered by the pastoral areas livestock census were Affar and Somalie region. Different methodologies were used in these two regions for data collection.

The national strategy for the development of statistics (NSDS) of Ethiopia was developed in 2009. In the development of the NSDS, the data needs assessment was conducted. One of the major data needs is the socio economic data particularly on agriculture and livestock relating to non sedentary areas. Some strategies are designed to address the issue.

2. Objectives of the pastoral areas livestock enumeration

The major objectives of the pastoral areas livestock enumeration is to provide bench marking data on the livestock population and associated variables. The census also provides data at lower administrative level which is difficult to get from annual survey. Such type of data which provides the livestock information in the pastoral areas at lower administrative level is crucial for policy making.

3. Major variables collected in the livestock census

The data collected in the 2003 livestock census in the pastoral area includes the size and age sex structure of the pastoral population and the socio economic characteristics of the population. The data also includes livestock population by type, age and sex, livestock products, livestock vaccination, disease, treatment and death and also effect of the drought on the livestock population.

4. Pastoral areas livestock enumeration in Affar region.

4.1. Methodology

The livestock census in Affar region covered both urban and rural pastoralist areas. Different methodologies were evaluated and after making repeated assessment in the region the appropriate month to get the households in their regular settlement was chosen for data collection.

A stratified single stage sample design was used. List of kebeles from administrative offices was used as frame since the pastoralist areas was not delineated to enumeration areas during 1994 population and housing census. The fresh list of households in the kebele is used for selection of ultimate sampling units (households). 40 households from each kebele were selected for data collection.

4.2. Data collection and data processing

The data collection manual was prepared and the training for enumerators and supervisors were conducted. A face to face interview method was used for data collection. Different efforts were done to maintain the data quality and intensive supervision was conducted. The ratio of supervisors to enumerators was 1: 5. In order to seek the cooperation of the holders (respondents), promotional efforts have been made using electronic and print media.

Manual editing, coding and verification were done for the data. IMPS was used for data entry. The verification activity was carried out by re entering the data.

Computer editing was done by IMPS. CSPRO and IMPS used for data editing and tabulation.

4.3. Estimation

4.3.1. Estimation of totals

$$\hat{Y}_h = \sum_{i=1}^{nh} W_{hi} Y_{hi}$$

in which $W_{hi} = \frac{N_{hi}}{n_{hi}}$ Is the weight.

4.3.2. Sampling variance of estimate

$$Var(\hat{Y}_h) = (1 - f_{hi}) \frac{n_{hi}}{n_{hi} - 1} \sum_{i=1}^{n_{hi}} (Y_{hi} - \frac{\hat{Y}_{hi}}{n_{hi}})^2$$

$$Var(\hat{Y}) = \sum_{h=1}^L Var(\hat{Y}_h)$$

5. Pastoral areas livestock enumeration in Somalie region

5.1. Introduction and back ground

Somalie regional state consists of 9 zones and 51 weredas, of which 42 are pastoralist and 9 weredas are semi pastoralist or sedentary. The agricultural sample census (which includes the livestock census) was conducted during the 2001/02 EASE in the 6 semi pastoralist or sedentary weredas, which are found in jijiga and liben zones. The livestock census in the entire 7 zones of the region (shinile, Fiq, Degahabur, Korah, Gode, Warder, and Afder) was conducted in November 2003 by aerial survey methodology known as systematic Reconnaissance Flight (SRF), while three weredas in jijiga zone, namely, Babile, Gursum, and Harshin were covered in November/December 2003 by conventional household survey methodology.

The methodology, data collection, data processing and estimation used in the semi pastoralist or sedentary areas of somalie region is similar to that of affar region where as a different methodology (aerial survey) is used in the pastoralist areas of the region.

The results obtained from the conventional households approach in semi pastoralist and sedentary areas and from the aerial survey was added up to get the over all livestock population of the region.

5.2. Methodology used in the aerial survey for pastoral areas livestock enumeration in Somalie region

5.2.1. Methodology

The designated survey area consists of the seven administrative zones of Somalia region namely, shinile, Fiq, Degahabur, Korahe, Gode, Warder, and Afder, which has an area of some 242,000 km². Systematic Reconnaissance Flight (usually known by its acronym, SRF) sampling method is used for the survey. The details of the method may be found in Norton – Griffiths (1978). In the aerial survey, transects were flown north- south at 10 Km intervals across the entire survey area.

Three aircraft were deployed for the survey all of which were high wing cessnas. One front seat observer (FSO) and two rear seat observers (RSOs), one on the left and the other on the right side, were involved in one aircraft.

The main duty of the rear seat observer is to count (estimate) animals and also to take photos of groups more than 10 animals. The variables counted by the rear seat observers (RSOs) in their sampling strips were

- Live stock : cattle, shoats (sheep and goats), Camels, Equids (horses, asses and mules)
- Dams and birkas (all man made water retention and storage de vises)
- Traditional roofs (structures roofed with thatch, mud or plastic sheeting)
- Modem roofs (structures roofed with tin sheets, tiles, cements etc)
- All wild life species

In addition to recording the aircraft's height above ground at least once in every 10 km segment of transect (or sub unit), the front seat observers (FSOs) recorded the following on a simple presence or absence basis :

- Surface water
- Temporary wells (hand dug wells in river beds)

Transects were defined, and data have been mapped, according to the internationally recognized UTM system. Position, direction, and ground speed were controlled using on board GPS navigation computers configured to the UTM system. Height above ground was controlled using radar altimeters.

Three separate data bases, one for each aircraft was created. Every observation was geo referenced to a given transect and subunit.

Photograph for groups of individuals greater than 10 in number were taken in flight. The actual number in the group was counted from the photo letter and used to edit the data base. A correction factor was obtained for each observer and each variable by comparing visual estimates with actual photo. Visual estimates of groups with more than 10 individuals for which there was no corresponding photograph were corrected according to the formula

$$y = mx + b$$

Where y= corrected value

X= visual estimate

And m and b are constants derived from the regression analysis of visual estimate photo count data pairs as shown in the table below.

Aircraft	Observer	species	No of data pairs	m	b
5Y-AHZ	Cc	Cattle	51	0.715	15.225
		Shoats	332	0.958	6.251
		Camel	14	1.226	-2.994
	GM	Cattle	39	0.548	8.280
		Shoats	383	0.514	21.950
		Camel	14	0.476	14.302
5Y-BIH	BR	Cattle	56	0.740	5.876
		Shoats	328	0.881	-1.862
		Camel	8	0.702	5.007
	HK	Cattle	74	0.742	6.977
		Shoats	265	0.802	15.914
		Camel	66	0.844	3.485
		Trad off	10	0.593	12.422
5Y-ATS	PN	Cattle	9	1.075	6.178
		Shoats	364	1.033	11.237
		Camel	19	1.068	-1.143
	JW	Cattle	13	0.871	1.877
		Shoats	536	0.717	16.789
		Camel	45	0.817	3.916

The three primary data bases obtained from the three aircrafts were rearranged by zone to get the data base for the seven zones.

Population estimates were derived from each zonal data bases using the Jolly II method for unequal sized sample units (Jolly 1969). Following the notation of Caughley (1977) this estimates the population Y as $Y=AD$ where A is the survey area and D is density. Density D is estimated as $D=\frac{\sum y}{\sum a}$ where y is the number of animals counted in a, the area sampled. The variance of Y is estimated as :

$$V(Y) = N(N - n) \sum y^2 + D^2 \sum a^2 - 2D \sum ay/n(n - 1)$$

Where, N is the total possible transects in the survey area and n the number of transects sampled.

In this method, a “sample unit “consists of all the individuals counted by both observers in a given transect. For any analytical stratum there fore, the number of samples equals the number of transects flown with in it. The method converts the raw count to a density, based on the length and width of the observers counting strip, its length being the same length as the transect, and its width dependent on the height above ground. The latter relation ship was determined by calibration flights carried out by each aircraft before surveying commenced.

5.2.2. Ground truthing survey

A ground truthing survey was conducted to get proportions that can be used to break down variables collected as shoats and equids. Ground truthing was employed in selected parts of the survey area to estimate:

1. The ratio between the numbers of sheep and goats in different parts of the survey area, since both were counted as “shoat “ from the air
2. The ratios of donkey, mules, and horses among the equids, since it was difficult to count them separately from the air
3. The sex and age composition of cattle, sheep, goats, camel and different species of equids in different parts of the region
4. The average size of holding of livestock per household (holder)

Ground truthing has taken place in selected sample units in five of the different domains representing different livelihood systems of the survey area. From each domain one/two wereda/s were purposefully selected to estimate ratios or proportions of the livestock.

The localities within kebeles were taken as primary sampling units since the area was not delineated to enumeration area.

From each selected wereda, 15 to 25 representative sample localities were randomly selected. In each sample locality, 30 households (livestock holders) were selected systematically from the fresh list of households and all holders in each sample household were interviewed.

6. The data needs for the pastoral areas livestock and strategies designed in the NSDS

The National Strategy for the Development of Statistics (NSDS) for Ethiopia was developed in 2009. It covers the period 2009/10 to 2013/14. The main objectives of developing this NSDS document were formulating a framework strategy and work program for the whole national statistical system of the country for the next five years.

Preparation of the NSDS started early in 2008 with the formation of sector working groups which were charged with determining the gaps in the national statistics. The gaps identified with sector working groups were extensive. Their work was further refined by asking key statistical user organizations to identify their three priorities for improvement, and to identify three, new, unmet data needs. In addition, each statistical domain was subjected to a light data quality assessment, using a simplified version of the IMF's data quality assessment framework (DQAF). This assessment was carried out by the sector working groups, and applied to all sectoral data in each of the 24 statistical domains that were grouped for this purpose. These assessments were used to consider data

quality problems, and informed discussion at the NSDS stake holders work shop held in October 2008. The stake holder's workshop considered the priority data gaps and the quality issues, and made recommendations for the NSDS. The recommendations were of three types: filling urgent data gaps, solving data quality problems and coordinating the National Statistical System (NSS).

One of the priority data needs related to agriculture statistics on the stakeholders workshop in the NSDS was coverage of non sedentary population, particularly livestock since the livestock numbers in non sedentary areas are not collected except the 2003 livestock census in pastoral areas.

Based on the stakeholder's recommendation, six strategic themes for the NSDS were developed. They are:

Strategic theme 1: Implementation of the statistical law

Strategic theme 2: develop data quality procedures

Strategic theme 3: enhance advocacy and use of statistics

Strategic theme 4: methodological improvements and statistical modernization

Strategic theme 5: capacity developments in the NSS

Strategic theme 6: relation ship of NSDS to the monitoring and evaluation of PASDEP and other interventions.

Specific to nomadic areas, theme 4, which is methodological improvements and statistical modernization suggests developing a methodology for the livestock estimation for nomadic populations, seeking technical assistance on the most appropriate method of data collection.

In the national strategy, it is planned to cover some more semi nomadic zones of Affar region in the annual livestock survey by choosing the appropriate time for data collection. The research division with in CSA also planned to look for an appropriate methodology for nomadic area data collection with support from

international organizations. In the NSDS it is also planned to conduct the agricultural census with regular time schedule. The next agricultural census will be conducted in 2013/14 which will include the nomadic livestock part.

7. The global strategy to improve agricultural and rural statistics

The global strategy to improve agricultural and rural statistics will play a significant role in guiding countries to develop and improve their own development strategy. This strategy will also help to organize and harmonize the agricultural statistics over the world.

The global strategy is so comprehensive that includes the scope and coverage of agricultural statistics, identifying the minimum set of core data and national priorities, integration of agriculture in to the national statistical system, governance and capacity buildings and the challenges .

On the social dimensions of data demand part of the global strategy, it is stated that reducing risk and vulnerability and assessing the food security at national level requires information. This may urge to develop method of collecting up to date information for nomadic areas which are highly exposed for risk and vulnerability and food security problem.

The scope and coverage part of the global strategy explains that the coverage of agricultural statistics should be exhaustive and as comprehensive as possible, and any omission of units based on their size, importance, location or other criteria should be avoided. But to cover some parts of the country like nomadic areas, it needs to develop an efficient methodology.

As stated on the remaining challenges part of the global strategy, the strategy does not solve all the methodological problems that face data collection. One of the methodological problems which should be included in the remaining challenges part is the nomadic area data collection and estimation.

To get an up to date data for nomadic areas, it needs to support for the regional and global research to prepare technical guidelines in the area.

8. Main findings and Summery

- The pastoral areas constitute significant percent of the total estimated livestock population of the country. In addition livestock in pastoral areas are the major source of food and income for pastoralists.
- Even though there are very large populations of varies livestock species in the pastoral areas of Ethiopia, there are no up to date information on the size of the population.
- CSA conducted the first livestock census in the pastoral areas in 2003 as part of agricultural census.
- As it needs different and complicated methodology and high resource, the pastoral areas livestock data could not be collected in the annual agricultural survey.
- The data obtained from the 2003 pastoral areas livestock census is helping policy makers in designing different strategies for nomadic areas. But that needs to be updated to design an effective policy.
- The National Statistical Development Strategy (NSDS) of Ethiopia which was developed in 2009 covers the period 2009/10 to 2013/14. The main objective of developing this NSDS document were formulating a frame work strategy and work program for the whole national statistical system of the country for the next five years.
- On the stakeholders workshop in the development of NSDS, the priority data gaps were identified. One of the priority data needs related to agriculture statistics on the stakeholders workshop was coverage of non sedentary population, particularly livestock since the livestock numbers in non sedentary areas are not regularly collected except that of 2003 livestock census in pastoral areas.

- The suggestion in the NSDS to fill this gap is developing a methodology for the livestock estimation for nomadic populations, seeking technical assistance on the most appropriate method of data collection.
- The global strategy to improve agricultural and rural statistics with its comprehensive contents incorporates different plans to improve agricultural statistics. The global strategy needs to incorporate the support to develop the methodology for nomadic area data collection.

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