

# *Sampling Practice for Bhutan under MoAF for producing Agriculture and Rural Statistics.*



## **Agricultural & Rural Statistics, BHUTAN**



**9-20 November 2015, Jakarta, Republic  
of Indonesia**

## **Introduction**

The Department of Agriculture (DoA) started the annual agriculture sample survey in 2004 and it has since then been an annual publication of the department. The statistics essentially includes information on agriculture land use, crop area, yield and production of cereals, oil seeds and pulses, spices, vegetables, fruits and nuts that are cultivated in the country. This provides timely and useful statistics for making informed policy decisions and planning appropriate investments.

The publication comes in two parts: 'Part 1' is a summary of the information collected which is presented at national level including data analysis on price and income, food security and crop utilization while the 'Part 2' of the publication contains data at the Dzongkhag level.

## Objectives of the Agriculture Sample survey

- The objectives of the survey are:
- To provide useful information on agricultural land use, crop area, yield and production of the crops cultivated in the country.
- To provide key statistics for helping in monitoring and evaluating agriculture development programmes.
- To provide statistical data for policy makers, agriculture extension workers, researchers and farmers for effective planning for investments in agriculture development.

## Frame for Agriculture statistics

Every year the list frame is collected and updated by the Agriculture Extension Officers (AEOs) who are based in the Gewogs/sub districts.

### Format for 2014 annual agriculture sample survey HHs listing

Sl.No	Name of head of the HHs	Village	H.no	T. no	Land cultivated/ not cultivated	If Cultivated		Land left fallow		Land leased out		Land leased in	
						WLC	DLC	WLF	DLF	WLO	DLO	WLI	DLI
1	Pema	Benzibee	Ka-3-42	198	LC		11.37		4.63				
2	Jangchub	Benzibee	KA-3-39	106	LC		8.76		10.59				
3	Dolkar	Benzibee	KA-3-41	231	NC			3.7		1.5			
4	Sangay	Benzibee	KA-3-40	199	LC		14.87		7.93				



## Questionnaire Design


- The survey questionnaire used for Agriculture Survey 2014 is the revised version of Agriculture Survey questionnaire 2013. The revision was done by the Agriculture Extension and Information Management Section (AEIMS) of the Department of Agriculture (DoA) in consultation with the division heads and representatives of all the 20 Dzongkhag Agriculture sectors.
- The revision of the 2013 questionnaire was done mainly for the following reasons:
  - To do away with the unwanted data variables.
  - To adapt the questionnaire as per the changing needs to include a variety of information required over time (eg; to integrate the questionnaire with the 11<sup>th</sup> Five Year Plan (FYP) for inclusion of information necessary for its effective implementation).



## Sample Size Calculation

It is difficult to produce high precision survey results for all crops in each Gewog as the diverse ecological and climatic zones of Bhutan determine the geographical distribution of the crops. Moreover, the estimation of the many indicators in agriculture like the annual crop yield and production, the cropped area, the number of fruit trees etc. becomes difficult as they are a function of many complex variables which in turn are dependent on many other factors. Therefore, making it increasingly difficult to come up with a rigid “sample size” which can give precise, unbiased and efficient estimates. The farmers in Bhutan practice conventional mix farming system with small land holdings.

The formulae given below were used for calculating the sample size, the information on agriculture utilized area at the Gewog level was used as an indicator for the sample size calculation.



The initial sample size  $n_0 = \left( \frac{Z*100* CV \text{ area}}{P} \right)^2$

Where,  $n_0$  = is the initial sample size

$Z$  = is the statistic that defines the level of confidence desired, at 95% Confidence Interval the value of  $Z = 1.96$

$C.V$  = non percentage  $C.V$  (coefficient of variation) of the agriculture utilized area is taken for this survey.

Non percentage  $C.V$  =  $SD \text{ area} / \bar{X} \text{ area}$

$P$  = the value of population proportion "p" or Margin of error is set at 15% i.e. 0.15 at geog level.

The final sample size is given by using population correction factor (CF),

$$= \frac{n_0}{(1 + (n_0 / N))}$$

Where,  $N$  = Population size / total farming Households at each Gewog/Sub districts.

The formulae presented above were used to determine the sample size for all the 205 Gewogs in the 20 Dzongkhags.



## Sampling Design

The “**Circular Systematic sampling**” method was adopted to select the sample at the Gewog/Sub districts level for many of its advantages and conveniences.

The farming households in the geog were taken as the ultimate sampling units from which the samples were drawn/selected using circular systematic sampling approach.

## Data Collection

The data collection was carried out in mid-March-June 2015, by the AEOs in the gewogs under the supervision of the Dzongkhag Agriculture Sector heads. Twenty Assistant Dzongkhag Agriculture Officers (ADAOs) were briefed on the use of the questionnaire and methods of data collection, who in turn trained the field agriculture staff.



### **Data Analysis and Estimation**

The data analysis was done in SPSS version 20 (provided by the NSB) by AEIMS of the DoA.

#### ***Yield Estimation:***

The yield of the various crops obtained from the survey have been crosschecked and validated with the yields from the crop cuts. In the event where there were inconsistencies in the survey data, the crop cut data was used.

***Production= Estimated total area (from the sample survey) \* Estimated yield (from the crop cuts)***

The 'weight estimation procedure' was used to determine the estimates of population from the sample survey where the data was multiplied by a sampling weight, or expansion factor. The basic weight for each sample household would be equal to the inverse of its probability of selection. The sample design for the agriculture survey 2014 is self-weighting within stratum/Gewog, meaning that all the sampled or the enumerated households within a Gewog will have the same weight.



### **Live Stock Statistics for Bhutan**

It is annually collected through well established administrative recoding system at gewog or sub district level.

Yields for various major livestock products like milk yield, meat, fish etc. are estimated through scientific approach developed by the Research Development centres.