

PR-ASC

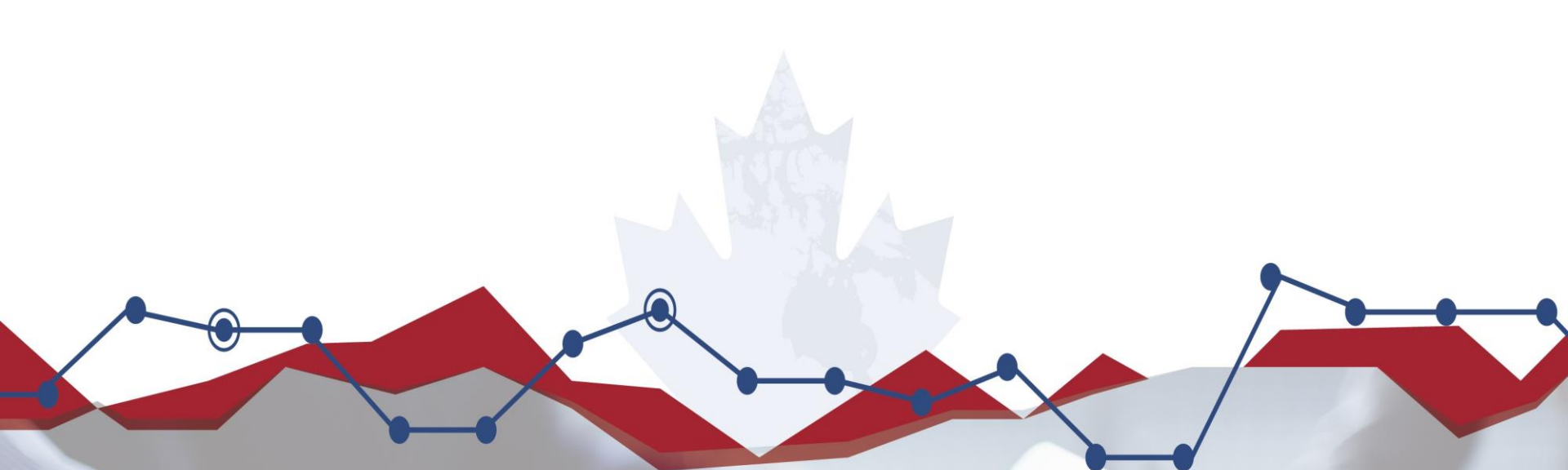


**Project for the Regional
Advancement of Statistics
in the Caribbean**

**Projet régional pour
l'avancement de la statistique
dans les Caraïbes**

Funded by the
Government
of Canada

Canada



Simple and Systematic Random Sampling

Project for the Regional Advancement of Statistics in the Caribbean (PRASC)

Gavin Thompson
March 23, 2021, Virtual, from Ottawa, Canada



Delivering insight through data for a better Canada



Bad Math Part I

Predicting Elections





DEWEY DEFEATS TRUMAN

G. O. P. Sweep Indicated in State; Boyle Leads in City

REPUBLICAN TICKET AHEAD OF 1944 VOTE

Tops Coghlin in Hot Race for Attorney

RECORD CITY VOTE SEEN IN LATE TALLIES

Suburban Ballot Near 70,000

BULLETINS ON ELECTIONS

Early Count Gives G.O.P. Senate Edge

POTS G.O.P. BACK IN THE WHITE HOUSE

Wash. Electoral Margin Seen

1948

The Literary Digest

NEW YORK

OCTOBER 31, 1936

Topics of the day

LANDON, 1,293,669; ROOSEVELT, 972,897

Final Returns in The Digest's Poll of Ten Million Voters

Well, the great battle of the ballots is the Poll of ten million voters, scattered throughout the forty-eight States of the

less National Committee purchased Ten Literary Digests? And all types and varieties, including: "Have the Jews purchased

returned and let the people of the Nation draw their conclusions as to our accuracy. So far, we have been right in every Poll. Will we be right in the current Poll? That, as Mrs. Roosevelt said concerning the President's reelection, is in the "lap of the gods."

"We cannot make any claims before election but we respectfully refer you to the opinion of one of the most respected citizens

1936

Landon(R) to defeat FDR(D) 1936

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- The frame they used was telephone books and car registration lists.
- Problem: This was 1936 and telephones and cars were still considered to be luxury items!
- Roosevelt captured 60% of the vote and won every state except for Maine and Vermont!

Dewey(R) Defeats Truman(D) 1948

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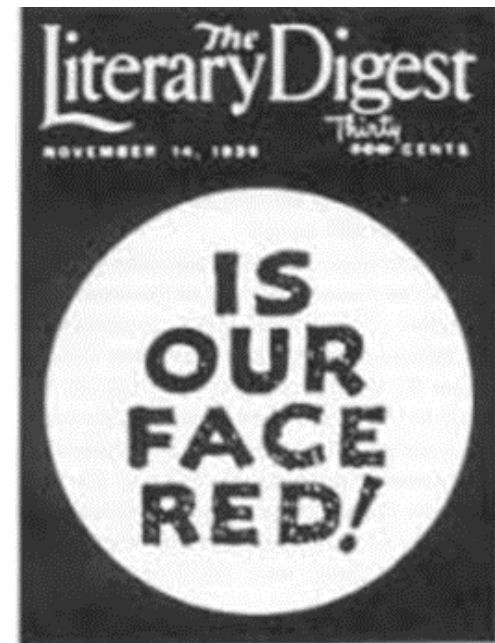
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- Problem: they stopped two weeks before the election!
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Dewey(R) Defeats Truman(D) 1948

- Gallop conducted Nation-wide phone polls
- Problem: phones were still expensive in 1948
- Problem: they stopped two weeks before the election!
- Problem: They didn't ask if people were planning on voting!
- Problem: They allowed their interviewers to use opportunity sampling!

Results

- Literary Digest went out of business.
- Gallop lost a lot of business and was forced to invest a lot in research.
- Opinion polls are much better designed due to the research that went into fixing these two huge gaffs.
- National polls in the States now need 1,500-4,000 respondents to get their results!





	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99		
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...																																																				
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Using the Random Numbers Table

- 1) Determine the starting point: both row and column.
- 2) Determine the number of digits needed to select your random number.
- 3) Determine the 'path' to finding extra numbers, if necessary.
- 4) Sample with or without replacement?



Using the Random Numbers Table

	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	8				
00	5	9	3	9	1	5	8	0	3	0	5	2	0	9	8	8	2	7	1	8	8	7	0	2	4	8	2	8	4	8	0	4				
01	9	9	5	6	7	7	6	3	6	4	7	7	2	0	4	0	4	6	1	5	2	7	0	6	2	9	6	6	2	1	4	3				
02	1	0	3	6	3	9	7	5	1	8	5	1	4	0	0	2	5	6	7	0	9	8	3	4	2	6	1	8	9	1	2	7				
03	8	6	8	5	9	1	9	5	5	8	6	4	4	3	2	1	6	7	0	6	9	9	6	1	2	5	9	7	9	8	3	2				
04	1	1	2	5	8	2	4	5	9	1	3	6	8	6	3	5	5	3	6	8	3	1	7	2	1	9	4	3	3	5	3	4				
05	9	5	0	6	8	8	8	6	2	8	3	5	9	1	1	1	4	5	3	0	3	3	0	2	0	8	0	4	2	8	3	9				
06	5	4	4	6	3	4	7	2	3	7	7	3	8	0	0	9	1	0	1	7	3	6	2	3	9	7	1	8	2	4	8	3				
07	1	6	8	7	4	6	2	6	7	7	5	7	4	1	2	1	3	2	1	5	3	1	3	8	9	6	2	2	3	3	8	0				
08	9	2	4	9	4	6	3	1	5	7	7	6	5	9	3	9	1	3	1	6	0	3	5	0	5	7	2	3	8	9	9	6				
09	1	5	6	6	9	5	6	6	8	9	3	5	6	8	2	4	0	8	4	4	5	3	2	5	6	8	1	8	7	2	3	5				
10	9	9	1	1	6	7	5	4	8	6	8	4	9	8	9	2	3	4	7	6	5	2	9	6	7	6	7	1	0	4	3	9				
11	1	5	6	9	6	1	0	7	0	3	6	5	1	7	8	9	0	6	3	7	6	3	1	1	0	1	7	6	2	2	5	3				
12	9	7	7	2	0	1	5	3	6	9	5	1	2	6	9	6	9	6	2	0	0	3	3	8	8	1	3	6	9	9	3	3				
13	1	1	6	6	6	1	3	8	4	1	7	1	6	8	1	9	8	0	0	0	3	5	9	7	9	3	9	7	1	9	8	1				
14	7	1	6	2	8	7	3	1	3	0	7	8	7	8	3	7	5	6	9	1	4	1	6	3	2	0	9	8	4	7	6	1				
15	4	0	5	0	1	5	1	0	8	9	9	9	9	4	3	9	1	8	4	3	4	1	9	9	5	8	8	9	3	1	7	3				
16	2	2	5	1	8	5	5	5	7	6	9	8	2	1	5	8	2	0	6	8	1	0	7	9	8	8	2	6	1	1	3	6				
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18	0	8	3	2	7	0	2	6	7	1	9	8	1	9	1	8	4	3	4	2	9	0	8	1	3	4	9	2	6	8	9	5				
19	6	0	2	5	1	4	5	5	4	8	0	2	1	4	6	0	5	5	9	7	4	8	2	2	8	8	1	3	6	6	3	4				
...																																				
40	6	3	5	2	5	9	4	4	4	1	7	7	0	3	3	1	2	1	4	7	5	1	0	5	4	4	9	9	5	5	5	8				
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- Starting at row 00 and column 50, going down, what are the first 3 numbers between 1 and 75?

Using the Random Numbers Table

	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85														
00	5	9	3	9	1	5	8	0	3	0	5	2	0	9	8	8	2	7	1	8	8	7	0	2	4	8	2	8	4	8	0	4																		
01	9	9	3	7	6	9	7	7	6		7	7	2	0	4	0	4	6	1	5	2	7	0	6	2	9	6	6	2	1	4	3																		
02	1	0	3	6	3	9	7	5	1	0	5	1	4	0	0	2	5	6	7	0	9	8	3	4	2	6	1	8	9	1	2	7																		
03	8	6	8	5	9	1	9	5	5	8	6	4	4	3	2	1	6	7	0	6	9	9	6	1	2	5	9	7	9	8	3	2																		
04	1	1	5	8	2	4	5	9	1		3	6	8	6	3	5	5	3	6	8	3	1	7	2	1	9	4	3	3	5	3	4																		
05	9	5	0	6	8	8	8				3	5	9	1	1	1	4	5	3	0	3	3	0	2	0	8	0	4	2	8	3	9																		
06	5	4	4	6	3	4	7				7	3	8	0	0	9	1	0	1	7	3	6	2	3	9	7	1	8	2	4	8	3																		
07	1	6	8	7	4	6	2	6	7	7	5	7	4	1	2	1	3	2	1	5	3	1	3	8	9	6	2	2	3	8	0																			
08	9	2	4	9	4	6	3				7	6	5	9	3	9	1	3	1	6	0	3	5	0	5	7	2	3	8	9	9	6																		
09																																																		
10	1	1	6	7	5	4	8	6			8	4	9	8	9	2	3	4	7	6	5	2	9	6	7	6	7	1	0	4	3	9																		
11	1	5	6	9	6	1	0	7	0	3	6	5	1	7	8	9	0	6	3	7	6	3	1	1	0	1	7	6	2	2	5	3																		
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13	1	1	6	6	6	1	3	8	4	1	7	1	6	8	1	9	8	0	0	0	3	5	9	7	9	3	9	7	1	9	8	1																		
14	7	1	6	2	8	7	3	1	3	0	7	8	7	8	3	7	5	6	9	1	4	1	6	3	2	0	9	8	4	7	6	1																		
15	4	0	5	0	1	5	1	0	8	9	9	9	9	4	3	9	1	8	4	3	4	1	9	9	5	8	8	9	3	1	7	3																		
16	2	2	5	1	8	5	5	5	7	6	9	8	2	1	5	8	2	0	6	8	1	0	7	9	8	8	2	6	1	1	3	6																		
17	7	5	1	1	2	3	0	4	8	5	6	2	1	7	3	0	2	1	3	2	1	4	8	7	8	9	2	8	7	9	2	2																		
18	0	8	3	2	7	0	2	6	7	1	9	8	1	9	1	8	4	3	4	2	9	0	8	1	3	4	9	2	6	8	9	5																		
19	6	0	2	5	1	4	5	5	4	8	0	2	1	4	6	0	5	5	9	7	4	8	2	2	8	8	1	3	6	6	3	4																		
...																																																		
40	6	3	5	2	5	9	4	4	4	1	7	7	0	3	3	1	2	1	4	7	5	1	0	5	4	4	9	9	5	5	5	8																		
41	4	7	6	0	6	9	3	4	1	0	1	6	3	5	9	8	9	0	3	3	8	9	6	9	6	4	7	2	3	1	6	4																		
42	5	2	6	6	9	4	5	0	3	0	9	6	2	7	9	1	4	7	0	9	5	2	3	7	2	8	7	8	3	2	0	2	7	3	5	5	0	8	0	3	7	2	7	4	4	8	8	2	0	8
43	1	6	7	3	8	6	0	1	5	9	0	7	4	2	5	6	2	3	6	9	0	7	5	1	5	8	2	7	2	1	3	7	8	7	5	7	1	1	5	3	2	1	3	1	5	0	0	1	3	2
44	5	9	3	4	8	1	1	6	9	5	4	5	7	5	1	1	5	8	6	5	7	4	7	3	9	0	5	5	7	2	3	2	6	8	8	2	0	2	7	1	6	5	1	2	8	1	4	5	5	1
45	1	2	9	0	0	7	1	7	7	5	2	9	8	4	5	6	0	7	7	4	9	4	9	2	4	2	1	8	1	0	3	8	6	3	6	3	3	7	1	7	6	7	5	9	8	8	2	5	2	1
46	7	5	0	8	6	2	3	5	3	7	4	9	9	3	9	3	3	5	9	5	1	3	4	8	4	9	7	5	8	8	2	8	6	1	7	1	7	9	7	9	7	0	7	4	9	3	5	2	3	4
47	9	9	4	9	5	5	1	4	3	4	2	9	1	8	1	0	9	9	9	3	3	8	1	9	0	4	2	5	5	3	6	8	9	2	2	5	2	1	2	5	9	1	0	7	7	4	0	1	9	7
48	2	6	0	7	5	3	1	6	7	1	4	5	3	8	6	3	6	5	8	3	9	3	4	5	9	4	8	5	9	9	5	2	0	2	2	4	1	3	3	0	6	0	6	5	1	9	1	3	2	1
49	1	3	6	3	6	9	3	5	9	6	2	3	3	7	7	5	1	1	3	3	9	5	1	2	6	6	1	4	9	6	4	2	4	7	4	4	5	1	4	1	4	6	6	6	0	4	2	3	3	8

- Starting at row 00 and column 50, going down, what are the first 3 numbers between 1 and 75?

Using the Random Numbers Table

	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99		
00	5	9	3	9	1	5	8	0	3	0	5	2	0	9	8	8	2	1	6	6	7	8	8	2	1	6	6	7	2	8	4	8	0	4	1	9	0	9	6	5	7	4	9	0	4	6	4	2	9	0	6	5
01	9	9	5	6	7	7	6	3	6	4	7	7	2	0	4	0	4	6	1	5	2	7	8	8	2	1	6	6	2	1	4	3																				
02	1	0	3	6	3	9	7	5	1	8	5	1	4	0	0	2	5	6	7	0	9	8	3	4	2	6	1	8	9	1	2	7																				
03	8	6	8	5	9	1	9	5	5	8	6	4	4	3	2	1	6	7	0	6	9	9	6	1	2	5	9	7	9	8	3	2																				
04	1	1	2	5	8	2	4	5	9	1	3	6	8	6	3	5	5	3	6	8	3	1	7	2	1	9	4	3	3	5	3	4																				
05	9	5	0	6	8	8	8	6	2	8	3	5	9	1	1	1	4	5	3	0	3	3	0	2	0	8	0	4	2	8	3	9																				
06	5	4	4	6	3	4	7	2	3	7	7	3	8	0	0	9	1	0	1	7	3	6	2	3	9	7	1	8	2	4	8	3																				
07	1	6	8	7	4	6	2	6	7	7	5	7	4	1	2	1	3	2	1	5	3	1	3	8	9	6	2	2	3	3	8	0																				
08	9	2	4	9	4	6	3	1	5	7	7	6	5	9	3	9	1	3	1	6	0	3	5	0	5	7	2	3	8	9	9	6																				
09	1	5	6	6	9	5	6	6	8	9	3	5	6	8	2	4	0	8	4	4	5	3	2	5	6	8	1	8	7	2	3	5																				
10	9	9	1	1	6	7	5	4	8	6	8	4	9	8	9	2	3	4	7	6	5	2	9	6	7	6	7	1	0	4	3	9																				
11	1	5	6	9	6	1	0	7	0	3	6	5	1	7	8	9	0	6	3	7	6	3	1	1	0	1	7	6	2	2	5	3																				
12	9	7	7	2	0	1	5	3	6	9	5	1	2	6	9	6	9	6	2	0	0	3	3	8	8	1	3	6	9	9	3	3																				
13	1	1	6	6	6	1	3	8	4	1	7	1	6	8	1	9	8	0	0	0	3	5	9	7	9	3	9	7	1	9	8	1																				
14	7	1	6	2	8	7	3	1	3	0	7	8	7	8	3	7	5	6	9	1	4	1	6	3	2	0	9	8	4	7	6	1																				
15	4	0	5	0	1	5	1	0	8	9	9	9	9	4	3	9	1	8	4	3	4	1	9	9	5	8	8	9	3	1	7	3																				
16	2	2	5	1	8	5	5	5	7	6	9	8	2	1	5	8	2	0	6	8	1	0	7	9	8	8	2	6	1	1	3	6																				
17	7	5	1	1	2	3	0	4	8	5	6	2	1	7	3	0	2	1	3	2	1	4	8	7	8	9	2	8	7	9	2	2																				
18	0	8	3	2	7	0	2	6	7	1	9	8	1	9	1	8	4	3	4	2	9	0	8	1	3	4	9	2	6	8	9	5																				
19	6	0	2	5	1	4	5	5	4	8	0	2	1	4	6	0	5	5	9	7	4	8	2	2	8	8	1	3	6	6	3	4																				
...																																																				
40	6	3	5	2	5	9	4	4	4	1	7	7	0	3	3	1	2	1	4	7	5	1	0	5	4	4	9	9	5	5	5	8																				
41	4	7	6	0	6	9	3	4	1	0	1	6	3	5	9	8	9	0	3	3	8	9	6	9	6	4	7	2	3	1	6	4																				
42	5	2	6	6	9	4	5	0	3	0	9	6	2	7	9	1	4	7	0	9	5	2	3	7	2	8	7	8	3	2	0	2																				
43	1	6	5	8	9	0	1	5	9	0	7	4	2	5	6	2	3	6	9	0	7	5	1	5	8	2	7	2	1	3	7																					
44	5	9	1	1	6	1	6	9	5	4	5	7	5	1	1	5	8	6	5	7	4	7	3	9	0	5	5	7	2	3	2																					
45	1	2	9	0	0	7	1	7	5	2	9	8	4	5	6	0	7	7	4	9	4	9	2	4	2	1	8	1	0	3	8																					
46	7	5	0	8	6	2	3	5	8	7	4	9	9	3	9	3	3	5	9	5	1	3	4	8	4	9	7	5	8	8	2	8																				
47	9	9	4	9	5	5	1	4	3	4	2	9	1	8	1	0	9	9	9	3	3	8	1	9	0	4	2	5	5	3	6	8																				
48	2	6	0	7	5	3	1	6	7	1	4	5	3	8	6	3	6	5	8	3	9	1	5	3	8	6	4	8	5	9	9	5	2																			
49	1	3	6	3	6	9	3	5	9	6	2	3	3	7	1	5	1	5	5	9	9	1	5	5	9	6	1	4	9	6	4	2																				

Starting at row 48 and column 61, going down, what are the first 3 numbers between 1 and 999?



Statistical Methods

Simple Random Sampling and Systematic Sampling





1.1 Determine needs for information	2.1 Design outputs	3.1 Build data collection instrument	4.1 Select sample	5.1 Integrate data	6.1 Prepare draft outputs	7.1 Update output systems	8.1 Define archive rules	9.1 Gather evaluation inputs
1.2 Consult and confirm needs	2.2 Design variable descriptions	3.2 Build or enhance process components	4.2 Set up collection	5.2 Classify and code	6.2 Validate outputs	7.2 Produce dissemination products	8.2 Manage archive repository	9.2 Conduct evaluation
1.3 Establish output objectives	2.3 Design data collection methodology	3.3 Configure workflows	4.3 Run collection	5.3 Review, validate and edit	6.3 Scrutinize and explain	7.3 Manage release of dissemination products	8.3 Preserve data and associate metadata	9.3 Agree action plan
1.4 Identify concepts	2.4 Design frame and sample methodology	3.4 Test production system	4.4 Finalize collection	5.4 Impute	6.4 Apply disclosure control	7.4 Promote dissemination products	8.4 Dispose of data and associated metadata	
1.5 Check data availability	2.5 Design statistical processing methodology	3.5 Test statistical business process		5.5 Derive new variables and statistical units	6.5 Finalize outputs	7.5 Manage user support		
1.6 Prepare business case	2.6 Design production systems and workflow	3.6 Finalize production system		5.6 Calculate weights				
				5.7 Calculate aggregates				
				5.8 Finalize				

Sample Plan

■ Sample Design

- ✓ Population
- ✓ Frame
- ✓ Survey units
- ✓ Sample size
- ✓ Sample allocation
- ✓ Sample selection methods

■ Estimation Procedures

■ Estimation of Precision

Probability Sampling

- Every unit in the population has a positive probability of being included in the sample and this probability can be calculated
- Sample drawn by some method of random selection

Simple Random Sampling (SRS)

Is a basic probability selection scheme in which a predetermined number of units is selected from a population list so that each unit on that list has an equal chance of being included in the sample.

Simple Random Sampling (SRS)

- Requires access to a suitable frame (list)
- Notation:
 - **N**: Population Size
 - **n**: Sample Size
 - **Y**: Variable of interest (e.g. Personal Income)
- Equal probability of selection for all units in the sample (each unit in the sample has the same chance of being selected): $p = n/N$

Upper case → Population

Lower case → Sample

Simple Random Sampling (SRS)

Sampling with or without replacement:

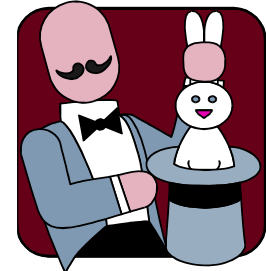
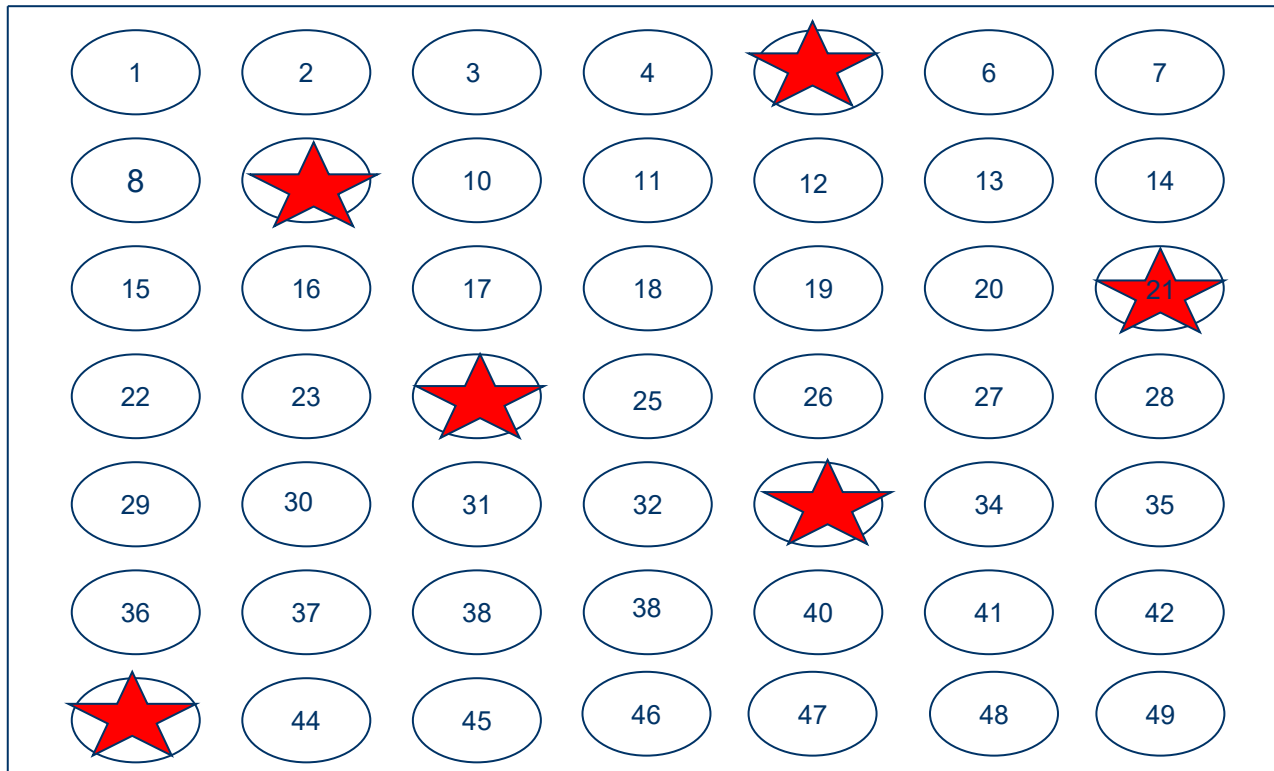
- Sampling with replacement (SRSWR) allows for a unit to be selected more than once
- Sampling without replacement (SRSWOR) means that once a unit has been selected, it cannot be selected again

SRSWR and SRSWOR are practically identical if the sample size is a very small fraction of the population size

Simple Random Sampling (SRS)

- Procedure to select a SRS:
 - 1) Sequential numbering of elements in the frame (1 to N)
 - 2) n units are selected one at a time using some randomization process (random numbers available in tables or generated by computer)

Simple Random Sampling



N=49

n=6

Example of SRS: Farm Expenditures

Farms	Expenditure (\$)
1	26,000
2	470,000
3	63,800
4	145,000
5	230,000
6	12,500
Total	947,300
Mean	157,883

Simple Random Sample of Farms

All possible samples of size $n=2$

Sample of size $n=2$	Mean of Farm Expenditure (\$)	Sample of size $n=2$	Mean of Farm Expenditure (\$)
1,2	248,000	2,6	241,250
1,3	44,900	3,4	104,400
1,4	85,500	3,5	146,900
1,5	128,000	3,6	38,150
1,6	19,250	4,5	187,500
2,3	266,900	4,6	78,750
2,4	307,500	5,6	121,250
2,5	350,000		

Simple Random Sample of Farms

All possible samples of size $n=3$



Sample of size $n=3$	Mean of Farm Expenditure (\$)	Sample of size $n=3$	Mean of Farm Expenditure (\$)
1,2,3	186,600	2,3,4	89,500
1,2,4	213,667	2,3,5	254,600
1,2,5	242,000	2,3,6	182,100
1,2,6	169,500	2,4,5	281,667
1,3,4	78,267	2,4,6	209,167
1,3,5	106,600	2,5,6	237,500
1,3,6	34,100	3,4,5	125,000
1,4,5	133,667	3,4,6	73,767
1,4,6	61,167	3,5,6	102,100
1,5,6	268,500	4,5,6	129,167

Simple Random Sample of Farms

All possible samples of size $n=4$



Sample of size $n=4$	Mean of Farm Expenditure (\$)	Sample of size $n=4$	Mean of Farm Expenditure (\$)
1,2,3,4	176,200	1,4,5,6	103,375
1,2,3,5	197,450	2,3,4,5	227,200
1,2,3,6	143,075	2,3,4,6	172,825
1,2,4,5	217,750	2,3,5,6	194,075
1,2,4,6	127,125	2,4,5,6	214,375
1,2,5,6	184,625	3,4,5,6	112,825
1,3,4,5	116,200		
1,3,4,6	61,825		
1,3,5,6	83,075		

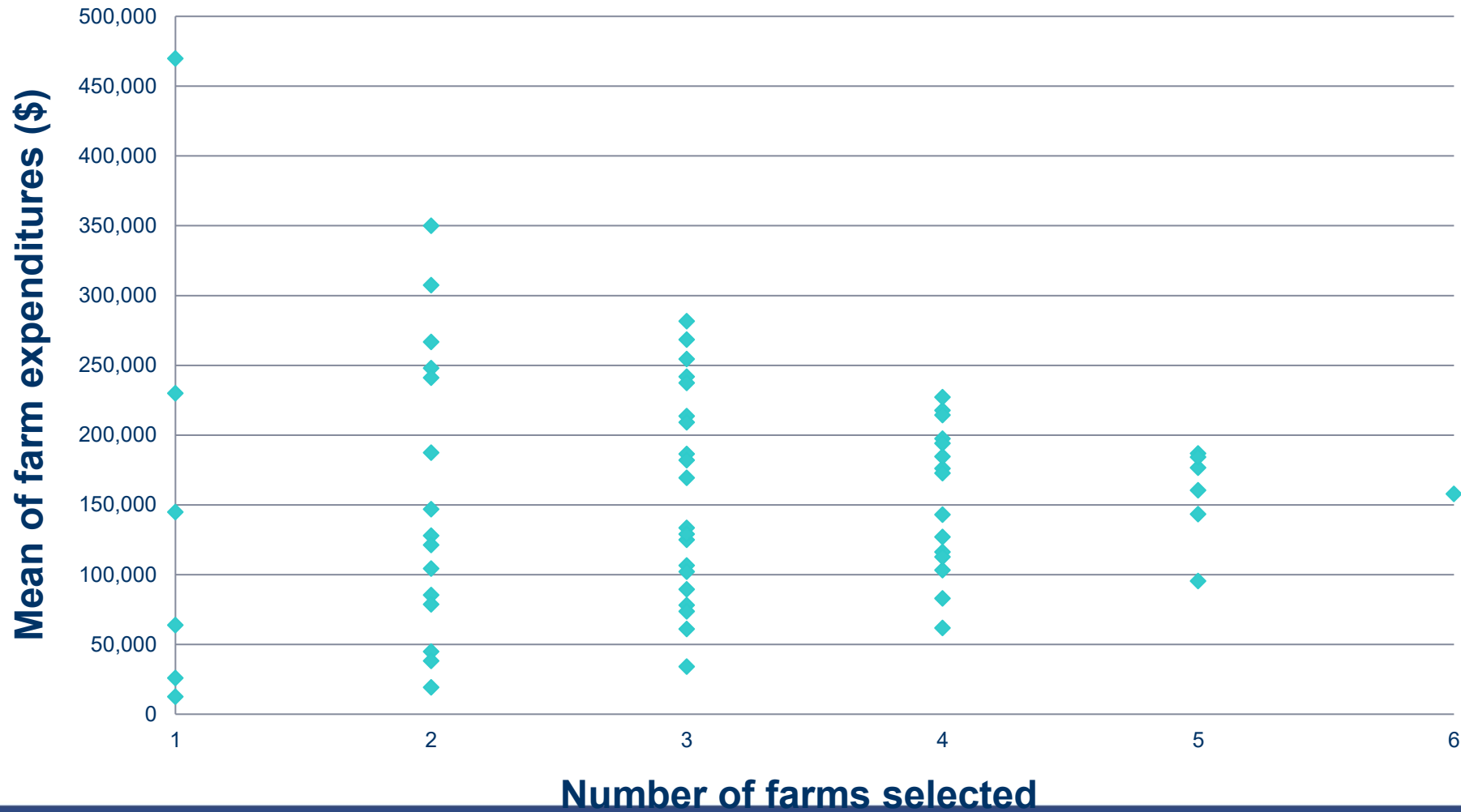
Simple Random Sample of Farms

All possible samples of size $n=5$

Sample of size $n=5$	Mean of Farm Expenditure (\$)	Sample of size $n=5$	Mean of Farm Expenditure (\$)
1,2,3,4,5	186,960		
1,2,3,4,6	143,460		
1,2,3,5,6	160,460		
1,2,4,5,6	176,700		
1,3,4,5,6	95,460		
2,3,4,5,6	184,260		

Mean of farm expenditures for all possible samples of size n=1, 2, 3, 4, 5, 6

100



Number of farms selected

Simple Random Sampling

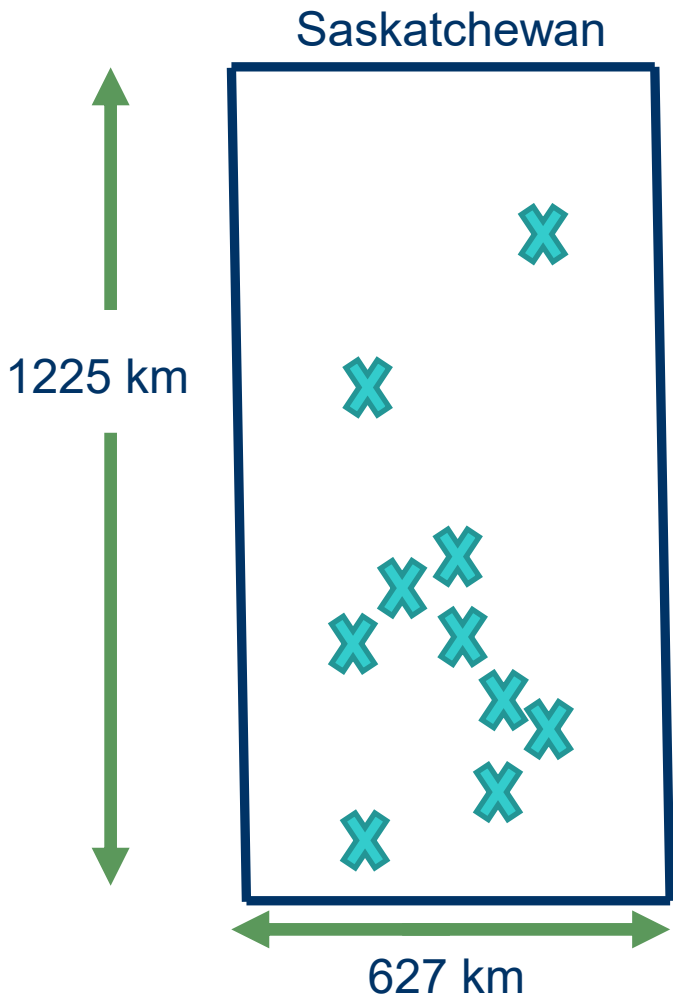
Advantages

- Simple sampling technique
- It requires no additional information on the frame in order to draw the sample
- Estimation is simple

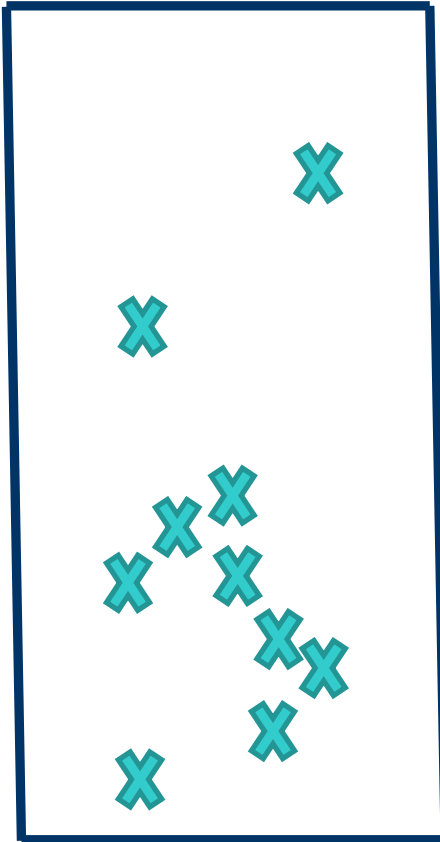
Disadvantages

- Requires a frame which lists each population element
- Can be very expensive to carry out face to face interviews
- Does not make use of auxiliary information about each population element which may be available
- Possible to draw a sample that poorly represents the population

Map Of Canada



Saskatchewan



- Face to Face Interviewing virtually impossible (well virtually possible, but not what I meant)
- Telephone interviewing, very easy

Exercise 1 : Simple Random Sampling

- Use Random Numbers Table to select 10 farms.
(starting point, number of digits, 'path', with/without replacement?)
- Calculate the mean of farm expenditures for the 10 farms.
- Starting point: row 00, col 55

Obs	Type	Expenses	Obs	Type	Expenses	Obs	Type	Expenses
1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
14	Other	5,000	48	Corn	13,000	82	Cattle	28,000
15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
16	Other	5,000	50	Corn	15,000	84	Cattle	31,000
17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
18	Corn	6,000	52	Corn	17,000	86	Cattle	39,000
19	Other	6,000	53	Cattle	17,000	87	Corn	45,000
20	Corn	6,200	54	Other	17,000	88	Cattle	48,000
21	Corn	6,700	55	Corn	17,500	89	Cattle	48,000
22	Corn	6,800	56	Cattle	17,500	90	Cattle	48,000
23	Other	7,000	57	Corn	18,500	91	Cattle	52,500
24	Corn	7,000	58	Cattle	18,500	92	Cattle	56,000
25	Corn	7,300	59	Cattle	19,000	93	Cattle	58,000
26	Corn	7,500	60	Cattle	19,000	94	Cattle	62,500
27	Corn	7,500	61	Cattle	19,000	95	Cattle	65,000
28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
29	Corn	7,600	63	Corn	20,000	97	Cattle	84,000
30	Corn	8,000	64	Cattle	21,000	98	Cattle	96,000
31	Other	8,000	65	Cattle	21,000	99	Cattle	96,000
32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
34	Corn	8,500	68	Corn	22,500			

	50	51	52	53	54	55	56	57	58	59	60
00	5	9	3	9	1	5	8	0	3	0	5
01	9	9	5	6	7	7	6	3	6	4	7
02	1	0	3	6	3	9	7	5	1	8	5
03	8	6	8	5	9	1	9	5	5	8	6
04	1	1	2	5	8	2	4	5	9	1	3
05	9	5	0	6	8	8	8	6	2	8	3
06	5	4	4	6	3	4	7	2	3	7	7
07	1	6	8	7	4	6	2	6	7	7	5
08	9	2	4	9	4	6	3	1	5	7	7
09	1	5	6	6	9	5	6	6	8	9	3
10	9	9	1	1	6	7	5	4	8	6	8
11	1	5	6	9	6	1	0	7	0	3	6
12	9	7	7	2	0	1	5	3	6	9	5
13	1	1	6	6	6	1	3	8	4	1	7
14	7	1	6	2	8	7	3	1	3	0	7
15	4	0	5	0	1	5	1	0	8	9	9
16	2	2	5	1	8	5	5	5	7	6	9
17	7	5	1	1	2	3	0	4	8	5	6
18	0	8	3	2	7	0	2	6	7	1	9
19	6	0	2	5	1	4	5	5	4	8	0

Obs	Type	Expenses	Obs	Type	Expenses	Obs	Type	Expenses
1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
14	Other	5,000	48	Corn	13,000	82	Cattle	28,000
15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
16	Other	5,000	50	Corn	15,000	84	Cattle	31,000
17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
18	Corn	6,000	52	Corn	17,000	86	Cattle	39,000
19	Other	6,000	53	Cattle	17,000	87	Corn	45,000
20	Corn	6,200	54	Other	17,000	88	Cattle	48,000
21	Corn	6,700	55	Corn	17,500	89	Cattle	48,000
22	Corn	6,800	56	Cattle	17,500	90	Cattle	48,000
23	Other	7,000	57	Corn	18,500	91	Cattle	52,500
24	Corn	7,000	58	Cattle	18,500	92	Cattle	56,000
25	Corn	7,300	59	Cattle	19,000	93	Cattle	58,000
26	Corn	7,500	60	Cattle	19,000	94	Cattle	62,500
27	Corn	7,500	61	Cattle	19,000	95	Cattle	65,000
28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
29	Corn	7,600	63	Corn	20,000	97	Cattle	84,000
30	Corn	8,000	64	Cattle	21,000	98	Cattle	96,000
31	Other	8,000	65	Cattle	21,000	99	Cattle	96,000
32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
34	Corn	8,500	68	Corn	22,500			

	50	51	52	53	54	55	56	57	58	59	60
00	5	9	3	9	1	5	8	0	3	0	5
01	9	9	5	6	7	7	6	3	6	4	7
02	1	0	3	6	3	9	7	5	1	8	5
03	8	6	8	5	9	1	9	5	5	8	6
04	1	1	2	5	8	2	4	5	9	1	3
05	9	5	0	6	8	8	8	6	2	8	3
06	5	4	4	6	3	4	7	2	3	7	7
07	1	6	8	7	4	6	2	6	7	7	5
08	9	2	4	9	4	6	3	1	5	7	7
09	1	5	6	6	9	5	6	6	8	9	3
10	9	9	1	1	6	7	5	4	8	6	8
11	1	5	6	9	6	1	0	7	0	3	6
12	9	7	7	2	0	1	5	3	6	9	5
13	1	1	6	6	6	1	3	8	4	1	7
14	7	1	6	2	8	7	3	1	3	0	7
15	4	0	5	0	1	5	1	0	8	9	9
16	2	2	5	1	8	5	5	5	7	6	9
17	7	5	1	1	2	3	0	4	8	5	6
18	0	8	3	2	7	0	2	6	7	1	9
19	6	0	2	5	1	4	5	5	4	8	0

Obs	Type	Expenses	Obs	Type	Expenses	Obs	Type	Expenses
1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
14	Other	5,000	48	Corn	13,000	82	Cattle	28,000
15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
16	Other	5,000	50	Corn	15,000	84	Cattle	31,000
17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
18	Corn	6,000	52	Corn	17,000	86	Cattle	39,000
19	Other	6,000	53	Cattle	17,000	87	Corn	45,000
20	Corn	6,200	54	Other	17,000	88	Cattle	48,000
21	Corn	6,700	55	Corn	17,500	89	Cattle	48,000
22	Corn	6,800	56	Cattle	17,500	90	Cattle	48,000
23	Other	7,000	57	Corn	18,500	91	Cattle	52,500
24	Corn	7,000	58	Cattle	18,500	92	Cattle	56,000
25	Corn	7,300	59	Cattle	19,000	93	Cattle	58,000
26	Corn	7,500	60	Cattle	19,000	94	Cattle	62,500
27	Corn	7,500	61	Cattle	19,000	95	Cattle	65,000
28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
29	Corn	7,600	63	Corn	20,000	97	Cattle	84,000
30	Corn	8,000	64	Cattle	21,000	98	Cattle	96,000
31	Other	8,000	65	Cattle	21,000	99	Cattle	96,000
32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
34	Corn	8,500	68	Corn	22,500			

	50	51	52	53	54	55	56	57	58	59	60
00	5	9	3	9	1	5	8	0	3	0	5
01	9	9	5	6	7	7	6	3	6	4	7
02	1	0	3	6	3	9	7	5	1	8	5
03	8	6	8	5	9	1	9	5	5	8	6
04	1	1	2	5	8	2	4	5	9	1	3
05	9	5	0	6	8	8	8	6	2	8	3
06	5	4	4	6	3	4	7	2	3	7	7
07	1	6	8	7	4	6	2	6	7	7	5
08	9	2	4	9	4	6	3	1	5	7	7
09	1	5	6	6	9	5	6	6	8	9	3
10	9	9	1	1	6	7	5	4	8	6	8
11	1	5	6	9	6	1	0	7	0	3	6
12	9	7	7	2	0	1	5	3	6	9	5
13	1	1	6	6	6	1	3	8	4	1	7
14	7	1	6	2	8	7	3	1	3	0	7
15	4	0	5	0	1	5	1	0	8	9	9
16	2	2	5	1	8	5	5	5	7	6	9
17	7	5	1	1	2	3	0	4	8	5	6
18	0	8	3	2	7	0	2	6	7	1	9
19	6	0	2	5	1	4	5	5	4	8	0

Obs	Type	Expenses	Obs	Type	Expenses	Obs	Type	Expenses
1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
14	Other	5,000	48	Corn	13,000	82	Cattle	28,000
15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
16	Other	5,000	50	Corn	15,000	84	Cattle	31,000
17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
18	Corn	6,000	52	Corn	17,000	86	Cattle	39,000
19	Other	6,000	53	Cattle	17,000	87	Corn	45,000
20	Corn	6,200	54	Other	17,000	88	Cattle	48,000
21	Corn	6,700	55	Corn	17,500	89	Cattle	48,000
22	Corn	6,800	56	Cattle	17,500	90	Cattle	48,000
23	Other	7,000	57	Corn	18,500	91	Cattle	52,500
24	Corn	7,000	58	Cattle	18,500	92	Cattle	56,000
25	Corn	7,300	59	Cattle	19,000	93	Cattle	58,000
26	Corn	7,500	60	Cattle	19,000	94	Cattle	62,500
27	Corn	7,500	61	Cattle	19,000	95	Cattle	65,000
28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
29	Corn	7,600	63	Corn	20,000	97	Cattle	84,000
30	Corn	8,000	64	Cattle	21,000	98	Cattle	96,000
31	Other	8,000	65	Cattle	21,000	99	Cattle	96,000
32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
34	Corn	8,500	68	Corn	22,500			

	50	51	52	53	54	55	56	57	58	59	60
00	5	9	3	9	1	5	8	0	3	0	5
01	9	9	5	6	7	7	6	3	6	4	7
02	1	0	3	6	3	9	7	5	1	8	5
03	8	6	8	5	9	1	9	5	5	8	6
04	1	1	2	5	8	2	4	5	9	1	3
05	9	5	0	6	8	8	8	6	2	8	3
06	5	4	4	6	3	4	7	2	3	7	7
07	1	6	8	7	4	6	2	6	7	7	5
08	9	2	4	9	4	6	3	1	5	7	7
09	1	5	6	6	9	5	6	6	8	9	3
10	9	9	1	1	6	7	5	4	8	6	8
11	1	5	6	9	6	1	0	7	0	3	6
12	9	7	7	2	0	1	5	3	6	9	5
13	1	1	6	6	6	1	3	8	4	1	7
14	7	1	6	2	8	7	3	1	3	0	7
15	4	0	5	0	1	5	1	0	8	9	9
16	2	2	5	1	8	5	5	5	7	6	9
17	7	5	1	1	2	3	0	4	8	5	6
18	0	8	3	2	7	0	2	6	7	1	9
19	6	0	2	5	1	4	5	5	4	8	0

Obs	Type	Expenses	Obs	Type	Expenses	Obs	Type	Expenses
1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
14	Other	5,000	48	Corn	13,000	82	Cattle	28,000
15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
16	Other	5,000	50	Corn	15,000	84	Cattle	31,000
17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
18	Corn	6,000	52	Corn	17,000	86	Cattle	39,000
19	Other	6,000	53	Cattle	17,000	87	Corn	45,000
20	Corn	6,200	54	Other	17,000	88	Cattle	48,000
21	Corn	6,700	55	Corn	17,500	89	Cattle	48,000
22	Corn	6,800	56	Cattle	17,500	90	Cattle	48,000
23	Other	7,000	57	Corn	18,500	91	Cattle	52,500
24	Corn	7,000	58	Cattle	18,500	92	Cattle	56,000
25	Corn	7,300	59	Cattle	19,000	93	Cattle	58,000
26	Corn	7,500	60	Cattle	19,000	94	Cattle	62,500
27	Corn	7,500	61	Cattle	19,000	95	Cattle	65,000
28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
29	Corn	7,600	63	Corn	20,000	97	Cattle	84,000
30	Corn	8,000	64	Cattle	21,000	98	Cattle	96,000
31	Other	8,000	65	Cattle	21,000	99	Cattle	96,000
32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
34	Corn	8,500	68	Corn	22,500			

	50	51	52	53	54	55	56	57	58	59	60
00	5	9	3	9	1	5	8	0	3	0	5
01	9	9	5	6	7	7	6	3	6	4	7
02	1	0	3	6	3	9	7	5	1	8	5
03	8	6	8	5	9	1	9	5	5	8	6
04	1	1	2	5	8	2	4	5	9	1	3
05	9	5	0	6	8	8	8	6	2	8	3
06	5	4	4	6	3	4	7	2	3	7	7
07	1	6	8	7	4	6	2	6	7	7	5
08	9	2	4	9	4	6	3	1	5	7	7
09	1	5	6	6	9	5	6	6	8	9	3
10	9	9	1	1	6	7	5	4	8	6	8
11	1	5	6	9	6	1	0	7	0	3	6
12	9	7	7	2	0	1	5	3	6	9	5
13	1	1	6	6	6	1	3	8	4	1	7
14	7	1	6	2	8	7	3	1	3	0	7
15	4	0	5	0	1	5	1	0	8	9	9
16	2	2	5	1	8	5	5	5	7	6	9
17	7	5	1	1	2	3	0	4	8	5	6
18	0	8	3	2	7	0	2	6	7	1	9
19	6	0	2	5	1	4	5	5	4	8	0

Obs	Type	Expenses	Obs	Type	Expenses	Obs	Type	Expenses
1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
14	Other	5,000	48	Corn	13,000	82	Cattle	28,000
15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
16	Other	5,000	50	Corn	15,000	84	Cattle	31,000
17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
18	Corn	6,000	52	Corn	17,000	86	Cattle	39,000
19	Other	6,000	53	Cattle	17,000	87	Corn	45,000
20	Corn	6,200	54	Other	17,000	88	Cattle	48,000
21	Corn	6,700	55	Corn	17,500	89	Cattle	48,000
22	Corn	6,800	56	Cattle	17,500	90	Cattle	48,000
23	Other	7,000	57	Corn	18,500	91	Cattle	52,500
24	Corn	7,000	58	Cattle	18,500	92	Cattle	56,000
25	Corn	7,300	59	Cattle	19,000	93	Cattle	58,000
26	Corn	7,500	60	Cattle	19,000	94	Cattle	62,500
27	Corn	7,500	61	Cattle	19,000	95	Cattle	65,000
28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
29	Corn	7,600	63	Corn	20,000	97	Cattle	84,000
30	Corn	8,000	64	Cattle	21,000	98	Cattle	96,000
31	Other	8,000	65	Cattle	21,000	99	Cattle	96,000
32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
34	Corn	8,500	68	Corn	22,500			

	50	51	52	53	54	55	56	57	58	59	60
00	5	9	3	9	1	5	8	0	3	0	5
01	9	9	5	6	7	7	6	3	6	4	7
02	1	0	3	6	3	9	7	5	1	8	5
03	8	6	8	5	9	1	9	5	5	8	6
04	1	1	2	5	8	2	4	5	9	1	3
05	9	5	0	6	8	8	8	6	2	8	3
06	5	4	4	6	3	4	7	2	3	7	7
07	1	6	8	7	4	6	2	6	7	7	5
08	9	2	4	9	4	6	3	1	5	7	7
09	1	5	6	6	9	5	6	6	8	9	3
10	9	9	1	1	6	7	5	4	8	6	8
11	1	5	6	9	6	1	0	7	0	3	6
12	9	7	7	2	0	1	5	3	6	9	5
13	1	1	6	6	6	1	3	8	4	1	7
14	7	1	6	2	8	7	3	1	3	0	7
15	4	0	5	0	1	5	1	0	8	9	9
16	2	2	5	1	8	5	5	5	7	6	9
17	7	5	1	1	2	3	0	4	8	5	6
18	0	8	3	2	7	0	2	6	7	1	9
19	6	0	2	5	1	4	5	5	4	8	0

Obs	Type	Expenses	Obs	Type	Expenses	Obs	Type	Expenses
1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
14	Other	5,000	48	Corn	13,000	82	Cattle	28,000
15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
16	Other	5,000	50	Corn	15,000	84	Cattle	31,000
17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
18	Corn	6,000	52	Corn	17,000	86	Cattle	39,000
19	Other	6,000	53	Cattle	17,000	87	Corn	45,000
20	Corn	6,200	54	Other	17,000	88	Cattle	48,000
21	Corn	6,700	55	Corn	17,500	89	Cattle	48,000
22	Corn	6,800	56	Cattle	17,500	90	Cattle	48,000
23	Other	7,000	57	Corn	18,500	91	Cattle	52,500
24	Corn	7,000	58	Cattle	18,500	92	Cattle	56,000
25	Corn	7,300	59	Cattle	19,000	93	Cattle	58,000
26	Corn	7,500	60	Cattle	19,000	94	Cattle	62,500
27	Corn	7,500	61	Cattle	19,000	95	Cattle	65,000
28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
29	Corn	7,600	63	Corn	20,000	97	Cattle	84,000
30	Corn	8,000	64	Cattle	21,000	98	Cattle	96,000
31	Other	8,000	65	Cattle	21,000	99	Cattle	96,000
32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
34	Corn	8,500	68	Corn	22,500			

	50	51	52	53	54	55	56	57	58	59	60
00	5	9	3	9	1	5	8	0	3	0	5
01	9	9	5	6	7	7	6	3	6	4	7
02	1	0	3	6	3	9	7	5	1	8	5
03	8	6	8	5	9	1	9	5	5	8	6
04	1	1	2	5	8	2	4	5	9	1	3
05	9	5	0	6	8	8	8	6	2	8	3
06	5	4	4	6	3	4	7	2	3	7	7
07	1	6	8	7	4	6	2	6	7	7	5
08	9	2	4	9	4	6	3	1	5	7	7
09	1	5	6	6	9	5	6	6	8	9	3
10	9	9	1	1	6	7	5	4	8	6	8
11	1	5	6	9	6	1	0	7	0	3	6
12	9	7	7	2	0	1	5	3	6	9	5
13	1	1	6	6	6	1	3	8	4	1	7
14	7	1	6	2	8	7	3	1	3	0	7
15	4	0	5	0	1	5	1	0	8	9	9
16	2	2	5	1	8	5	5	5	7	6	9
17	7	5	1	1	2	3	0	4	8	5	6
18	0	8	3	2	7	0	2	6	7	1	9
19	6	0	2	5	1	4	5	5	4	8	0

Obs	Type	Expenses	Obs	Type	Expenses	Obs	Type	Expenses
1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
14	Other	5,000	48	Corn	13,000	82	Cattle	28,000
15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
16	Other	5,000	50	Corn	15,000	84	Cattle	31,000
17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
18	Corn	6,000	52	Corn	17,000	86	Cattle	39,000
19	Other	6,000	53	Cattle	17,000	87	Corn	45,000
20	Corn	6,200	54	Other	17,000	88	Cattle	48,000
21	Corn	6,700	55	Corn	17,500	89	Cattle	48,000
22	Corn	6,800	56	Cattle	17,500	90	Cattle	48,000
23	Other	7,000	57	Corn	18,500	91	Cattle	52,500
24	Corn	7,000	58	Cattle	18,500	92	Cattle	56,000
25	Corn	7,300	59	Cattle	19,000	93	Cattle	58,000
26	Corn	7,500	60	Cattle	19,000	94	Cattle	62,500
27	Corn	7,500	61	Cattle	19,000	95	Cattle	65,000
28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
29	Corn	7,600	63	Corn	20,000	97	Cattle	84,000
30	Corn	8,000	64	Cattle	21,000	98	Cattle	96,000
31	Other	8,000	65	Cattle	21,000	99	Cattle	96,000
32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
34	Corn	8,500	68	Corn	22,500			

	50	51	52	53	54	55	56	57	58	59	60
00	5	9	3	9	1	5	8	0	3	0	5
01	9	9	5	6	7	7	6	3	6	4	7
02	1	0	3	6	3	9	7	5	1	8	5
03	8	6	8	5	9	1	9	5	5	8	6
04	1	1	2	5	8	2	4	5	9	1	3
05	9	5	0	6	8	8	8	6	2	8	3
06	5	4	4	6	3	4	7	2	3	7	7
07	1	6	8	7	4	6	2	6	7	7	5
08	9	2	4	9	4	6	3	1	5	7	7
09	1	5	6	6	9	5	6	6	8	9	3
10	9	9	1	1	6	7	5	4	8	6	8
11	1	5	6	9	6	1	0	7	0	3	6
12	9	7	7	2	0	1	5	3	6	9	5
13	1	1	6	6	6	1	3	8	4	1	7
14	7	1	6	2	8	7	3	1	3	0	7
15	4	0	5	0	1	5	1	0	8	9	9
16	2	2	5	1	8	5	5	5	7	6	9
17	7	5	1	1	2	3	0	4	8	5	6
18	0	8	3	2	7	0	2	6	7	1	9
19	6	0	2	5	1	4	5	5	4	8	0

Obs	Type	Expenses	Obs	Type	Expenses	Obs	Type	Expenses
1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
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12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
14	Other	5,000	48	Corn	13,000	82	Cattle	28,000
15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
16	Other	5,000	50	Corn	15,000	84	Cattle	31,000
17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
18	Corn	6,000	52	Corn	17,000	86	Cattle	39,000
19	Other	6,000	53	Cattle	17,000	87	Corn	45,000
20	Corn	6,200	54	Other	17,000	88	Cattle	48,000
21	Corn	6,700	55	Corn	17,500	89	Cattle	48,000
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00	5	9	3	9	1	5	8	0	3	0	5
01	9	9	5	6	7	7	6	3	6	4	7
02	1	0	3	6	3	9	7	5	1	8	5
03	8	6	8	5	9	1	9	5	5	8	6
04	1	1	2	5	8	2	4	5	9	1	3
05	9	5	0	6	8	8	8	6	2	8	3
06	5	4	4	6	3	4	7	2	3	7	7
07	1	6	8	7	4	6	2	6	7	7	5
08	9	2	4	9	4	6	3	1	5	7	7
09	1	5	6	6	9	5	6	6	8	9	3
10	9	9	1	1	6	7	5	4	8	6	8
11	1	5	6	9	6	1	0	7	0	3	6
12	9	7	7	2	0	1	5	3	6	9	5
13	1	1	6	6	6	1	3	8	4	1	7
14	7	1	6	2	8	7	3	1	3	0	7
15	4	0	5	0	1	5	1	0	8	9	9
16	2	2	5	1	8	5	5	5	7	6	9
17	7	5	1	1	2	3	0	4	8	5	6
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19	6	0	2	5	1	4	5	5	4	8	0

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3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
14	Other	5,000	48	Corn	13,000	82	Cattle	28,000
15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
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17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
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00	5	9	3	9	1	5	8	0	3	0	5
01	9	9	5	6	7	7	6	3	6	4	7
02	1	0	3	6	3	9	7	5	1	8	5
03	8	6	8	5	9	1	9	5	5	8	6
04	1	1	2	5	8	2	4	5	9	1	3
05	9	5	0	6	8	8	8	6	2	8	3
06	5	4	4	6	3	4	7	2	3	7	7
07	1	6	8	7	4	6	2	6	7	7	5
08	9	2	4	9	4	6	3	1	5	7	7
09	1	5	6	6	9	5	6	6	8	9	3
10	9	9	1	1	6	7	5	4	8	6	8
11	1	5	6	9	6	1	0	7	0	3	6
12	9	7	7	2	0	1	5	3	6	9	5
13	1	1	6	6	6	1	3	8	4	1	7
14	7	1	6	2	8	7	3	1	3	0	7
15	4	0	5	0	1	5	1	0	8	9	9
16	2	2	5	1	8	5	5	5	7	6	9
17	7	5	1	1	2	3	0	4	8	5	6
18	0	8	3	2	7	0	2	6	7	1	9
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7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
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	50	51	52	53	54	55	56	57	58	59	60
00	5	9	3	9	1	5	8	0	3	0	5
01	9	9	5	6	7	7	6	3	6	4	7
02	1	0	3	6	3	9	7	5	1	8	5
03	8	6	8	5	9	1	9	5	5	8	6
04	1	1	2	5	8	2	4	5	9	1	3
05	9	5	0	6	8	8	8	6	2	8	3
06	5	4	4	6	3	4	7	2	3	7	7
07	1	6	8	7	4	6	2	6	7	7	5
08	9	2	4	9	4	6	3	1	5	7	7
09	1	5	6	6	9	5	6	6	8	9	3
10	9	9	1	1	6	7	5	4	8	6	8
11	1	5	6	9	6	1	0	7	0	3	6
12	9	7	7	2	0	1	5	3	6	9	5
13	1	1	6	6	6	1	3	8	4	1	7
14	7	1	6	2	8	7	3	1	3	0	7
15	4	0	5	0	1	5	1	0	8	9	9
16	2	2	5	1	8	5	5	5	7	6	9
17	7	5	1	1	2	3	0	4	8	5	6
18	0	8	3	2	7	0	2	6	7	1	9
19	6	0	2	5	1	4	5	5	4	8	0



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5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
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12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
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28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
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32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
34	Corn	8,500	68	Corn	22,500			

6,000
7,000
13,000
17,500
18,500
20,000
20,000
24,000
48,000
48,000
84,000

258,000

$258,000/10 = \$25,800$

Systematic Sampling

Is a sampling process consisting of selecting in turn every k^{th} unit from the frame starting at a random point.

Systematic Sampling

- Requires access to a suitable frame
- Equal probability of selection for all units in the sample
 $p = 1/k$

Systematic Sampling

- Procedure to select a Systematic RS: n units are selected one at a time by first determining a sampling interval and a random start point
 - 1) Sequential numbering of elements in the frame (1 to N)
 - 2) Calculate the Sampling interval $k = N/n$
 - 3) Choose a Random start (r): a random integer between 1 and N
 - 4) Choose units $r, r+k, \dots, r+(n-1)k,$
 - 5) Loop back to start of list (if necessary)

Systematic Sampling



$N = 49$

$n = 7$

$k = N/n = 7$

$r = 3$

What exactly is k ?

- k is simply the skip used to select our sample.
- k could have decimals.
- The list we use has ordinal numbers (number labels), so they do not have decimals.



Example: Systematic Sample of Farms

Farms	Expenditures (\$)
1	26,000
2	470,000
3	63,800
4	145,000
5	230,000
6	12,500
Total	947,300
Mean	157,883

Example: Systematic Sample of Farms

All possible samples of size $n=2$ and $n=3$

n=2		n=3	
Samples of size n=2	Mean of Farm Expenditure (\$)	Samples of size n=3	Mean of Farm Expenditure (\$)
1,4	85,500	1,3,5	106,600
2,5	350,000	2,4,6	209,167
3,6	38,150		

$$k = 6/2 = 3$$

$$k = 6/3 = 2$$

Systematic Sampling

Advantages

- Easier to select than SRS
- Disperses sample more evenly over population (with respect to some pre-established order existing in the population)
- Easy to estimate characteristics of the population

Disadvantages

- Requires a frame which lists each population element
- Can be very expensive to carry out face to face interviews
- Periodicity in frame may result in a sample that poorly represents the population

Exercise 2: Systematic Sampling

Systematically select your 10 farms

- Calculate k (keep one decimal place!)
- Random Start (r): 8
- Calculate the mean of farm expenditures for the 10 farms.



Obs	Type	Expenses	Obs	Type	Expenses	Obs	Type	Expenses
1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
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27	Corn	7,500	61	Cattle	19,000	95	Cattle	65,000
28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
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32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
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$$K = N/n$$



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6	Other	3,800	40	Corn	11,500	74	Corn	23,000
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13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
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15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
16	Other	5,000	50	Corn	15,000	84	Cattle	31,000
17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
18	Corn	6,000	52	Corn	17,000	86	Cattle	39,000
19	Other	6,000	53	Cattle	17,000	87	Corn	45,000
20	Corn	6,200	54	Other	17,000	88	Cattle	48,000
21	Corn	6,700	55	Corn	17,500	89	Cattle	48,000
22	Corn	6,800	56	Cattle	17,500	90	Cattle	48,000
23	Other	7,000	57	Corn	18,500	91	Cattle	52,500
24	Corn	7,000	58	Cattle	18,500	92	Cattle	56,000
25	Corn	7,300	59	Cattle	19,000	93	Cattle	58,000
26	Corn	7,500	60	Cattle	19,000	94	Cattle	62,500
27	Corn	7,500	61	Cattle	19,000	95	Cattle	65,000
28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
29	Corn	7,600	63	Corn	20,000	97	Cattle	84,000
30	Corn	8,000	64	Cattle	21,000	98	Cattle	96,000
31	Other	8,000	65	Cattle	21,000	99	Cattle	96,000
32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
34	Corn	8,500	68	Corn	22,500			

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1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
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31	Other	8,000	65	Cattle	21,000	99	Cattle	96,000
32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
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5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
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33	Corn	8,500	67	Cattle	22,000			
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1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
14	Other	5,000	48	Corn	13,000	82	Cattle	28,000
15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
16	Other	5,000	50	Corn	15,000	84	Cattle	31,000
17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
18	Corn	6,000	52	Corn	17,000	86	Cattle	39,000
19	Other	6,000	53	Cattle	17,000	87	Corn	45,000
20	Corn	6,200	54	Other	17,000	88	Cattle	48,000
21	Corn	6,700	55	Corn	17,500	89	Cattle	48,000
22	Corn	6,800	56	Cattle	17,500	90	Cattle	48,000
23	Other	7,000	57	Corn	18,500	91	Cattle	52,500
24	Corn	7,000	58	Cattle	18,500	92	Cattle	56,000
25	Corn	7,300	59	Cattle	19,000	93	Cattle	58,000
26	Corn	7,500	60	Cattle	19,000	94	Cattle	62,500
27	Corn	7,500	61	Cattle	19,000	95	Cattle	65,000
28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
29	Corn	7,600	63	Corn	20,000	97	Cattle	84,000
30	Corn	8,000	64	Cattle	21,000	98	Cattle	96,000
31	Other	8,000	65	Cattle	21,000	99	Cattle	96,000
32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
34	Corn	8,500	68	Corn	22,500			

$$k = N/n$$

$$N = 100$$

$$n = 10$$

$$k = 100/10$$

$$k = 10$$

$$rs = 8$$



Obs	Type	Expenses	Obs	Type	Expenses	Obs	Type	Expenses
1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
14	Other	5,000	48	Corn	13,000	82	Cattle	28,000
15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
16	Other	5,000	50	Corn	15,000	84	Cattle	31,000
17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
18	Corn	6,000	52	Corn	17,000	86	Cattle	39,000
19	Other	6,000	53	Cattle	17,000	87	Corn	45,000
20	Corn	6,200	54	Other	17,000	88	Cattle	48,000
21	Corn	6,700	55	Corn	17,500	89	Cattle	48,000
22	Corn	6,800	56	Cattle	17,500	90	Cattle	48,000
23	Other	7,000	57	Corn	18,500	91	Cattle	52,500
24	Corn	7,000	58	Cattle	18,500	92	Cattle	56,000
25	Corn	7,300	59	Cattle	19,000	93	Cattle	58,000
26	Corn	7,500	60	Cattle	19,000	94	Cattle	62,500
27	Corn	7,500	61	Cattle	19,000	95	Cattle	65,000
28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
29	Corn	7,600	63	Corn	20,000	97	Cattle	84,000
30	Corn	8,000	64	Cattle	21,000	98	Cattle	96,000
31	Other	8,000	65	Cattle	21,000	99	Cattle	96,000
32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
34	Corn	8,500	68	Corn	22,500			

$$k = N/n$$

$$N = 100$$

$$n = 10$$

$$k = 100/10$$

$$k = 10$$

$$rs = 8$$



Obs	Type	Expenses	Obs	Type	Expenses	Obs	Type	Expenses
1	Corn	2,700	35	Corn	8,700	69	Cattle	22,500
2	Other	3,000	36	Cattle	9,600	70	Other	22,500
3	Other	3,200	37	Corn	10,000	71	Cattle	23,000
4	Other	3,500	38	Corn	10,000	72	Corn	23,000
5	Corn	3,800	39	Corn	11,000	73	Cattle	23,000
6	Other	3,800	40	Corn	11,500	74	Corn	23,000
7	Corn	4,000	41	Corn	12,000	75	Corn	24,000
8	Other	4,000	42	Corn	12,500	76	Corn	24,000
9	Other	4,000	43	Corn	12,500	77	Corn	24,000
10	Corn	4,500	44	Corn	12,500	78	Cattle	26,000
11	Corn	4,800	45	Corn	12,500	79	Other	26,000
12	Other	4,800	46	Corn	12,500	80	Cattle	27,500
13	Corn	5,000	47	Corn	13,000	81	Cattle	28,000
14	Other	5,000	48	Corn	13,000	82	Cattle	28,000
15	Other	5,000	49	Cattle	14,000	83	Corn	31,000
16	Other	5,000	50	Corn	15,000	84	Cattle	31,000
17	Corn	5,700	51	Corn	16,500	85	Corn	34,000
18	Corn	6,000	52	Corn	17,000	86	Cattle	39,000
19	Other	6,000	53	Cattle	17,000	87	Corn	45,000
20	Corn	6,200	54	Other	17,000	88	Cattle	48,000
21	Corn	6,700	55	Corn	17,500	89	Cattle	48,000
22	Corn	6,800	56	Cattle	17,500	90	Cattle	48,000
23	Other	7,000	57	Corn	18,500	91	Cattle	52,500
24	Corn	7,000	58	Cattle	18,500	92	Cattle	56,000
25	Corn	7,300	59	Cattle	19,000	93	Cattle	58,000
26	Corn	7,500	60	Cattle	19,000	94	Cattle	62,500
27	Corn	7,500	61	Cattle	19,000	95	Cattle	65,000
28	Corn	7,500	62	Cattle	20,000	96	Cattle	65,000
29	Corn	7,600	63	Corn	20,000	97	Cattle	84,000
30	Corn	8,000	64	Cattle	21,000	98	Cattle	96,000
31	Other	8,000	65	Cattle	21,000	99	Cattle	96,000
32	Corn	8,000	66	Corn	22,000	100	Cattle	120,000
33	Corn	8,500	67	Cattle	22,000			
34	Corn	8,500	68	Corn	22,500			

4,000

6,000

7,500

10,000

13,000

18,500

22,500

26,000

48,000

96,000

251,500

$251,500/10=\$25,150$



Questions?

You can contact the PRASC team at:
statcan.prasc-prasc.statcan@canada.ca