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**OPERATIONAL PROCEDURES FOR SELECTING SAMPLES
FOR REPEATED AGRICULTURAL SURVEYS
WITH A ROTATION DESIGN**

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WITH A ROTATION DESIGN**

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Introduction

In agricultural surveys, the target populations are agricultural holdings¹ that are, broadly speaking, independent producers of agricultural products. Agricultural holdings are generally classified into two categories: (i) holdings in the household sector (operated by households) and (ii) holdings in the non-household sector (operated by other structures like corporations and government institutions). The FAO sampling strategy for agricultural surveys recommends a two-stage sampling design for the first category and a single stage sampling design for the second population (FAO, 2017).

The agricultural survey programs proposed by FAO to countries recommend the implementation of a census of agriculture at least once every ten years and regular annual agricultural surveys. From one year to another, there are three alternatives regarding the samples for such repeated surveys: (i) selecting a new sample every year (often called “repeated cross-section”), (ii) using the same sample during a number of years (panel) or (iii) changing a proportion of the sample from one year to another (partial rotation). The first option would substantially increase operational costs of the survey program as selecting a sample every year requires updating the sampling frame and locating the new sampling units for survey implementation. In addition it does not guarantee enough overlapping units between samples over two survey rounds for longitudinal analyses and reliable estimates of changes. For developing countries, FAO recommends either the panel or the partial rotation designs as cost effective options for annual survey programs. The panel design allows both cross sectional and longitudinal analyses with, in theory, all sample units. It is less costly and presents some operational advantages, as the enumerators shall interview the same holdings every year. However, the panel sample could suffer from attrition and obsolescence that would deter its representativeness and increase sampling errors and operational costs for tracking missing units. The partial rotation scheme is a great alternative to address the issue of sample attrition through a renewal of a part of the sample while allowing longitudinal analyses over two different survey occasions.

The main objective of this note is to present how to perform sample selection with partial rotation over the survey cycle. A number of methods recommended in the literature are proposed here considering their suitability, cost effectiveness and ease of implementation in the context of agricultural surveys in developing countries.

¹ The World Programme for the Census of Agriculture 2020 (WCA 2020) defines the agricultural holding as “*economic units of agricultural production under single management comprising all livestock kept and all land used wholly or partly for agricultural production purposes, without regard to title, legal form or size. Single management may be exercised by an individual or household, jointly by two or more individuals or households, by a clan or tribe, or by a juridical person such as a corporation, cooperative or government agency. The holding’s land may consist of one or more parcels, located in one or more separate areas or in one or more territorial or administrative divisions, providing the parcels share the same production means, such as labor, farm buildings, machinery or draught animals*” (FAO, 2015).

1 Rotation in single-stage and multistage sampling

Single-stage and multistage sampling are the most common sampling designs for agricultural surveys (FAO, 2017). In case of a single-stage sampling (as recommended for non-household holdings), the procedures proposed in this document could be used to select rotating samples in the population or in each stratum if a stratification is performed.

In the framework of a multistage sampling, rotation is advised in the final selection phase. For instance in two-stage sampling, it would be recommended to rotate the secondary sampling units (SSU) rather than the primary sampling units (PSU). Graham (1963, p108) recognises cost advantages associated with maintaining a fixed set of PSU although higher variability between them could be noticed in some cases; the paper recommends definitively a rotation of higher-stage sampling units. In fact, rotating the PSU would be more expensive as it would imply updating more populations (populations of SSU in more PSU and the population of PSU in each survey occasion). In addition, rotating SSU is likely to produce smoother estimates than rotating PSU. Therefore, with a two-stage sampling, rotation procedures should be performed for the SSU in each sampled PSU.

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