Dairy Sector in Uganda

23rd January 2019

1. Sales

1.1. Farmers

Table 1: Farmer Characteristics

Sales...	Direct Neighbor			Trader to MCC			Transp to MCC			Direct MCC		
	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs
Num HH Members	6.7	3.0	386	7.4	3.1	488	7.4	3.9	160	7.2	3.4	201
HH Head Female	0.1	0.3	386	0.1	0.3	488	0.1	0.3	160	0.05	0.2	201
HH Head Completed Primary	0.19	0.4	385	0.22	0.4	487	0.26	0.4	160	0.24	0.4	200
KM to Nearest...												
Tarmac road	10.5	12.0	367	21.7	19.0	431	21.9	19.3	153	17.4	16.9	180
Murram Road	1.3	2.4	382	2.5	3.5	485	2.9	3.5	158	2.3	3.2	201
MCC	12.6	11.2	322	7.5	7.8	478	7.0	5.8	158	5.1	6.1	200
Neighbor	0.3	0.4	386	0.5	0.7	487	0.5	0.7	159	0.5	0.8	200
Market	4.9	4.4	383	7.7	5.6	477	8.6	5.8	159	8.1	6.4	192

Overall, the basic household characteristics are about the same across all sales outlets. Households have on average 7 members, with about 10% of households having a female head and about 20% of the households have a head who completed primary school. However, we see that remoteness may play a role in who the farmers sell to. Those who sell directly to their neighbor live, on average, closest to the tarmac and murram roads as well as the nearest market. And also closest to their neighbor (as expected). They tend to live the farthest from a MCC. Those to tell to one of the other three outlets, to a trader or transporter who sells to MCC or directly to MCC are fairly similar. With the exception of those who sell direct to a MCC live closest (as expected). Those who sell to a transporter (who may charge more) tend to live the farthest from tarmac and murram roads as well as a market suggesting they are the most remote farmers.

1.1.1. Seasonality

Table 2: Dry Season Sales

Sales...	Direct Neighbor			Trader to MCC			Transp to MCC			Direct MCC		
	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs
Local Cows	2.41	3.63	381	4.15	6.59	479	4.84	8.22	158	3.49	5.47	206
Local Cows Abv 8yrs	0.95	1.63	260	1.76	2.98	268	2.85	3.86	74	1.87	2.86	92
Local Cows Prod	2.72	2.03	268	2.19	2.03	278	2.74	3.17	78	2.53	2.21	95
Exotic Cowns	0.85	1.83	381	5.05	6.12	480	8.16	10.55	156	6.86	7.61	200
Exotic Cows Abv 8yrs	0.46	1.21	131	1.34	2.55	362	2.17	4.25	127	1.66	2.82	162
Exotic Cows Prod	5.47	4.91	131	5.45	7.18	369	5.47	8.00	128	9.04	12.29	165
Price	951.2	210.2	319	845.1	182.0	448	894.3	192.0	146	920.0	179.3	187
Lowest Price	884.48	207.79	319	749.44	203.36	449	800.68	210.91	146	821.66	213.58	187
Highest Price	1018.03	243.01	319	940.80	192.33	448	988.01	200.89	146	1018.45	182.78	187
Avg Amt Sold Per Day	4.68	5.70	320	15.07	15.98	453	17.70	18.12	150	20.34	18.01	190
Avg Amt Consumed Per Day	2.29	1.45	323	3.72	1.89	453	4.04	2.05	148	4.48	2.18	190
Avg Amt Given Per Day	0.45	1.18	317	0.70	1.51	451	0.85	1.89	148	0.96	1.62	185
Avg Amt Fed to Calves Per Day	0.94	1.60	204	1.85	2.69	248	1.20	2.30	72	1.82	2.67	112
Avg Amt Processed Per Day	0.45	1.06	312	1.82	1.84	436	1.59	1.84	147	2.07	2.26	182
Avg Amt Milked Per Day	13.26	21.41	327	44.31	105.76	462	68.03	151.38	151	78.65	141.13	193
dry_income	6684.27	7188.42	124	15760.31	15798.43	354	18179.55	18201.93	124	22481.21	18939.12	157

Figure 1: Dry Season Sales

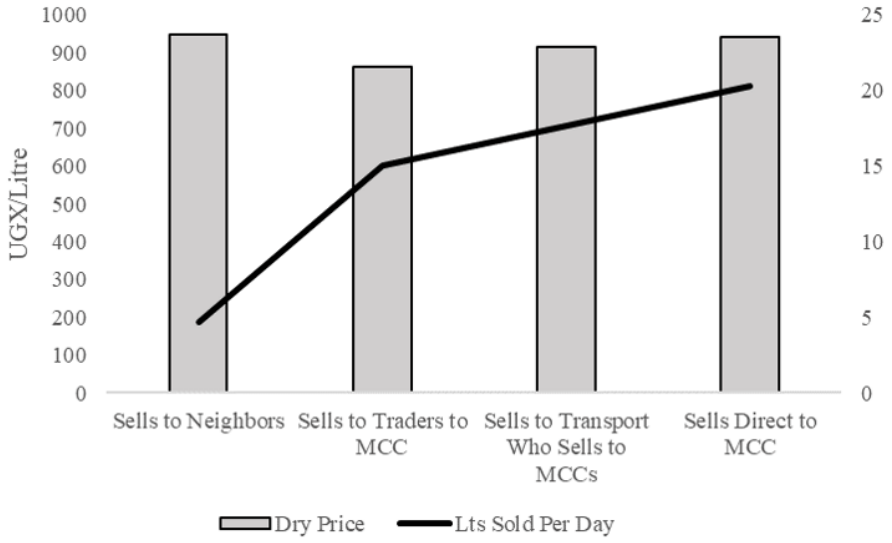


Table 3: Rainy Season Sales

Sales...	Direct Neighbor			Trader to MCC			Transp to MCC			Direct MCC		
	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs
Local Cows	2.5	3.6	383	3.7	5.7	486	4.9	8.1	160	4.0	8.2	200
Local Cows Abv 8yrs	0.7	1.4	290	1.4	2.5	263	2.3	4.3	84	1.8	2.5	94
Local Cow Prod	3.5	2.5	297	3.2	2.4	277	3.6	3.2	88	4.6	5.5	96
Exotic Cows	0.9	1.9	382	5.5	5.8	484	8.0	8.4	159	7.6	8.3	199
Exotic Cows Abv 8yrs	0.3	0.9	145	1.2	2.2	388	2.0	4.3	136	1.7	3.1	164
Exotic Cows Prod	7.1	8.9	145	8.2	9.7	397	7.8	11.2	137	11.19	14.47	172
Price	843.2	228.6	367	581.2	162.0	477	613.1	187.5	159	610.6	177.3	196
Lowest Price	781.1	242.3	367	500.4	163.5	477	536.2	190.6	159	531.1	171.9	196
Highest Price	905.3	239.1	367	662.3	187.5	478	690.0	206.8	159	690.0	212.6	196
Avg Amt Sold Per Day	5.9	7.2	365	27.0	43.9	476	32.2	35.9	158	37.2	53.4	197
Avg Amt Consumed Per Day	2.4	1.5	366	4.2	1.8	477	4.5	2.0	156	4.8	2.1	196
Avg Amt Given Per Day	0.5	1.0	362	1.0	1.8	468	1.1	2.1	153	1.1	1.8	192
Avg Amt Fed To Calves Per Day	0.8	1.4	224	2.1	2.7	259	1.6	2.7	77	1.9	2.8	116
Avg Amt Processed Per Day	0.6	1.2	356	2.4	2.0	458	2.2	2.1	154	2.7	2.5	190
Avg Amt Milked Per Day	15.7	30.2	368	69.8	169.2	478	89.7	188.2	159	134.9	281.1	198
rainy_income	6434.8	7079.6	145	16564.7	25366.9	395	19838.2	20350.1	136	26236.7	42227.8	165

Figure 2: Rainy Season Sales

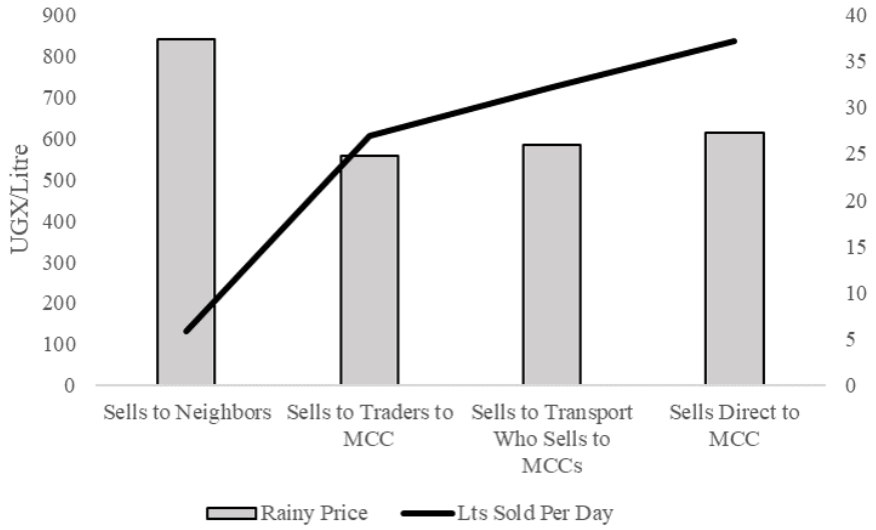
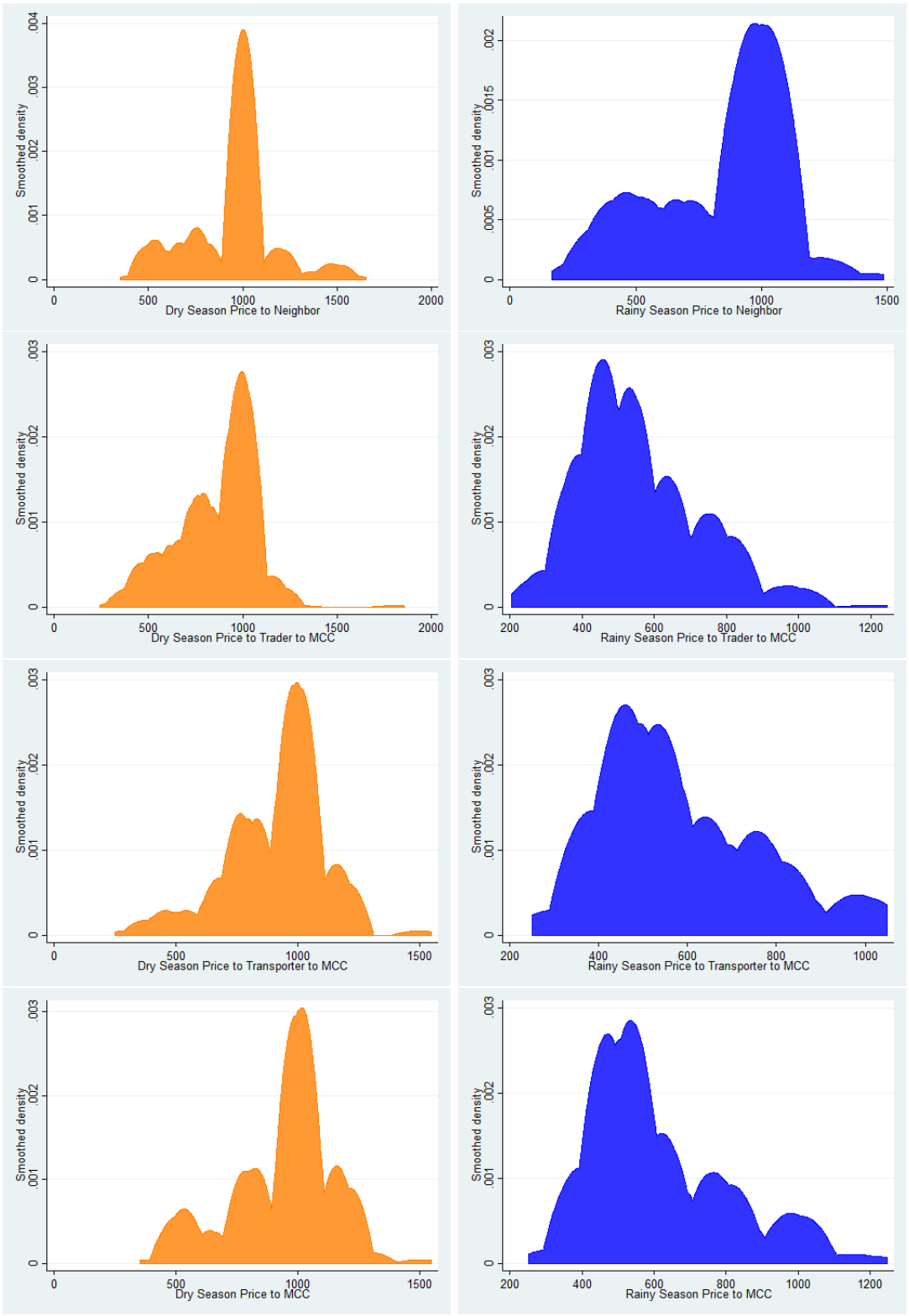


Figure 3: Rainy Season Sales

Figure 4: Seasonal Prices Changes by Sales Outlet



1.1.2. Recent Sales

Table 4: Sales

Sales...	Direct Neighbor			Trader to MCC			Transp to MCC			Direct MCC		
	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs
Number Transactions in Last 7 days	5.93	2.79	427	6.57	1.62	513	6.69	1.1	164	6.61	1.96	209
Number of Buyers	3.14	2.88	414	1.51	1.87	507	1.34	1.74	161	2.16	3.6	189
Price Received	906.81	215.8	433	515.84	166.35	142*	783.25	310.27	163	799.47	233.41	207
Liters Sold	32.14	142.29	428	51.24	140.36	510	65.07	176.25	161	82.27	201.88	209
HH Head Decided	0.86	0.35	423	0.95	0.21	499	0.99	0.11	159	0.98	0.14	205
Cash Payment	0.99	0.11	437	0.99	0.1	506	0.97	0.18	159	0.97	0.17	197
Payment Direct	0.34	0.48	435									
Payment Daily				0.01	0.11	507	0.01	0.08	163	0.01	0.12	208
Payment Weekly	0.18	0.39	435	0.65	0.48	507	0.6	0.49	163	0.44	0.5	208
Payment Monthly	0.03	0.16	435									
No Agreement	0.51	0.5	432	0.34	0.48	512	0.43	0.5	164	0.43	0.5	208
Years Selling to this customer	2.95	3.86	426	2.98	3.12	506	4.24	5.37	164	4	4.23	206
Never Rejected	0.74	0.44	386	0.74	0.44	479	0.67	0.47	159	0.5	0.5	202
Pay Premium	0.1	0.3	433	0.07	0.26	511	0.06	0.23	163	0.07	0.26	209
Assist With..												
Training	0.15	0.35	96	0.13	0.34	70	0.08	0.28	25	0.34	0.48	68
Inputs	0.78	0.42	96	0.37	0.49	70	0.2	0.41	25	0.38	0.49	68
Credit	0.17	0.37	96	0.61	0.49	70	0.44	0.51	25	0.78	0.42	68
Uses Boda Boda				0.9	0.3	51	0.82	0.38	163	0.59	0.49	209
Jerry Can container				0.63	0.48	512	0.57	0.5	160	0.54	0.5	209
Farmer Paid Transport							2273.94	1548.58	137	2712.36	1195.86	182
Main Income Source Dairy	0.47		437	0.84		513	0.92		164	0.83		209

Notes. *Price for those who sold to traders who sell to MCCs was only collected in the SW milk shed.

Figure 5: Recent Prices by Shed

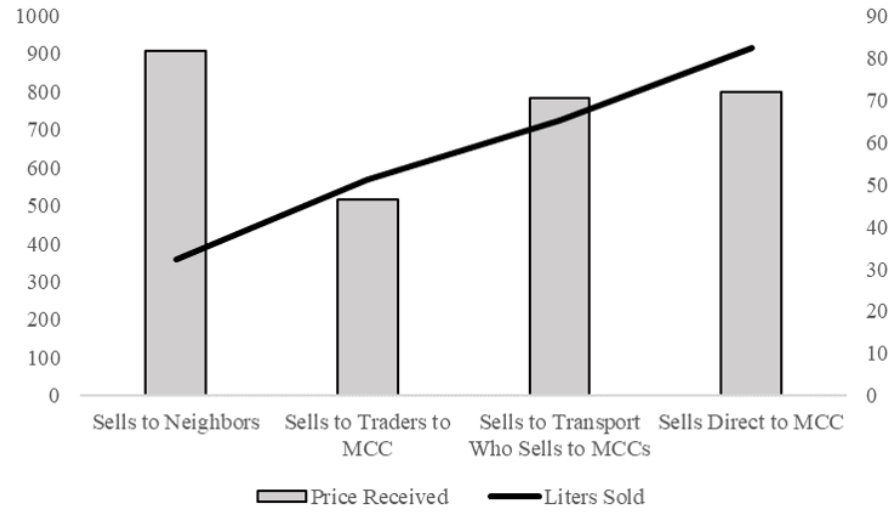
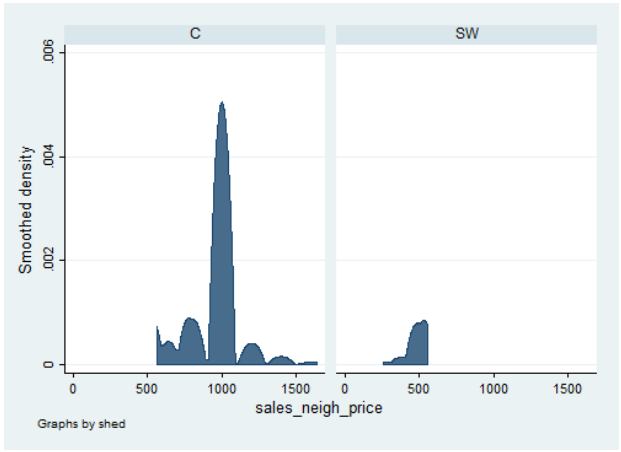
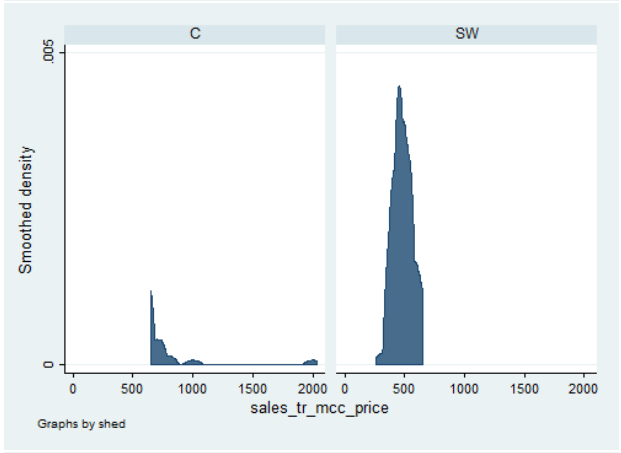
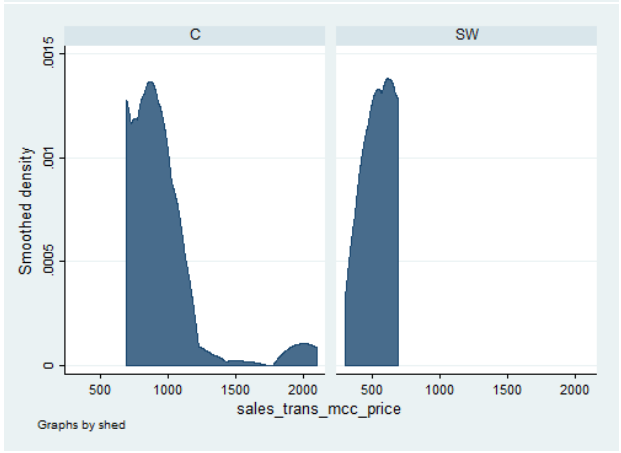
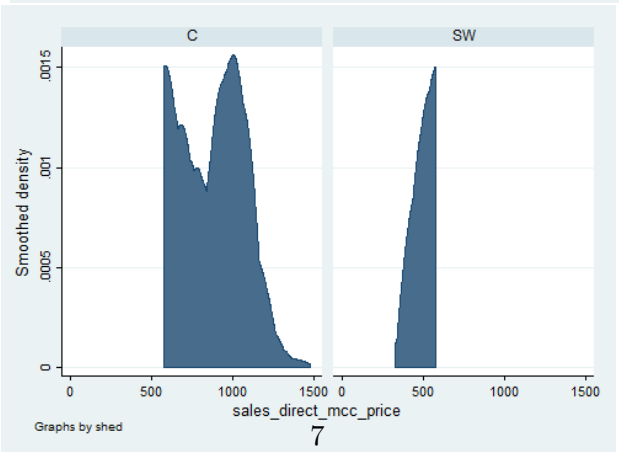


Figure 6: Recent Sales









1.1.3. Gender

Table 5: T-Test Different Gender HH Heads

Sales...	F Headed Household			M Headed Household			
	Mean	Sd	Obs	Mean	Sd	Obs	P-value
In Last 7 Days...							
Sells Direct to Neighbor	27%		150	25%		1,399	0.60
Num Transactions	5.9	3	39	6	2.8	339	0.85
Number Buyers	2.6	2.2	39	3.2	3	333	0.28
Price	867.5	236.8	40	915.4	210.8	344	0.18
Liters	86.1	220.8	39	29.4	139.6	342	0.03**
Years Selling to this Outlet	1.8	1.5	39	3.1	4.1	339	0.05*
Milk Never Rejected	0.8	0.4	32	0.7	0.4	308	0.37
Pay for Premium	0	0.2	40	0.1	0.3	344	0.12
Sells Trader to MCC	31%		150	31%		1,399	0.96
Num Transactions	6.6	1.4	47	6.6	1.6	441	0.80
Number Buyers	1.2	0.7	47	1.5	2	436	0.25
Price	533.3	148.4	15	507.6	167.8	118	0.57
Liters	88.5	206.3	46	44.5	120.5	440	0.03**
Years Selling to this Outlet	2.7	3.6	47	3	3.1	434	0.50
Milk Never Rejected	0.7	0.5	42	0.7	0.4	412	0.46
Pay for Premium	0	0.1	46	0.1	0.2	440	0.24
Sells Trans to MCC	12%		150	10%		1,399	0.48
Num Transactions	7	0	18	6.7	1.1	142	0.22
Number Buyers	1.3	0.7	18	1.4	1.9	139	0.86
Price	700	221.6	18	789.1	317.5	141	0.25
Liters	34.2	63.9	17	70.2	187.3	140	0.43
Years Selling to this Outlet	5.6	6.5	18	4.1	5.2	142	0.27
Milk Never Rejected	0.6	0.5	17	0.7	0.5	138	0.44
Pay for Premium	0.1	0.2	18	0	0.2	141	0.91
Sells Direct MCC	7%		150	14%		1,399	0.015**
Num Transactions	5.8	2.5	10	6.6	2	191	0.20
Number Buyers	1	0	9	2.2	3.7	173	0.33
Price	956.3	301.7	8	788.4	227	191	0.045**
Liters	176.1	355.7	10	77.9	194	191	0.14
Years Selling to this Outlet	3.7	3.6	10	3.9	4.3	188	0.86
Milk Never Rejected	0.5	0.5	10	0.5	0.5	185	0.99
Pay for Premium	0	0	10	0.1	0.3	191	0.40

In Table 5, the only significant difference between male headed households and female headed household, in terms of sales outlets, is that women are less likely to sell directly to an MCC. However, if they do sell directly to a MCC, then they receive a significantly higher price. We see that Female headed households who sell only to neighbors tend to sell more liters of milk but have been selling for over a year less. Also female headed households who sell to traders who sell to MCCS sell more liters as well.

In terms of distance, there is no significant difference in distances to roads between female and male headed households when looking at sales outlets separately. When looking at the full sample, female headed households are located slightly further from MCCs than male head

households (10.2 km v 8.6 km; p-value: 0.053).

1.1.4. Poverty

The poverty indicator was created by first a sum of whether or not the respondent owned the following assets: milk shed, cattle barn, feeding troughs, steel milking cans, steel buckets, jerry-cans, plastic buckets, mobile phone, motorbike, bike, car, radio, water pump, panga, wheelbar-row, sickles, hay forks, tarps, cutting machine, hosepipes and knapsacks. With a total of 21 assets, the maximum number owned by a household is 8. 74% of households own only 2 of these, therefore we define a rich household as those who have more than 2 of these assets. We do not consider the number of each asset owned in Table 6.

We first look at the full sample and see that rich households have sold to their outlet for on average 1 year longer than poor households. However, more poor households report selling to an outlet in which they are paid a premium. When we split the sub-sample into which outlets they sell to, we begin to see a few more differences between rich and poor. For those who sell to neighbors, the poor households sell to a significantly lower number of neighbors and received a significantly lower price. But once again, the poor households report selling to buyers who pay premiums for milk. As for those who sell to either a trader to a transporter who sells to the MCC, there are minimal differences between rich and poor households. Those who sell direct to the MCC, the poor households have been selling for fewer years but report earning a higher price per liter.

Table 6: T-Test Assets Over Poverty Level

Sales...	Rich Household			Poor Household			
	Mean	Sd	Obs	Mean	Sd	Obs	P-value
In Last 7 Days...							
Full Sample							
Num Transactions	6.4	2.0	331	6.4	2.1	896	0.74
Number Buyers	2.2	2.8	327	2.0	2.6	867	.38
Price	791.5	291.2	262	803.0	257.5	613	0.56
Liters	62.6	154.0	334	48.5	159.7	891	0.16
Years Selling to their Outlet	4.1	4.5	331	3.0	3.7	886	0.00***
Milk Never Rejected	0.7	0.5	313	0.69	0.5	831	0.58
Pay for Premium	0.04	0.2	331	0.08	0.27	896	0.01***
Sells Direct to Neighbor							
Num Transactions	6.3	2.4	86	5.9	2.9	292	0.28
Number Buyers	3.7	2.8	87	2.9	2.9	285	.03**
Price	962.9	244.7	89	894.6	201.4	295	0.01***
Liters	32	109.3	89	36.2	161.1	292	0.82
Years Selling to this Outlet	3.2	3.3	87	2.9	4	291	0.55
Milk Never Rejected	0.8	0.4	80	0.7	0.4	260	0.07*
Pay for Premium	0.02	0.1	89	0.1	0.3	295	0.01***
Sells Trader to MCC							
Num Transactions	6.3	2	118	6.6	1.4	370	0.09*
Number Buyers	1.7	2.6	118	1.4	1.6	365	0.23
Price	517.4	121.7	46	506.9	184.9	87	0.73
Liters	55.5	114.8	118	46.4	136.3	368	0.51
Years Selling to this Outlet	3.4	2.7	117	2.9	3.2	364	0.12
Milk Never Rejected	0.7	0.4	111	0.7	0.4	343	0.98
Pay for Premium	0.1	0.2	118	0.1	0.2	368	0.9
Sells Trans to MCC							
Num Transactions	6.6	1.3	52	6.8	0.9	108	0.52
Number Buyers	1.2	0.5	52	1.4	2.1	105	0.39
Price	799.4	339.7	52	769.2	293.9	107	0.56
Liters	80.2	183.1	52	59.4	176.4	105	0.49
Years Selling to this Outlet	5.4	6.9	52	3.7	4.4	108	0.054*
Milk Never Rejected	0.7	0.5	50	0.7	0.5	105	0.84
Pay for Premium	0	0.1	52	0.1	0.2	107	0.21
Sells Direct MCC							
Num Transactions	6.4	1.7	75	6.7	2.1	126	0.22
Number Buyers	2	3.6	70	2.3	3.7	112	0.54
Price	750.7	235.6	75	822.1	226.3	124	0.03**
Liters	97.8	214.3	75	73.9	199.1	126	0.45
Years Selling to this Outlet	5.3	5.3	75	3.1	3.2	123	0.00***
Milk Never Rejected	0.5	0.5	72	0.5	0.5	123	0.35
Pay for Premium	0	0.2	75	0.1	0.3	126	0.27

1.2. Traders

1.2.1. Seasonality

Table 7: Type of Traders Sales

Sales...	Trader Only			Transporter Only			Trader and Transporter		
	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs
Private Collector	0.59	0.5	197	0.4	0.5	304	0.5	0.5	185
Cooperative	0.32	0.5	197	0.4	0.5	304	0.4	0.5	185
Processor	0.1	0.3	197	0.1	0.4	304	0.1	0.3	185
Dry Price	1049.7	174.6	196	1062.3	181.2	288	1029.8	171.2	178
Dry Liters	138.2	166.9	196	158.7	269.3	296	165.0	219.7	178
Dry Suppliers	7.4	7.7	194	4.2	5.3	291	7.5	6.9	178
Rain Price	660.9	185.8	201	685.5	203.7	300	681.5	214.8	184
Rain Liters	257.0	294.3	200	234.7	258.4	304	277.1	327.9	185
Rain Suppliers	9.1	9.1	200	5.3	8.7	300	8.6	7.3	183
Cost Margin or Transp Charge	123.3	61.4	197	67.6	45.0	295			

Table 8: Traders Sales

Sales...	Private Collector			Cooperative			Processor		
	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs
Main Buyer	0.50		686	0.39		686	0.11		686
Dry Price	1040.8	183.2	325	1064.3	159.3	255	1036.8	203.8	72
Dry Liters	166.1	290.5	328	149.1	152.8	258	132.1	146.4	74
Rainy Price	663.0	201.7	338	688.5	200.5	261	688.2	201.0	76
Rainy Liters	268.9	328.6	339	241.7	242.3	264	247.0	257.8	75

Figure 7: Dry Season Sales

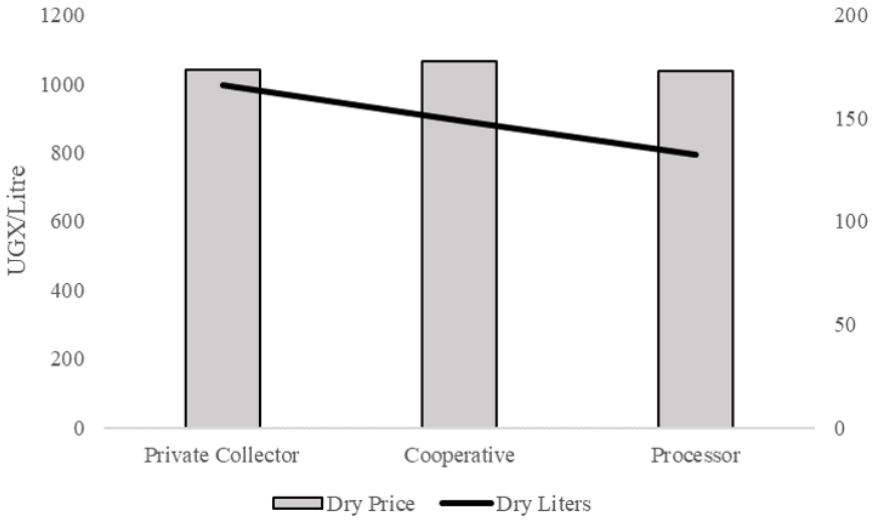


Figure 8: Rainy Season Sales

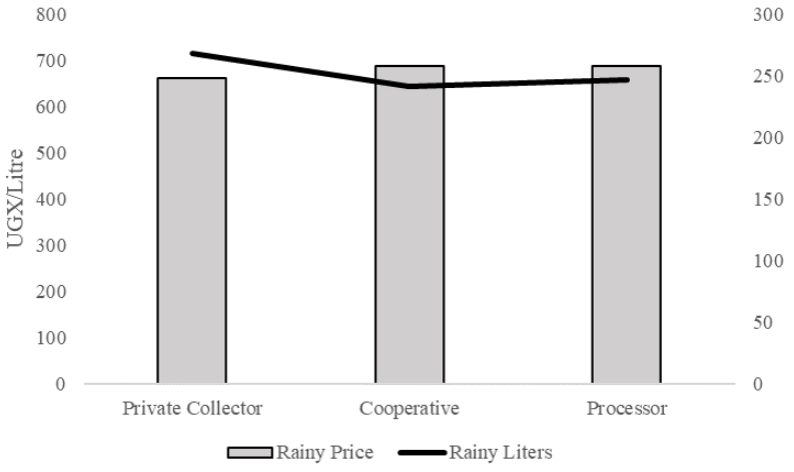
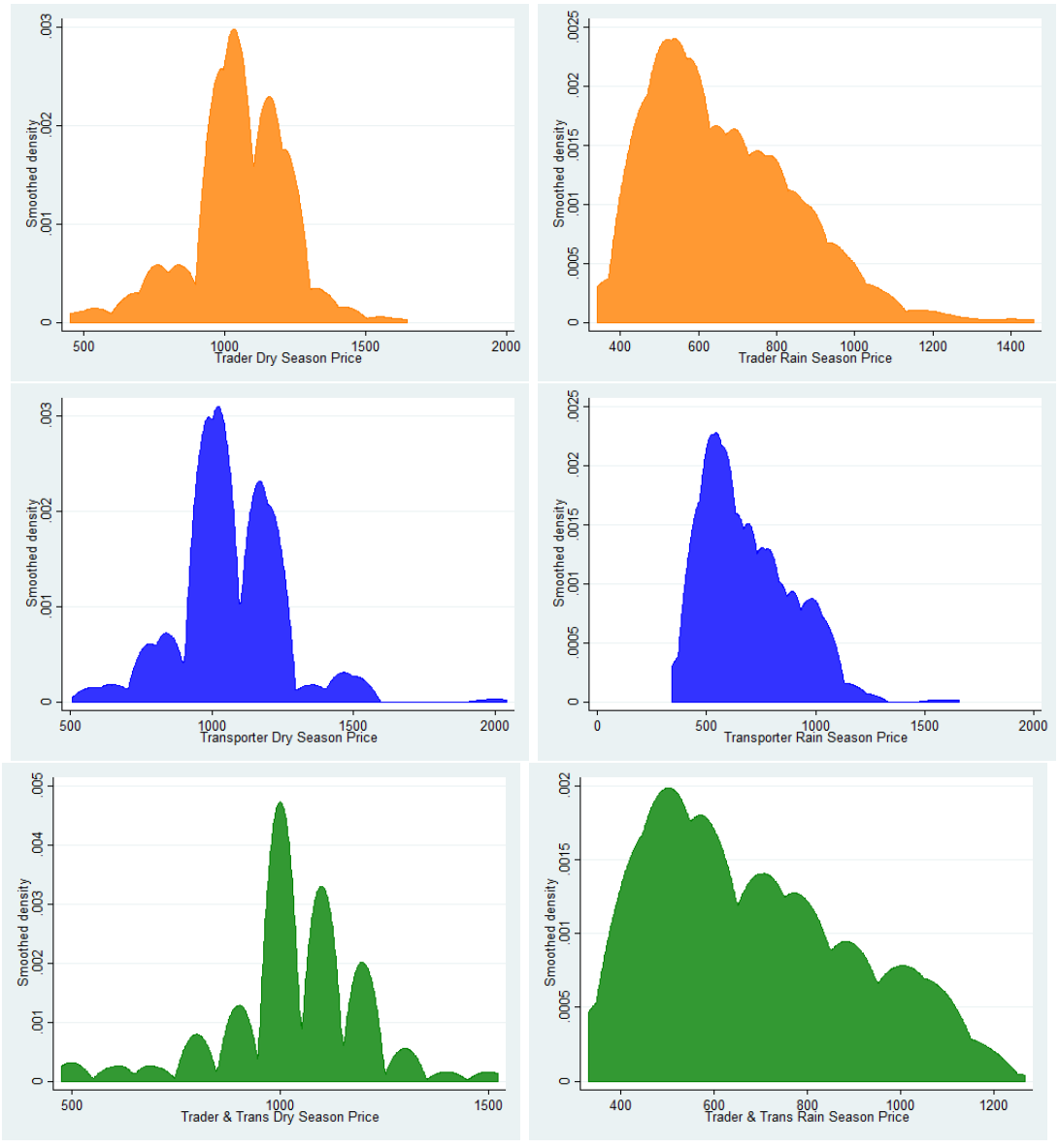


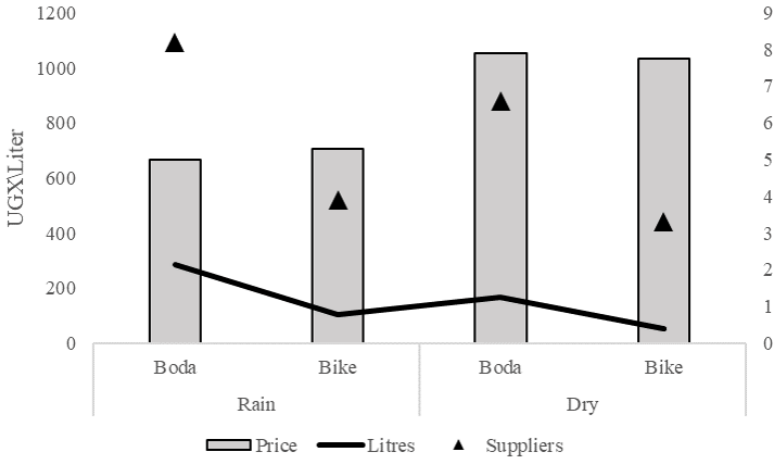
Figure 9: Recent Prices

Figure 10: Prices by Season



1.2.2. Poverty

Figure 11: Boda vs Bike



Traders who have access to a boda rather than a bicycle are able to have a much most lucrative business. In Figure 11 we see that in the rainy season, those on a bike may have a slightly higher price but they have few suppliers and sell fewer liters. We see the same pattern in the dry season, with the prices received by all traders being closer.

Table 9: Traders Assets by Transport Type

Sells to...	Bicycle				Boda			
	Mean	Sd	Obs	P-Value	Mean	Sd	Obs	P-Value
50L Containers Owned	0.4	0.8	166	0.00***	1.64	2.1	508	0.06*
25L Containers Owned	0.13	0.4	166	0.11	0.22	0.8	508	0.68
10L Containers Owned	0.05	0.3	166	0.42	0.11	0.8	508	0.41
Jerrycans Owned	3.81	3.3	166	0.00***	6.14	5.7	508	0.00***
Mobiles Owns	0.9	0.7	166	0.00***	1.09	0.5	508	0.00***
Measuring Cups Owned	0.85	1.1	166	0.47	0.85	1	508	0.27
Sieves Owned	0.97	1	166	0.30	1.04	1	508	0.96

Notes. The p-values are the results of t-tests for each transport type compared to the other transport types.

table 11 shows the summary for assets for those who use a bicycle versus those who use a boda. As expected, those who use w bike have fewer 50L milk containers, jerrycans and mobiles.

Table 10 shows the asset ownership by who the trader sells to. We see that those who sell to Cooperatives have significantly less Jerrycans than those who sell to private collectors or processors and also have more measure cups and sieves. This is expected as we know that quality is important in the cooperatives.

There were significant differences between the traders in each milk shed. The southwest milk shed, where the dairy business has been growing significantly, the traders have more 50L milk

Table 10: Traders Assets

Sells to...	Private Collector				Cooperative				Processor			
	Mean	Sd	Obs	P-Value	Mean	Sd	Obs	P-Value	Mean	Sd	Obs	P-Value
50L Containers Owned	1.58	4.2	341	0.54	1.51	2.1	265	0.97	1.21	1.7	77	0.39
25L Containers Owned	0.17	0.8	341	0.06*	0.27	1	265	0.36	0.39	1.2	77	0.103
10L Containers Owned	0.12	0.9	341	0.46	0.06	0.3	265	0.27	0.14	1.1	77	0.56
Jerrycans Owned	6.41	5.6	341	0.00***	4.16	4.6	265	0.00***	6.08	5.3	77	0.29
Motorcycles Owned	0.86	0.6	341	0.84	0.9	0.7	265	0.20	0.78	0.7	77	0.24
Bicycles Owned	0.52	0.6	341	0.76	0.51	0.6	265	0.66	0.58	0.7	77	0.38
Mobiles Owns	1.09	0.5	341	0.06*	1.02	0.5	265	0.28	0.97	0.7	77	0.19
Measuring Cups Owned	0.86	1	341	0.62	1.03	1.1	265	0.002***	0.45	0.8	77	0.00***
Sieves Owned	1.05	1	341	0.93	1.14	1.1	265	0.06*	0.73	0.9	77	0.003***

Notes. The p-values are the results of t-tests for each sales outlet compared to the other two combined.

Table 11: Traders Assets by Milk Shed

	Central Shed			SW Shed			
	Mean	Sd	Obs	Mean	Sd	Obs	P-Value
50L Containers Owned	0.88	1.4	541	3.66	5.9	153	0.00***
25L Containers Owned	0.1	0.5	541	0.68	1.6	153	0.000***
10L Containers Owned	0.1	0.8	541	0.07	0.5	153	0.66
Jerrycans Owned	6.61	5.3	541	1.3	2.8	153	0.00***
Motorcycles Owned	0.82	0.6	541	0.98	0.7	153	0.008***
Bicycles Owned	0.56	0.6	541	0.4	0.8	153	0.004***
Mobiles Owns	1.05	0.6	541	1.05	0.5	153	0.97
Measuring Cups Owned	0.86	1.1	541	0.95	0.8	153	0.37
Sieves Owned	1.1	1	541	0.87	0.9	153	0.014**

Notes. The p-values are the results of t-tests for each transport type compared to the other transport types.

containers, more 25 L milk containers, less jerrycans, more motorcycles and less bicycles than the central milk shed.