

**International Seminar on Approaches and Methodologies for
Private Food Grain Stock Measurement**
New Delhi, 9-11 November 2016

**Food Grain Stocking Pattern in India
& the Information Gap**

Technical Session 1: Conceptual and Methodological Issues Involved in Measurement of Private Food Grain Stocks

Rajiv Mehta *
Adviser AMIS, FAO India

Decision making on food security management require reasonably good estimates of stocks of food grain over time.

However, availability of food stocks data is generally inadequate in the statistical systems.

Note: Discussion in this paper is mainly focussed around AMIS commodities: Wheat, Rice, Maize and Soybean

Searching questions

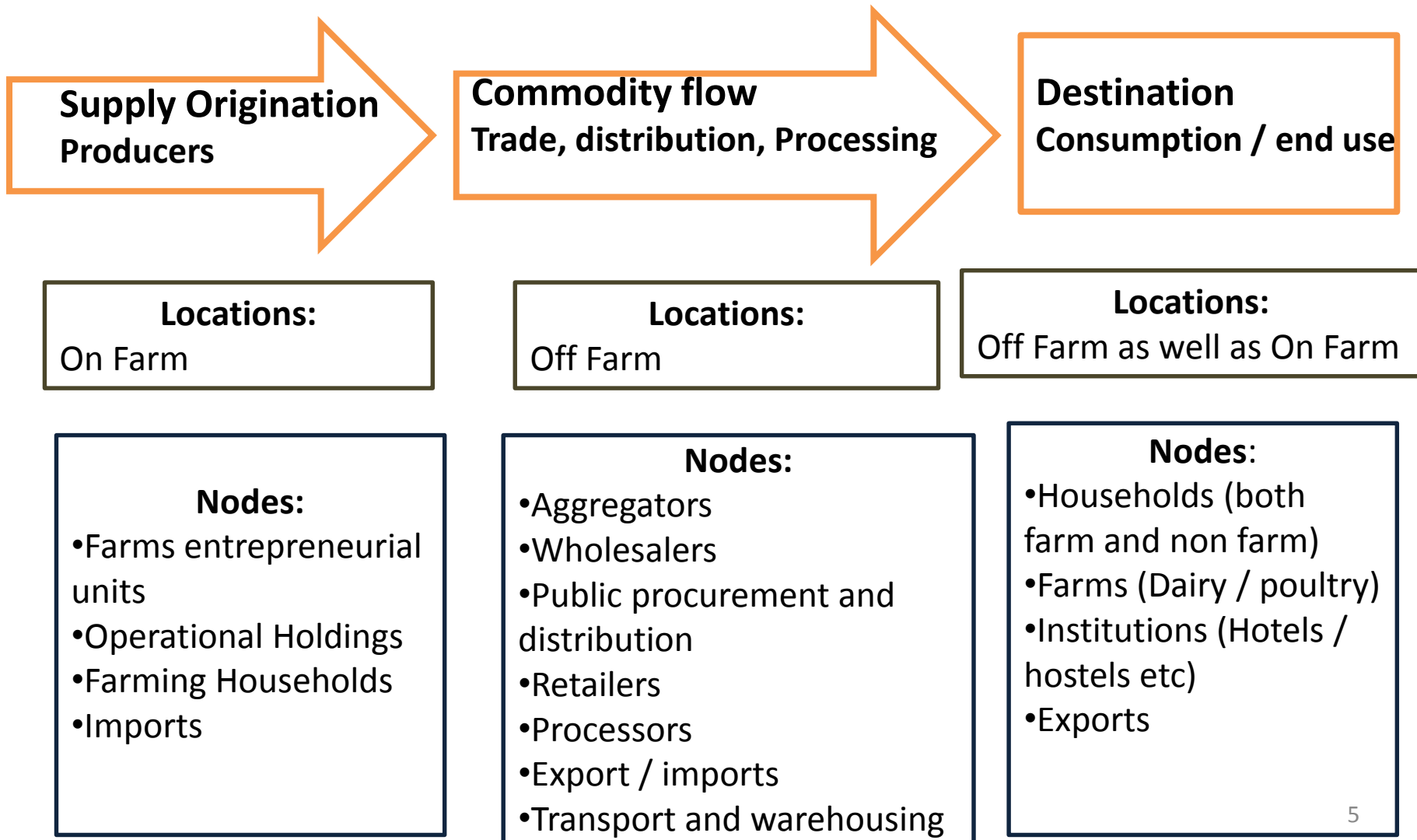
- What to measure?
 - Understanding the phenomenon of food stocking
- Where to measure ?
 - Domains of occurrence of phenomenon
- how and when to measure ?

Understanding the phenomenon of food stocking

- Complex phenomenon existing in a diverse domain
 - Incidence of **accumulation** in commodity supply chain from production to consumption
 - Dynamic phenomenon, important for **distributed availability** over time and space
- Performed by the diverse set of actors in supply chain
 - Producers / Farmers / Farms
 - Aggregators / traders/ Exporters / importers/Processors / millers/ institutional buyers
 - Consumers : Household / institutions
- Depends on several factors
 - Supply and its structure : food grain production, import, export,
 - marketed surplus and pattern of marketing ,
 - structure and environment of food grain market and value chain
 - consumption.

Nodes of food stocking in supply chain

Food grain supply chain



Domain features

- **Origin domain**
 - Crop area 140 million HA
 - Operational farm holdings 138 Millions
 - In different size classes
 - Agriculture Households 90 Millions
- **Flow domain**
 - Off farm post harvest economic activities
 - About 10 million
 - 75% household enterprises: without hired workers
- **Destination domain**
 - About 250 million households (including farm households)
 - Other consuming institutions

Off farm activities of commodity flow of food supply chain with scope of food stocking for AMIS crops

Activity description in National Industry Classification (NIC) 2008	NIC	Number of Establishment (000)	Number of Establishment without hired workers (000)
1	2	3	4
Manufacture of vegetable and animal oils and fats	104	39.5	23.0
Manufacture of grain mill products, starches and starch products (Rice miller , Floor Mill)	106	854.8	650.1
Manufacture of other food products (Bakery, Processed grain food)	107	325.6	181.2
Manufacture of prepared animal feeds (Poultry Feed)	108	11.5	6.5
Manufacture of prepared animal feeds	461	128.2	66.4
Wholesale of agricultural raw materials and live animals	462	213.2	140.9
Wholesale of food, beverages and tobacco	463	213.4	121.3
Retail sale in non-specialized stores	471	2335.2	1859.9
Retail sale of food, beverages and tobacco in specialized stores	472	6537.5	5222.8
Warehousing and storage	521	313.1	141.0
Restaurants and mobile food service activities	561	978.2	569.1
Event catering and other food service activities	562	270.9	142.1
Sub Total		12221.1	9124.3
All non agriculture activities in NIC		58495.4	41964.0

Seasonality in price cycle (AMIS Crops)

•Wheat and Soybean:
Single season crops

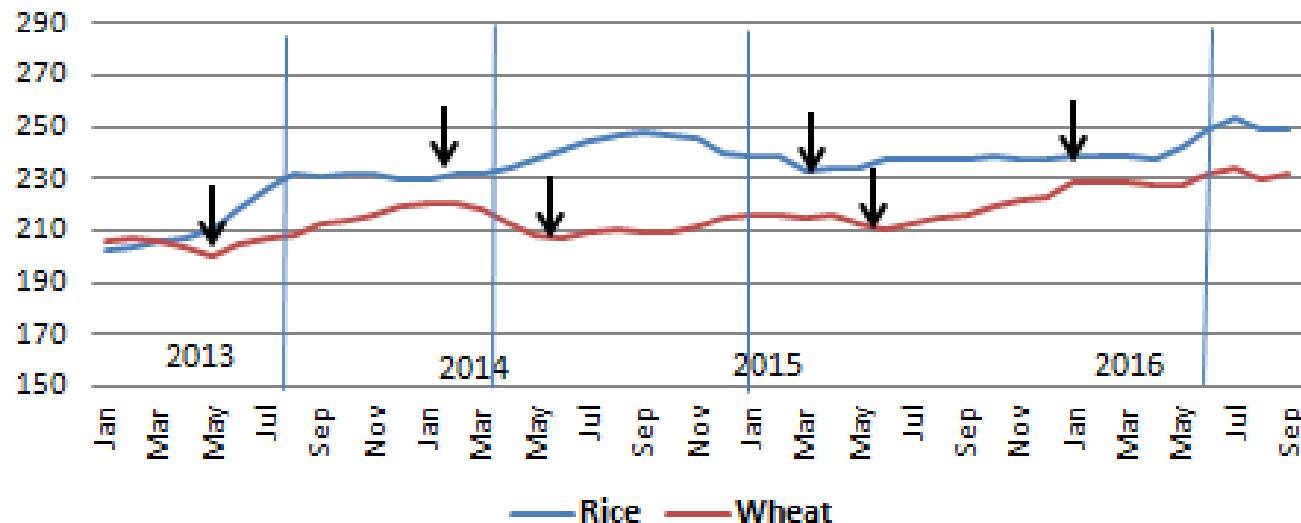
•Rice and Maize:
Multiple season crops

•Wheat and rice: more price stability due to **large public intervention**

•Likely impact on behavior of food grain stocking in supply chain

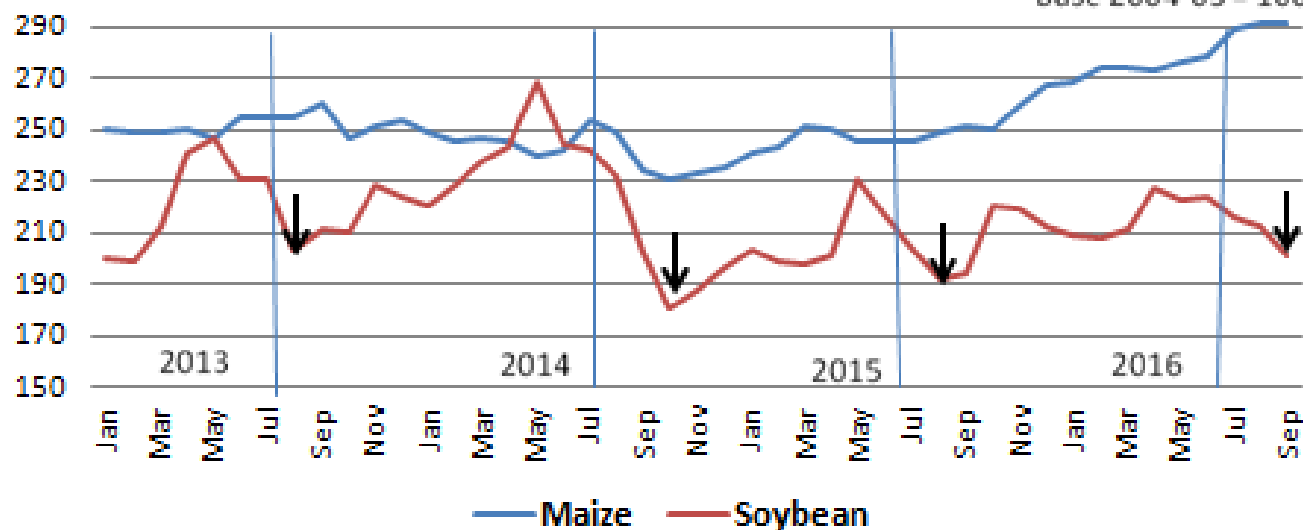
Wholesale Price Index* Monthly 2013-2016

* Base 2004-05 = 100



Wholesale Price Index* Monthly 2013-2016

* Base 2004-05 = 100



Few statistical operations with subject matter and coverage cross-cutting food stocking domains

Surveys

agricultural production / cost survey
household survey on consumer expenditure
situation assessment survey of farmers
enterprise survey
annual survey of industries,
international trade, etc.

Domains

Farms / operation holdings
Households
Farm household
Traders / Processors
processors / millers

- Survey objectives and reports do not specifically focus on food stocking phenomenon
- Not systematically designed or organised to record the quantity of stocks held at the different points of the supply chain

Studies of Cost of Cultivation of Principal Crops

- **Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare since 1970-71**
 - field data on **cost of cultivation and cost of production** and its estimation for 28 crops ,
 - (includes all the four AMIS crops);
 - Sampling unit: Farm Operation holding,
 - construction of the indices of terms of trade between agriculture and non-agriculture sectors and MSR.
- **Special schedule (Record Type – RT 610)**
 - **crop wise receipts and disposal of harvested produce** by the farmers
 - **STOCKS**: Begin (year),
 - **RECEIPTS**: Form Production, Received Free, Bought, Received on credit, Received as wages, Other Receipts.
 - **DISPOSAL**: Destroyed, Stolen, Given Free, Consumed, Fed to Animals, Use as Seed, Sold, Loan & Other Repayment (in kind), Other Disposal,
 - **STOCKS**: End (year)
 - **Scope of monthly information**
- **Data validation issue**

NSS Situation Assessment Survey

(Schedule 33, NSS 70th round -January, 2013- December, 2013)

- To capture **condition of agricultural households** in the context of policies and programmes of Government of India.
- collection of information on aspects relating to **farming and other socio-economic characteristics** of agricultural households.
 - information on household consumer expenditure,
 - income, productive assets, indebtedness,
 - farming practices and preferences,
 - resource availability,
 - Marketing and produce management and disposal
 - awareness of technological developments
 - access to modern technology
 - information on crop loss, crop insurance
 - awareness about Minimum Support Price (MSP)
- Sampling unit: Household, validated micro data available
- Data of situation assessment survey can be used for validation

NSS Household Consumer Expenditure Survey

Schedule 1.0, NSS 68th round: 2012-13

- Flagship survey of NSS for **measurement of level of living**
- Monthly Household consumption of food and non food items
- Quantity and value of consumption of different food items including cereals and pulses
- **Relevant to food supply chain,**
 - household consumption in breakup of
 - consumption out of market purchase,
 - from Public Distribution and
 - from home grown stock.
 - Using **unit level (micro) data** estimates of total consumption of food grains (wheat, rice and maize) worked out in three breakups.
 - indicator “**ratio of household consumption out of home grown produce to total consumption**” will be useful for estimation of stocks by household for self consumption.
- Sampling unit: Household, validated micro data available

NSS Un incorporated Enterprise survey

NSS 67th round (2011-12)

- **Coverage: un incorporated enterprises in non agriculture sector.**
 - manufacturing and services including trade but excluding construction
- Information collected in the survey:
 - Enterprises identified in maximum permissible 5 digit NIC classification.
 - Information on characteristics of the enterprises, fixed assets, employment, operating expenses and
 - receipt and disposal,
 - **opening and closing stock**, value added, etc.
- Sampling unit: Enterprise, validated micro data available
 - Enterprises identified in maximum permissible 5 digit NIC classification.
- stock position of the enterprises in the un-incorporate sector was attempted from this data.

Annual Survey of Industries (ASI)

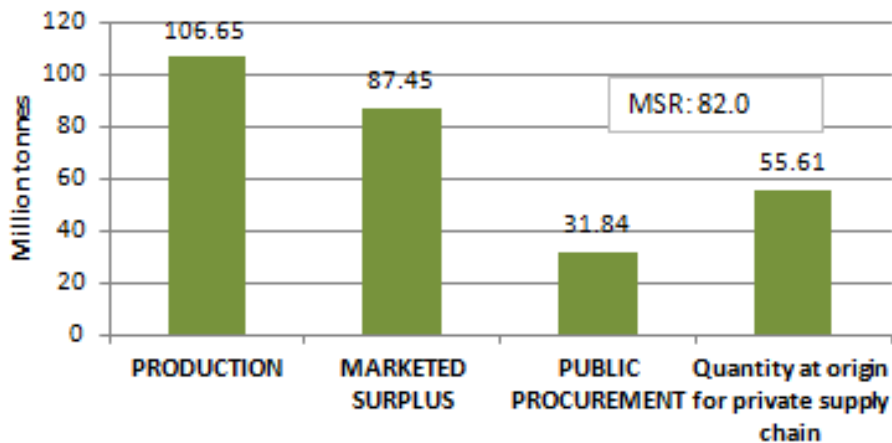
- ASI is principal source of Industrial Statistics in India.
- Statistical information to assess and evaluate –
 - changes in the growth,
 - composition and structure of organised manufacturing sector comprising activities related to manufacturing processes, repair services, gas and water supply and cold storage.
 - **Data relevant to assessment of stocks** are covered under the following:
 - manufacturing of the grain product,
 - data on output,
 - disposal and stock data for large and medium manufactures .
- From unit level data, considering Industrial Classification for activities in food stock supply chain, rates and ratios of production to opening and closing stocks are expected to be worked out.

6th Economic Census 2013

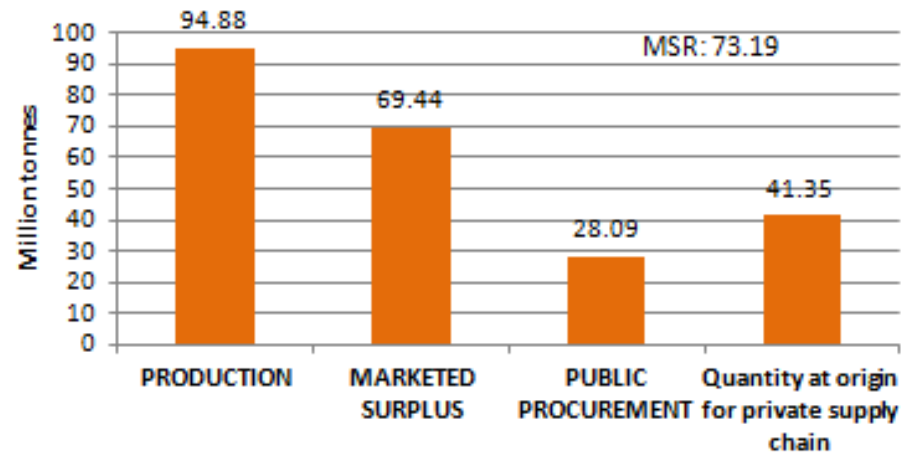
- Information on activity-wise operational and economic variables of all the establishments engaged in any economic activities of either agricultural or non-agricultural sector (excluding crop production, plantation, public administration, defence and compulsory social security) of the country.
- Provide updated Directory of Establishments employing 10 or more workers
- Provide an up-to-date '**frame**' containing information on number of establishments and number of workers by industry, by type of ownership of establishments,

Residual quantity of commodity with private players at the origin of supply chain

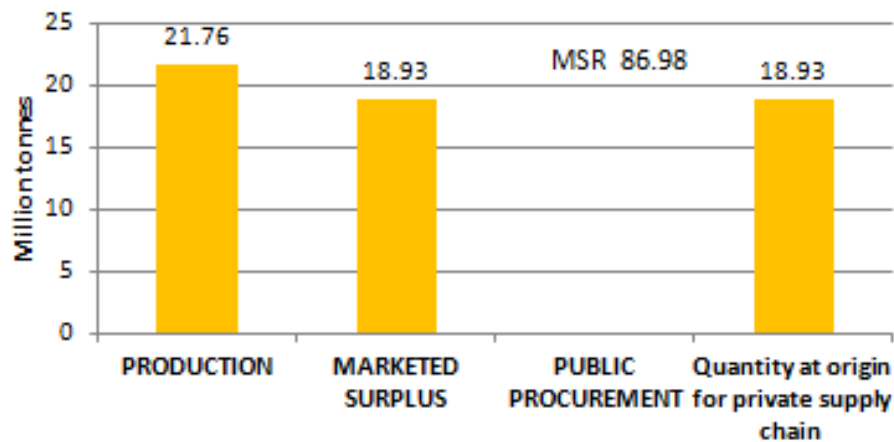
Assessing Production distribution at Farm level Rice
2013-14



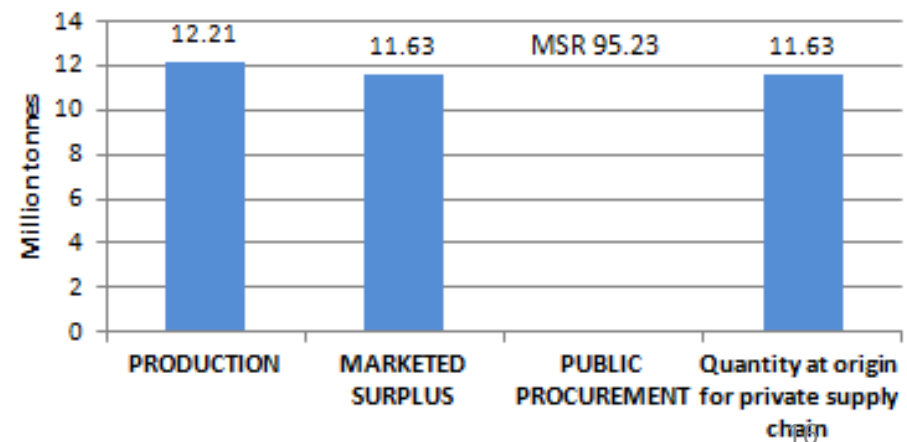
Assessing Production distribution at Farm level Wheat
2013-14



Assessing Production distribution at Farm level Maize
2013-14



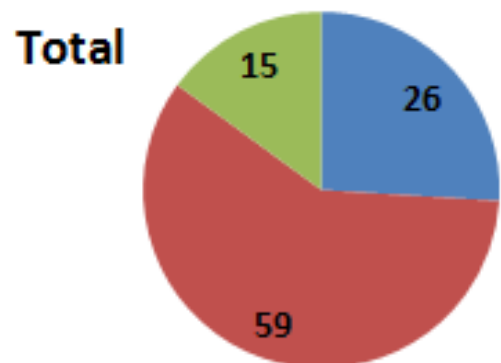
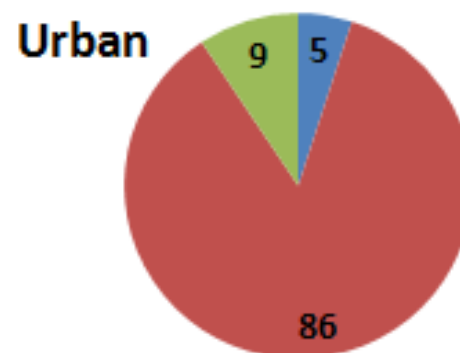
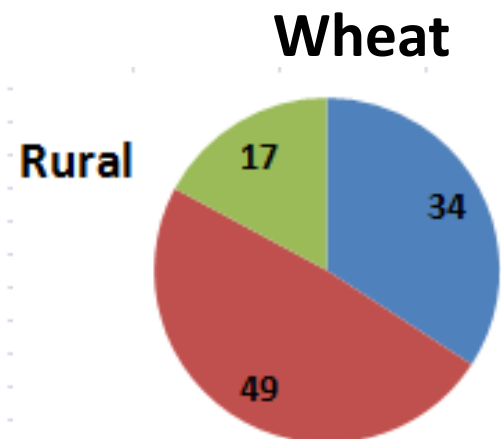
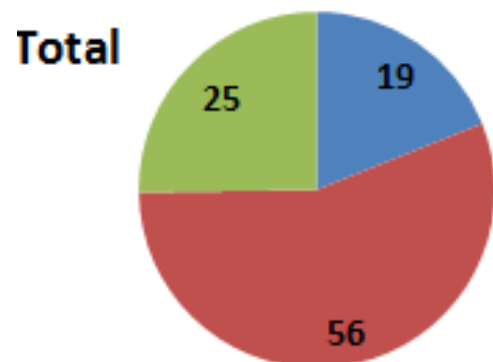
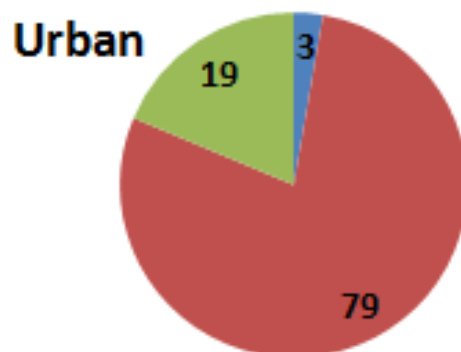
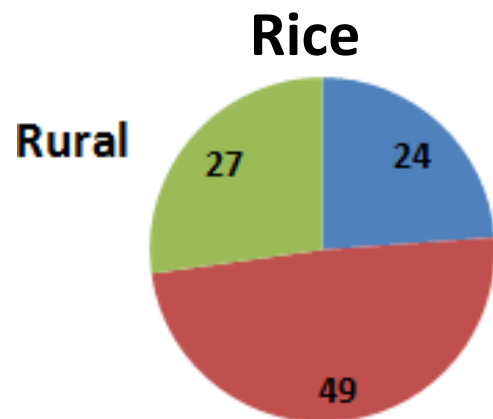
Assessing Production distribution at Farm level Soybean
2013-14



Household Consumption Share of Rice & Wheat by Sources:

- a. Home grown
- b. Market
- c. PDS

(NSS 68th rd data 2012-13)



■ Home grown ■ Market ■ PDS ■ Home grown ■ Market ■ PDS

Percentage
distribution of
total
household
annual
consumption
of Rice

(NSS 68th rd
data 2012-13)

Household type	home grown	from market	From PDS	<i>Total</i>
	Rice			
Rural				
<i>self-employed in agriculture</i>	13	8	6	27
<i>self-employed in non-agriculture</i>	2	9	3	14
<i>regular wage/salary earner</i>	1	4	1	6
<i>casual labour in agriculture</i>	1	10	6	18
<i>casual labour in non-agriculture</i>	1	6	3	9
<i>others</i>	0	2	1	3
<i>Total Rural</i>	18	38	21	77
Urban				
<i>self-employed</i>	0	7	2	9
<i>regular wage/salary earning</i>	0	8	1	9
<i>casual labour</i>	0	2	1	4
<i>others</i>	0	1	0	1
<i>Total Urban</i>	1	18	4	23
Grand total	19	56	25	100

Percentage
distribution of
total
household
annual
consumption
of Wheat

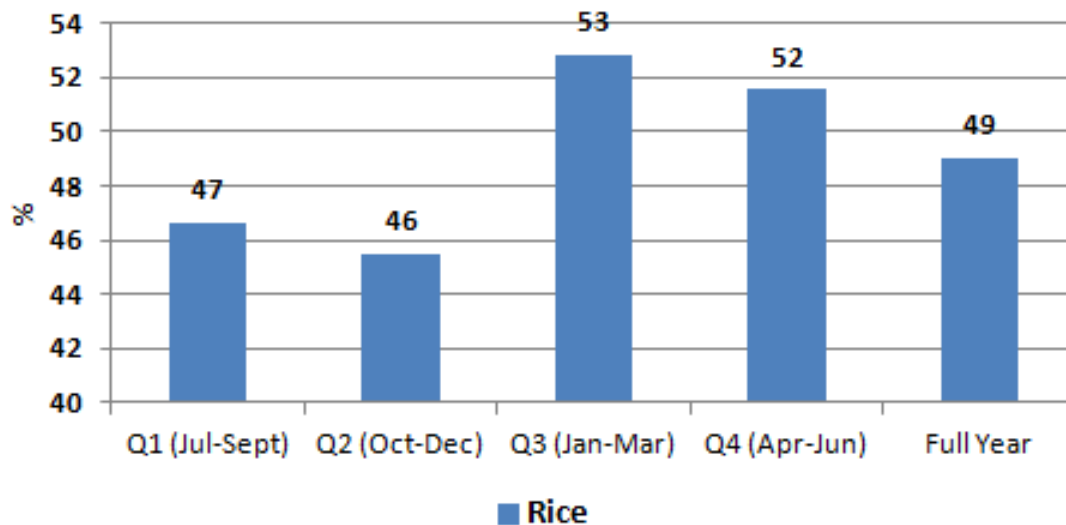
(NSS 68th rd data
2012-13)

Household type	home grown	from market	From PDS	<i>Total</i>
	Wheat			
Rural				
<i>self-employed in agriculture</i>	19	8	3	31
<i>self-employed in non-agriculture</i>	2	8	2	12
<i>regular wage/salary earner</i>	1	4	1	6
<i>casual labour in agriculture</i>	1	7	3	11
<i>casual labour in non-agriculture</i>	1	7	2	10
<i>others</i>	0	2	0	2
Total Rural	25	35	12	72
Urban				
<i>self-employed</i>	1	10	1	12
<i>regular wage/salary earning</i>	0	10	1	11
<i>casual labour</i>	0	3	1	3
<i>others</i>	0	1	0	1
Total Urban	1	24	3	28
Grand total	26	59	15	100

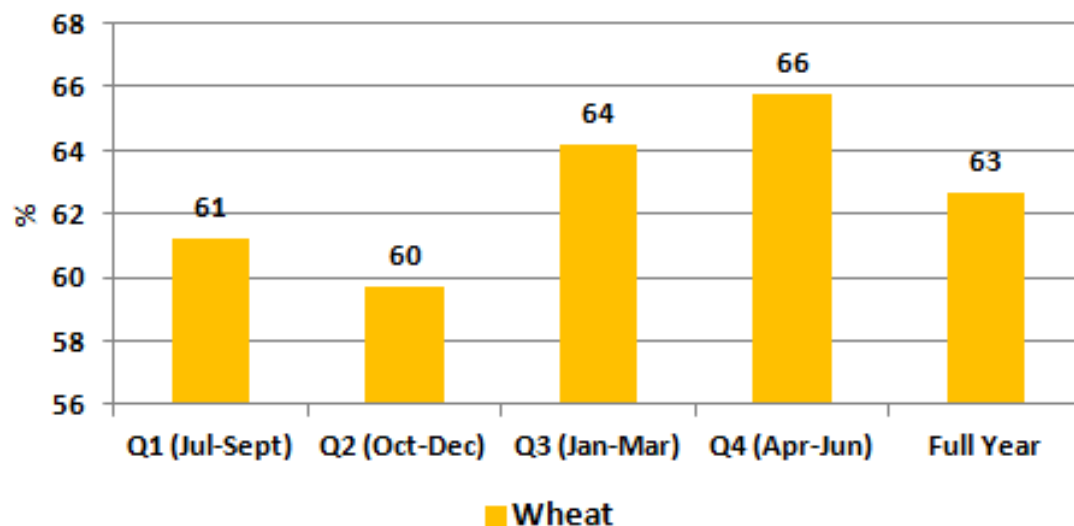
Behavior of Food Stock at Farm level

(NSS 68th rd data 2012-13)

% Consumption from Home Grown Produce for Self Employed in Agriculture Households(NSS 68 Rd. 2012-13)



% Consumption from Home Grown Produce for Self Employed in Agriculture Households(NSS 68 Rd. 2012-13)



**Composite
Analysis of
Surveys
and
data for
measurement
of
food stocks**

Sl. No.	Survey data analysed	Survey Ownership	Commodity covered and Domains of food stock	Periodicity (and reference period)	Type of measurement	Data issues
1	Cost of Cultivation Studies	DES <u>MoA</u>	All AMIS Crops, Farm gate (Operational holding)	Annual (concurrent crop season)	Marketed Surplus, periodic Farm gate stock and disposal	Good scope in farm gate stock measurement coverage and periodicity, survey operation and data quality need improvement
2	Situation Assessment Surveys	NSS <u>MoSPI</u>	All AMIS crops, Farm gate (Farmer household)	Quinquennial Season (<u>Kharif</u> / Rabi)	Marketed surplus and farm gate disposal	Validated quality data, <u>good</u> to understand supply chain and stocking phenomenon and validation. Periodicity infrequent
3	Household Consumer Expenditure	NSS <u>MoSPI</u>	Wheat, Rice and Maize, Farm gate and end consumer	Quinquennial (previous 30 days)	Consumption out of own production, PDS and Market purchase,	Validated quality data, <u>good</u> to understand supply chain and stocking phenomenon and validation. Periodicity infrequent
5	Un-incorporated non <u>agri</u> enterprises	NSS <u>MoSPI</u>	Intermediate off farm Traders / processors	Quinquennial (previous 30 days)	Domain size/Stock in the nodes of food supply chain	Validated quality data, <u>good</u> to understand stocking phenomenon and validation. Classification and coverage limitation, Periodicity infrequent
6	Annual Survey of Industry	CSO <u>MoSPI</u>	Intermediate off farm Processors	Annual, (previous accounting year)	Domain size/Stock in the nodes of food supply chain	Validated quality data, Can provide opening and closing stock indicators with some modification, Classification and coverage limitation, Periodicity annual but not concurrent with time lag in results

Food Stocking in supply chain: issues on information gaps and measurement

- **Better data for measuring farm stock at origin of supply chain (RT 610)**
- **Household consumption data implies on stocking behavior**
 - On farm stocking
 - Importance of subsistence farming / consumption from home grown
 - Consistent consumption from home grown for farm household
 - Data periodicity: 5 years, non concurrent
- **Stocking cycle**
 - In synergy with production and price cycle
- **Main data limitations**
 - off farm stocking in commodity flow
 - Consumption by non households / institutions
- **Stocking in trade / processing**
 - Limitation of enterprise classification in NIC
 - **Stocking as flow (inventory) or accumulation (speculative)**
 - In Annual Survey of Industry, stocks taken as working capital
 - **Mixed activities:** trade – processing - stocking
- **Policy considerations**
 - Market intervention (procurement and disposal by Government)
 - Stipulation on stocking limits

Thanks

Contact email: rajivmehta2@gmail.com; rajiv.mehta@fao.org

* also Member, National Statistical Commission, Govt. of India