Dairy Sector in Uganda

14th February 2019

1. Farmers

Table 1: Farmer Characteristics

	Mean	Sd	Obs
Num. HH Mem	7.15	3.3	1616
F HH Head	0.10	0.3	1616
Head Completed Primary	0.22	0.4	1613
KM to Tarmac	16.49	17.2	1486
KM to Murram	2.07	3.2	1604
KM to MCC	8.89	9.0	1482
KM to Neighbor	0.47	0.7	1612
KM to Market	6.71	5.5	1585

Tables 1 gives descriptives of the farmers in our sample. Households are quite large in our sample, with an average of 7 members. Only about 10% are female headed households and 22% of household heads have completed primary school.

Table 2 gives the descriptives for the dry and rainy season for our farmers. We see the production per day of the cows is lower in the dry season for both local cows and exotics. We see that the milk consumed, given away, given to calves or processed at the home level is about the same in each season. In the rainy season, only the amount sold increases.

Figure 1 shows the distribution of the average price for each season. While they both have high variation, we do see that the most common dry season price is 100 UGX/liter and the rainy season is 500 UGX/liter.

Table 3 summarized the recent sales for the farmers. Households average 6.4 transactions in the last 7 days and on average, sell to two suppliers. The price has been nearly 800 UGX per liter and households sell on average 54 liters in recent transactions. In 20% of households, the decision to sell milk was made by a woman.

Table 2: Seasonality: Full Sample

	Dry			*Rainy*		
	Mean	Std.Dev.	Obs	Mean	Std.Dev.	Obs
Num Local Cows	3.73	5.94	1590	3.58	5.89	1601
Local Cows Cows Prod/Day/Cow	2.53	2.22	964	3.55	3.2	1001
Num Exotic Cows	4.17	6.7	1593	4.42	6.36	1598
Exotic Cows Prod/Day/Cow	6.45	8.9	1009	9.05	12.23	1062
Avg Price/Liter	902.58	199.6	1440	684.04	226.1	1549
Avg Lowest Price	814.75	215.55	1441	608.84	234.38	1549
Avg Highest Price	990.4	218.9	1440	759.26	241.01	1550
L Sold/Day	12.86	15.28	1455	21.69	38.1	1545
L Consume/Day	3.43	1.96	1462	3.76	1.97	1547
L Given/Day	0.71	1.51	1443	0.87	1.56	1519
L Calves/Day	1.53	2.36	831	1.6	2.44	870
L Processed/Day	1.35	1.8	1398	1.75	2.03	1485
Avg Dairy Income/Day	15741.23	16084.93	962	16904.27	26414.32	1055

Figure 1: Seasonal Prices

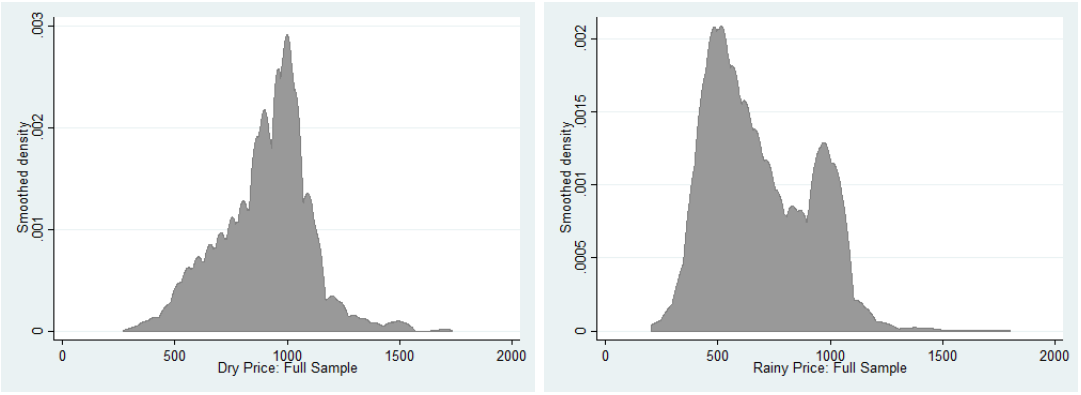


Table 3: Recent Sales

	Mean	Sd	Obs
Num Transactions in Last Week	6.4	2.1	1494
Num Suppliers in Last Week	2.0	2.6	1448
Avg Price/L in Last Week	797.9	262.6	1131
Avg L Sold in Last Week	54.1	164.1	1490
Yrs Selling to Recent Outlets	3.3	3.9	1482
Recent Milk Never Rejected	0.7	0.5	1388
Outlets Pay Prem	0.1	0.3	1500
Female Dec. on Recent Sales	0.2	0.4	1398

1.1. Sales Outlets

Table 4: Sales Outlets

	Mean	Sd	Obs
Sells to Neighbor	0.25	0.43	1549
Sells Direct	0.15	0.36	1549
Sells Trader	0.41	0.49	1549
Sells Transporter	0.12	0.33	1549
Sells Other	0.07	0.26	1549

Most households (96%), sell to only one type of outlet. We define sales outlets by selling to neighbors, only directly (either to MCCs or milk shops), selling to a trader (who purchases the milk directly) or selling to a transporter (charges transportation but does not own the milk). The most common sales outlet is selling to a trader, followed by selling to a neighbor. All but 67 households only report selling to one type of outlet (although they may have multiple suppliers within this outlet). In order to better understand the characteristics of households who sell to each outlet, we will drop these 67 households and only keep those which sell to one type of outlet.

Table 5: Characteristics by Sales Outlets

Sales...	Neighbor			Direct Outlet			Trader			Transp			Other		
	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs
Num. HH Mem	6.73	3.0	386	7.11	3.5	230	7.40	3.3	637	7.37	3.9	186	6.81	3.0	110
F HH Head	0.10	0.3	386	0.06	0.2	230	0.10	0.3	637	0.12	0.3	186	0.11	0.3	110
Head Completed Primary	0.19	0.4	385	0.24	0.4	229	0.22	0.4	636	0.25	0.4	186	0.19	0.4	110
KM to Tarmac	10.52	12.0	367	16.74	16.5	207	20.30	19.0	566	20.69	18.8	176	12.14	15.7	103
KM to Murram	1.28	2.4	382	2.36	3.4	230	2.35	3.3	631	2.77	3.4	184	1.66	3.5	110
KM to MCC	12.57	11.2	322	5.75	6.9	226	7.83	7.5	608	7.07	5.7	173	12.60	11.7	93
KM to Neighbor	0.32	0.4	386	0.58	0.8	229	0.53	0.8	635	0.56	0.7	185	0.36	0.4	110
KM to Market	4.89	4.4	383	7.97	6.4	219	7.31	5.4	625	8.16	5.6	183	4.72	4.6	109

Table 5 shows the household characteristics by sales outlets. Those who sell to neighbors have smaller households while those selling to traders have the largest households, on average. Those who sell direct are the least likely to have a female head. There is no difference in average education across sales outlets. Those who sell to neighbors tend to live closer to tarmac and murram roads, other neighbors and markets and furthest from MCCs. Those who sell direct live closest to MCCs and further from neighbors and markets. Those who sell to traders and transporters tend to live further from all aspects except MCCs.

Table 6 shows the sales outlet differences in the milk sheds. In the southwest, farmers are

Table 6: Sales Outlets by Shed

Shed	Central			Southwest		
	Mean	Sd	Obs	Mean	Sd	Obs
Sells to Neighbor	0.29	0.46	1211	0.09	0.29	338
Sells Direct	0.12	0.32	1211	0.26	0.44	338
Sells Trader	0.39	0.49	1211	0.48	0.50	338
Sells Transporter	0.11	0.32	1211	0.15	0.36	338
Sells Other	0.09	0.28	1211	0.02	0.14	338

All outlets are statistically significantly different at the 1% level except for transporters which is significant at the 10% level.

more likely to sell directly which is expected due to the recent processor expansion in the area in recent years.

1.1.1. Seasonality

Table 7: Dry Season Sales

Sales...	Direct Neighbor			Direct Outlet			Trader			Transp			Other		
	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs
Dry Num Local Cows	2.4	3.6	381	3.5	5.3	227	4.3	6.7	626	5.1	7.9	183	2.7	3.5	108
Dry Local Cows Cows Prod/Day/Cow	2.7	2.0	268	2.7	2.5	113	2.3	2.1	373	2.8	3.1	100	2.3	1.3	70
Dry Num Exotic Cows	0.8	1.8	381	6.5	7.4	229	5.0	6.7	628	7.4	10.0	181	0.9	1.4	108
Dry Exotic Cows Prod/Day/Cow	5.5	4.9	131	9.3	12.2	184	6.0	8.8	467	5.3	7.6	143	4.6	2.8	44
Dry Avg Price/Liter	951.3	210.2	319	929.6	178.2	216	853.4	187.0	586	903.1	196.8	170	946.7	204.7	90
Dry Total L/Day	20.9	116.9	73	22.1	117.3	76	7.2	7.2	233	6.5	4.6	67	7.3	2.1	22
Dry Avg Lowest Price	884.5	207.8	319	829.9	211.7	216	758.6	206.6	587	811.8	210.6	170	876.1	213.9	90
Dry Avg Highest Price	1018.0	243.0	319	1029.4	185.3	216	948.2	202.1	586	994.4	217.4	170	1017.2	236.4	90
Dry L Sold/Day	4.7	5.7	320	19.5	18.1	219	14.9	16.0	593	16.6	17.3	175	4.6	5.2	90
Dry L Consume/Day	2.3	1.5	323	4.3	2.2	219	3.7	1.8	595	3.9	2.0	173	2.9	1.6	93
Dry L Given/Day	0.4	1.2	317	1.0	1.7	214	0.7	1.4	590	0.8	1.8	172	0.6	1.4	91
Dry L Calves/Day	0.9	1.6	204	1.9	2.7	135	1.8	2.7	329	1.3	2.1	86	0.6	0.9	37
Dry L Processed/Day	0.4	1.1	312	1.9	2.2	209	1.7	1.8	566	1.5	1.8	170	0.6	1.3	85
Dry Avg Dairy Income/Day	6684.3	7188.4	124	21903.2	18578.7	174	16118.1	15872.5	445	17430.3	17599.8	139	6803.8	5833.9	40

Table 7 shows the descriptives of cattle herd and production in the dry season by sales outlet. Figure 2 shows the average liters sold per day and the average price per liter received in the dry season by sales outlet. We see the average price is fairly consistent between outlets, between 850-950 UGX per liter. However, the amount sold per day does vary drastically by outlet.

Figure 2: Dry Season Sales

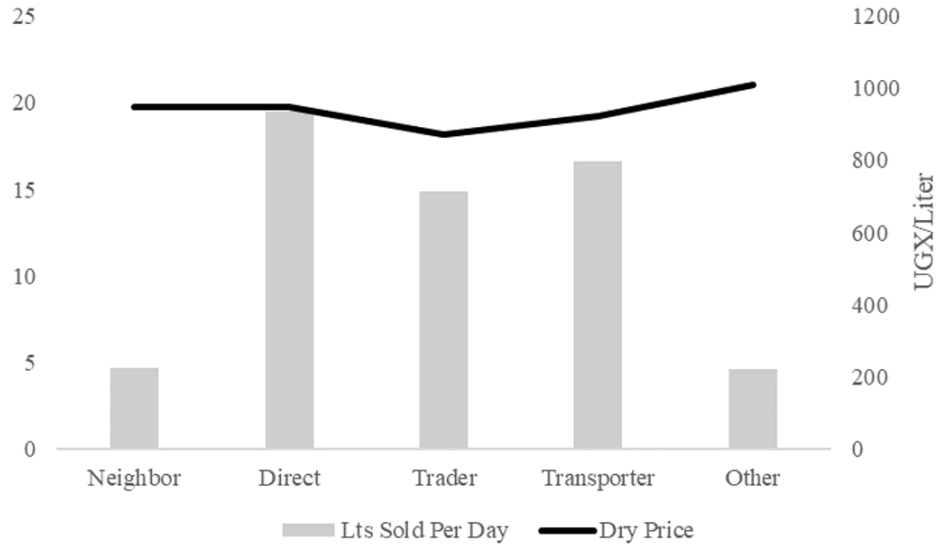


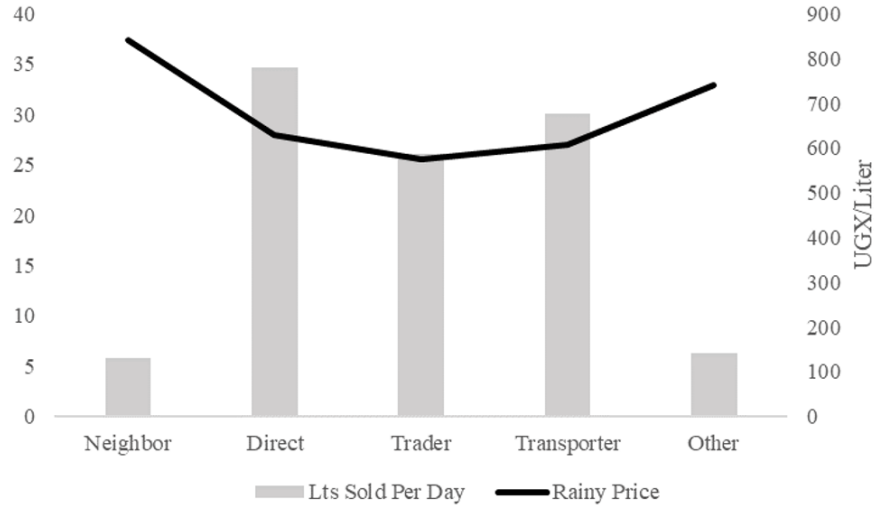
Table 8 shows the descriptives of cattle herd and production in the rainy season by sales outlet. Figure 3 shows the average liters sold per day and the average price per liter received in the dry season by sales outlet. We see the average price has more variation by outlet than in the

Table 8: Rain Season Sales

Sales...	Direct Neighbor			Direct Outlet			Trader			Transp			Other		
	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs
Rainy Num Local Cows	2.5	3.6	383	3.8	7.8	229	3.9	5.9	635	5.0	7.8	185	2.5	3.0	105
Rainy Local Cows Cows Prod./Day/Cow	3.5	2.5	297	4.4	5.3	110	3.4	2.7	374	3.6	3.1	105	2.8	1.3	73
Rainy Num Exotic Cows	0.9	1.9	382	7.1	8.1	228	5.3	6.2	633	7.4	8.1	183	0.6	1.2	106
Rainy Exotic Cows Prod./Day/Cow	7.1	8.9	145	12.4	16.7	185	9.0	11.8	499	7.5	10.6	154	5.8	2.5	33
Rainy Avg Price/Liter	843.2	228.6	367	629.3	201.8	223	601.6	176.7	626	637.0	201.0	181	797.5	237.0	89
Rainy Total L/Day	9.0	5.6	74	26.8	119.1	71	13.5	63.4	247	8.8	3.8	76	7.9	2.3	16
Rainy Avg Lowest Price	781.1	242.3	367	548.9	194.0	223	521.4	180.2	626	561.0	207.3	181	739.9	250.7	89
Rainy Avg Highest Price	905.3	239.1	367	709.8	236.0	223	682.1	199.5	627	713.0	215.6	181	855.1	243.7	89
Rainy L Sold/Day	5.9	7.2	365	34.6	50.9	224	26.1	44.3	625	30.1	34.4	180	6.3	9.3	88
Rainy L Consume/Day	2.4	1.5	366	4.7	2.1	223	4.1	1.8	625	4.4	2.0	178	3.0	1.7	91
Rainy L Given/Day	0.5	1.0	362	1.1	1.7	218	1.0	1.7	613	1.0	2.0	175	0.7	1.1	89
Rainy L Calves/Day	0.8	1.4	224	1.9	2.7	138	2.0	2.8	336	1.6	2.5	90	0.7	0.7	39
Rainy L Processed/Day	0.6	1.2	356	2.5	2.5	216	2.2	2.0	594	2.1	2.0	176	0.8	1.3	84
rainy_income	6434.8	7079.6	145	24979.6	40348.2	184	16827.7	25898.8	497	19359.9	19710.7	152	8160.9	8987.1	32

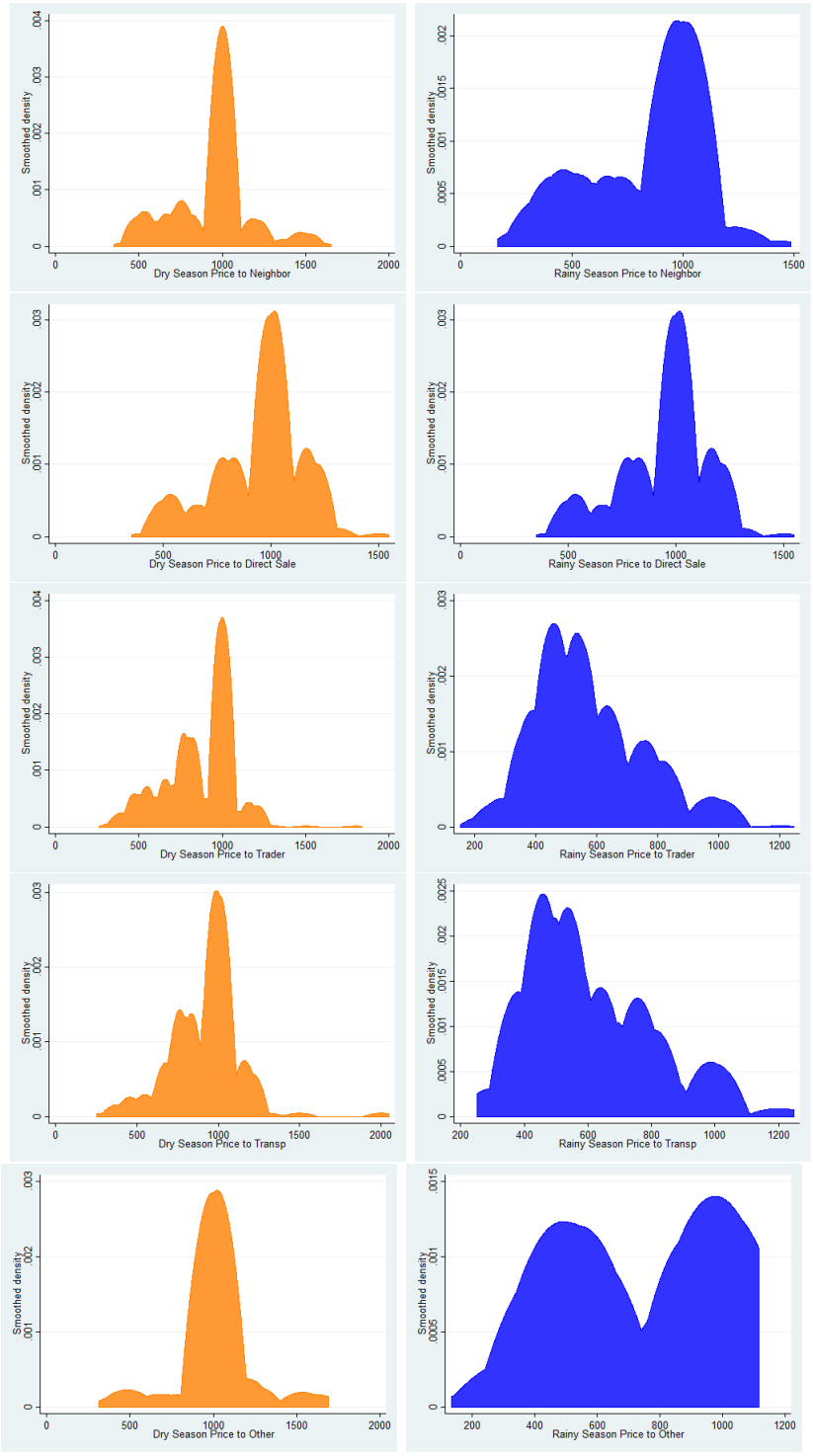
dry season. The price ranges from 600-843 UGX. There is still a high variation in the amount sold per day, however the amount sold by those selling to their neighbors or to 'Other' outlets in the rainy season only goes up marginally.

Figure 3: Rainy Season Sales



In Figure 4, we see that for each type of outlet, the dry season price is most commonly 1,000 UGX. The rainy season has much more variation, although those who sell to their neighbor or direct to an outlet do tend to also receive close to 1,000 UGX in the rainy season as well. However, those selling to a trader or a transporter face much more variation and lower prices.

Figure 4: Seasonal Price Changes by Sales Outlet



In Figures 5 and 6, we split this by location as well as see the vast difference by milk shed. The southwest milk shed faces much lower prices in general, most likely due to the high competition in the quickly growing dairy section in this region.

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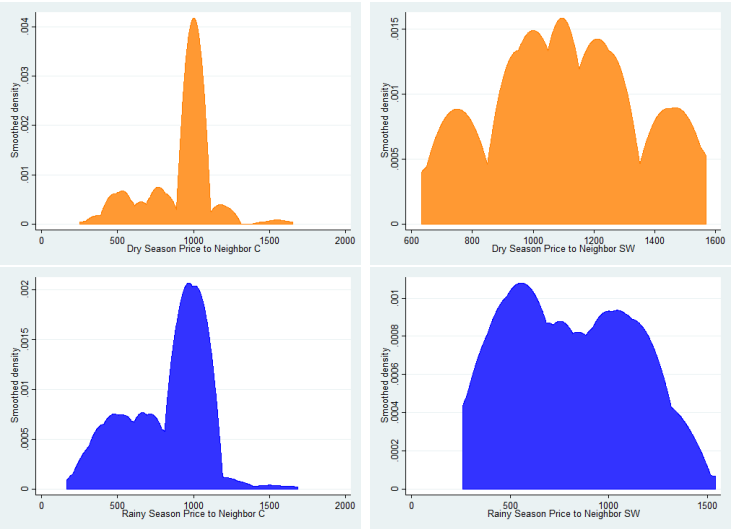
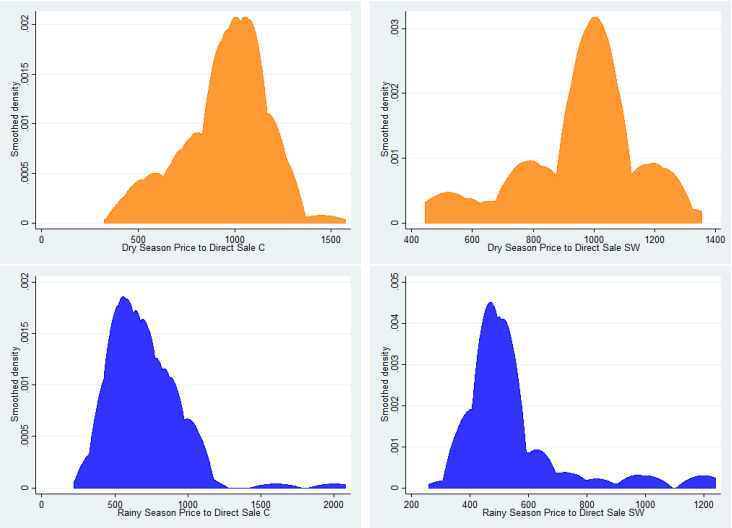
Figure 5: Seasonal Prices Changes by Sales Outlet By Shed

Sells to Neighbor



Sells Direct



Sells to Trader

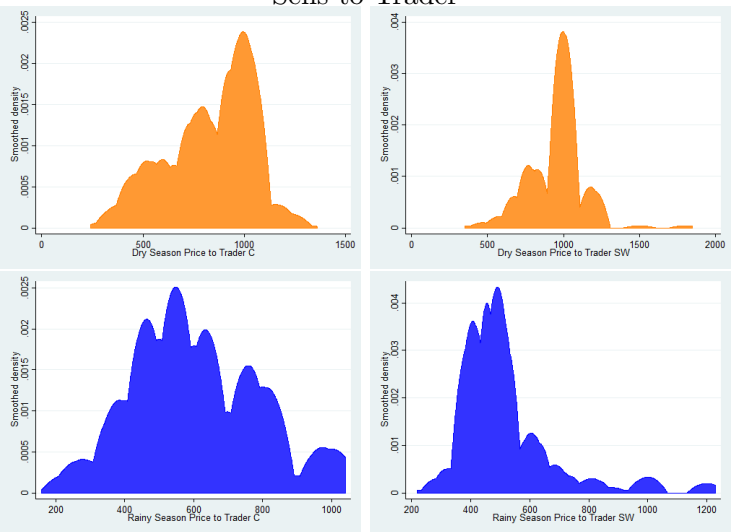
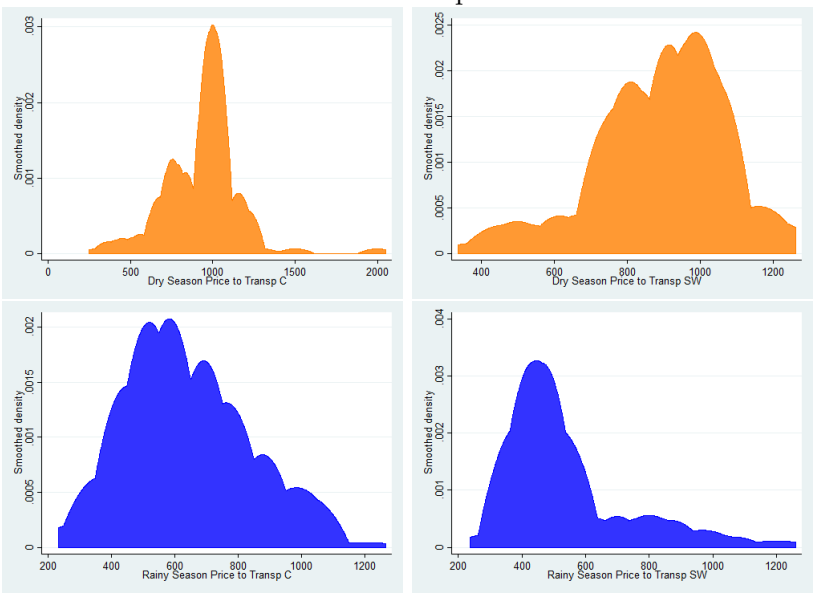
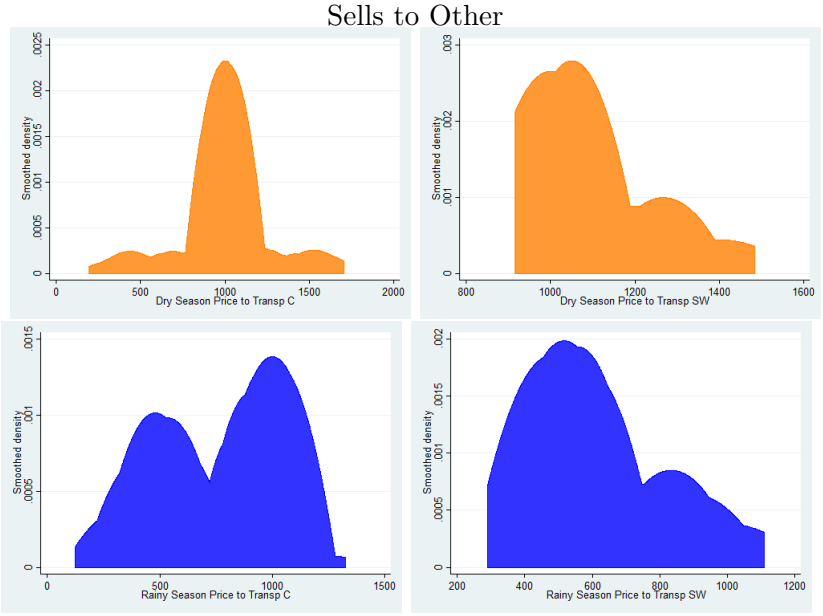


Figure 6: Continued: Seasonal Prices Changes by Sales Outlet By Shed

Sells to Transporter



Sells to Other



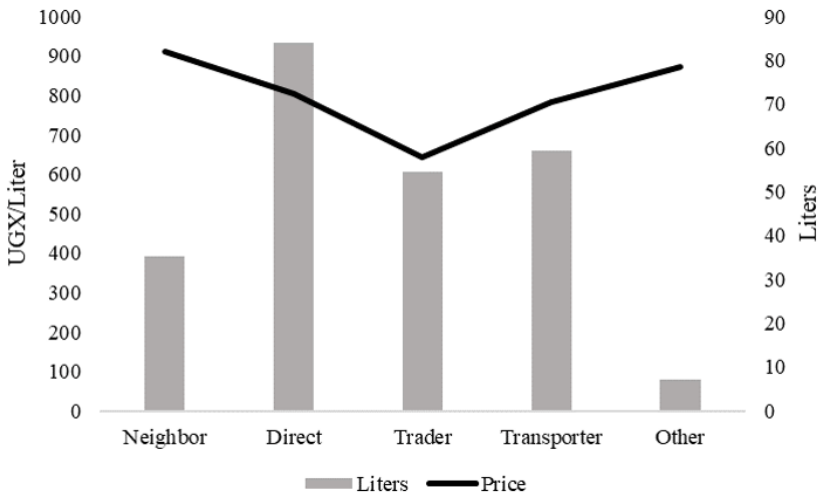
1.1.2. Recent Sales: Last 7 Days

Table 9: Sales

Sales...	Neighbor			Direct			Trader			Transp			Other		
	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs
Num Transactions in Last Week	6.00	2.7	428	6.61	1.9	245	6.47	1.7	681	6.57	1.3	192	5.58	2.4	12
Num Suppliers in Last Week	2.97	2.8	416	2.20	3.5	217	1.55	2.0	675	1.43	1.8	189	1.56	0.9	9
Avg Price/L in Last Week	904.96	222.5	423	810.66	238.3	243	658.69	240.8	314	783.70	301.4	192	872.73	316.5	11
Avg L Sold in Last Week	35.64	148.4	429	81.38	206.1	244	54.32	153.1	679	57.66	163.7	189	7.09	6.3	11
Yrs Selling to Recent Outlets	2.90	3.8	427	4.00	4.3	242	3.03	3.3	672	3.94	5.1	193	2.09	1.7	11
Recent Milk Never Rejected	0.74	0.4	387	0.50	0.5	235	0.74	0.4	627	0.66	0.5	187	0.75	0.5	12
Outlets Pay Prem	0.10	0.3	435	0.08	0.3	245	0.07	0.3	680	0.07	0.3	192	0.08	0.3	13
Female Dec. on Recent Sales	0.23	0.4	404	0.10	0.3	226	0.15	0.4	640	0.14	0.4	175	0.15	0.4	13

Table 9 shows the summary of recent sales by each sales outlet. Figure 7 shows the prices and amounts sold recently by outlet.

Figure 7: Recent Sales



We know that the milk sheds are quite different, Figures 8 and 9 show the distribution of price and amounts recently sold by each outlet. The prices tend to be much lower in the southwest. As for the amounts, there seem to be a few larger scale producers in the central shed, where in the southwest the farmers are smaller scale, except for a few that sell direct.

Figure 8: Recent Prices by Shed

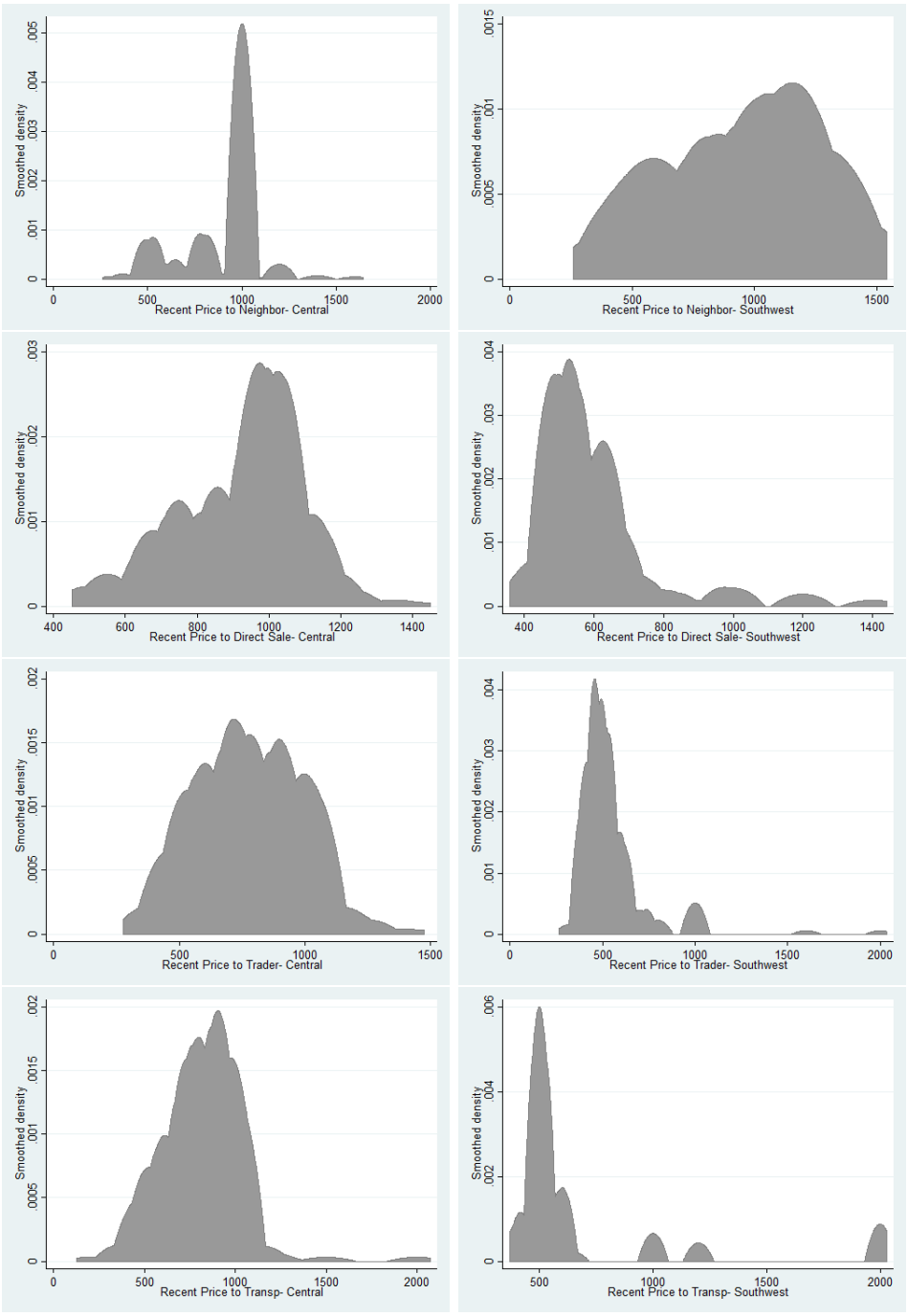
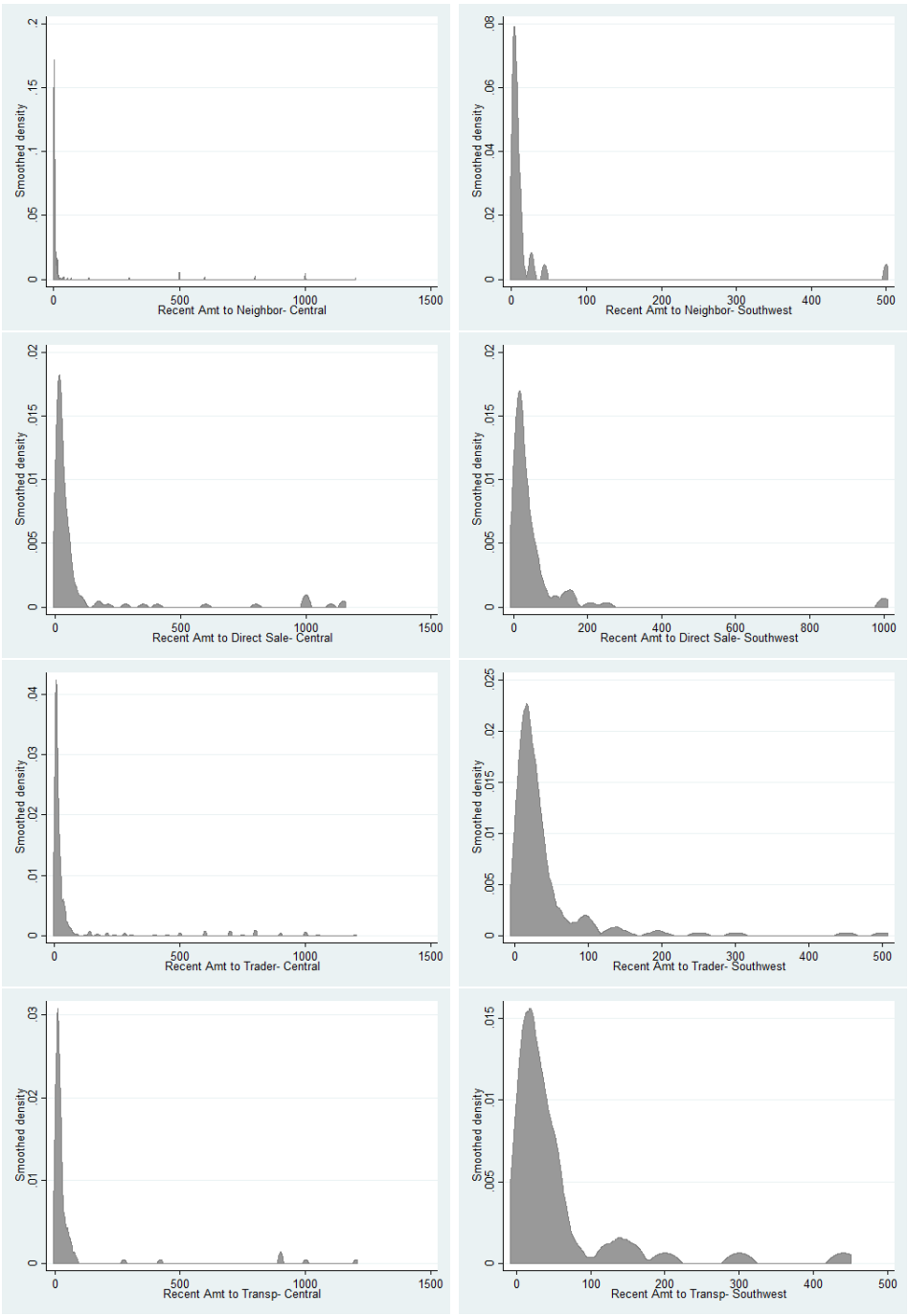


Figure 9: Recent Amounts by Shed



1.1.3. Gender

We now look at differences in sales by gender. We use decision making instead of the gender of the household head as this gives a little more variation. Most female headed households have a woman who makes the decisions on dairy and a few more households are male headed but a woman decides on the dairy activities. **[ADD STATS]**

Table 10: T-Test Decision Making

Sales...	F Make Sales Dec			M Make Sales Dec			
	Mean	Sd	Obs	Mean	Sd	Obs	P-value
Sells to Neighbors	0.38	0.49	216	0.24	0.43	1,121	0.00***
Sells to Traders	0.41	0.49	216	0.45	0.50	1,121	0.19
Sells to Transporters	0.12	0.32	216	0.13	0.34	1,121	0.61
Sells Direct	0.10	0.30	216	0.17	0.28	1,121	0.007***

In Table 10, we look at the distribution of sales outlets by the gender of the decision maker. 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 outlet and more likely to sell to a neighbor.

Table 12 looks at recent sales differences between the two different types of househods.

Table 12 looks at the differences more in depth. If women do sell directly to an outlet, 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).

Table 11: T-Test Different Decision Makers

Sales...	F Decided			M Decided		
	Mean	Sd	Obs	Mean	Sd	Obs
Num Transactions in Last Week	6.2	2.1	226	6.4	2.1	1162
Num Suppliers in Last Week	2.0	2.0	223	2.0	2.6	1124
Avg Price/L in Last Week	803.4	251.9	179	788.8	258.8	864
Avg L Sold in Last Week	63.1	194.7	224	51.8	157.4	1162
Yrs Selling to Recent Outlets	3.3	4.2	227	3.3	3.9	1148
Recent Milk Never Rejected	0.7	0.5	209	0.7	0.5	1077
Outlets Pay Prem	0.1	0.2	227	0.1	0.3	1166

Notes: A two sample t-test was run for each variable and there are no significant differences between households where a woman made the dairy farming decisions or a man made these decisions.

Table 12: T-Test Different Gender HH Heads

	F Decided			M Decided		
Sells to Neighbors						
	Mean	Sd	Obs	Mean	Sd	Obs
Num Transactions in Last Week	5.7	2.6	80	6.2	2.8	270
Num Suppliers in Last Week	3.0	2.4	82	3.2	3.1	263
Avg Price/L in Last Week	915.4	211.0	81	904.5	215.1	275
Avg L Sold in Last Week	58.5	203.3	81	27.7	125.5	273
Yrs Selling to Recent Outlets	2.5	2.6	81	3.1	4.3	268
Recent Milk Never Rejected	0.7	0.4	72	0.8	0.4	241
Outlets Pay Prem	0.1	0.2	82	0.1	0.3	273
Sells Direct						
	Mean	Sd	Obs	Mean	Sd	Obs
Num Transactions in Last Week	6.2	1.9	21	6.7	1.9	191
Num Suppliers in Last Week	1.5	2.1	18	2.1	3.3	171
Avg Price/L in Last Week	889.5	299.3	19	786.9	221.6	191
Avg L Sold in Last Week	151.3	349.1	20	81.9	201.3	191
Yrs Selling to Recent Outlets	4.2	5.3	21	3.9	4.1	188
Recent Milk Never Rejected	0.6	0.5	20	0.5	0.5	185
Outlets Pay Prem	0.0	0.2	21	0.1	0.3	191
Sells to Trader						
	Mean	Sd	Obs	Mean	Sd	Obs
Num Transactions in Last Week	6.5	1.7	88	6.4	1.7	509
Num Suppliers in Last Week	1.3	1.0	88	1.6	2.0	505
Avg Price/L in Last Week	630.7	190.2	44	629.4	228.2	215
Avg L Sold in Last Week	63.5	171.1	88	50.6	145.4	509
Yrs Selling to Recent Outlets	3.5	4.0	88	3.0	3.2	501
Recent Milk Never Rejected	0.7	0.5	81	0.8	0.4	467
Outlets Pay Prem	0.1	0.2	87	0.1	0.2	509
Sells to Transporter						
	Mean	Sd	Obs	Mean	Sd	Obs
Num Transactions in Last Week	6.7	1.0	25	6.6	1.3	144
Num Suppliers in Last Week	1.8	2.0	25	1.4	1.9	142
Avg Price/L in Last Week	744.0	211.8	25	780.3	299.4	144
Avg L Sold in Last Week	26.8	54.4	24	67.5	185.9	142
Yrs Selling to Recent Outlets	5.7	7.1	25	3.7	4.9	144
Recent Milk Never Rejected	0.6	0.5	24	0.7	0.5	140
Outlets Pay Prem	0.1	0.3	25	0.1	0.2	144
Sells to Other						
	Mean	Sd	Obs	Mean	Sd	Obs
Num Transactions in Last Week	5.0	2.8	2	5.7	2.5	10
Num Suppliers in Last Week	1.0	.	1	1.6	0.9	8
Avg Price/L in Last Week	350.0	212.1	2	988.9	190.0	9
Avg L Sold in Last Week	14.0	8.5	2	5.6	5.1	9
Yrs Selling to Recent Outlets	2.5	0.7	2	2.0	1.9	9
Recent Milk Never Rejected	0.5	0.7	2	0.8	0.4	10
Outlets Pay Prem	0.0	0.0	2	0.1	0.3	11

Notes: A two sample t-test was run for each variable and there are minimal significant differences between households where a woman made the dairy farming decisions or a man made these decisions. No variables are significantly different at the 5% or 1% levels. Three variables (Average L Sold for Selling to Neighbors, Average Price for Selling Direct and Years Selling for Selling to Transporter) are significant at the 10% level.

1.1.4. Poverty

We define rich households as households with consumption greater than the median consumption reported.

[**ADD STATS and LABEL and TTEST**]

Table 13: T-Test Consumption Over Poverty Level

	Rich Household			Poor Household		
Recent Sales: Full Sample						
	Mean	Sd	Obs	Mean	Sd	Obs
Num Transactions in Last Week	6.3	2.0	714	6.5	2.1	714
Num Suppliers in Last Week	2.0	2.7	696	2.1	2.5	693
Avg Price/L in Last Week	793.5	268.9	520	798.1	255.4	558
Avg L Sold in Last Week	62.8	178.1	714	46.7	152.0	712
Yrs Selling to Recent Outlets	3.5	4.3	708	3.0	3.5	709
Recent Milk Never Rejected	0.7	0.5	670	0.7	0.5	656
Outlets Pay Prem	0.1	0.2	715	0.1	0.3	718
Sells Direct to Neighbor						
	Mean	Sd	Obs	Mean	Sd	Obs
sales_neigh_trans	6.0	2.5	144	6.0	3.0	234
sales_neigh_num	3.4	3.5	142	2.9	2.4	230
sales_neigh_price	920.2	219.3	146	904.4	210.7	238
sales_neigh_amt	46.2	186.7	145	28.5	123.0	236
sales_neigh_yrs	3.6	4.1	143	2.6	3.7	235
sales_neigh_qual_nevrej	0.8	0.4	134	0.7	0.4	206
sales_neigh_prem	0.1	0.3	146	0.1	0.3	238
Sells Direct						
	Mean	Sd	Obs	Mean	Sd	Obs
sales_direct_trans	6.4	1.8	121	6.9	2.1	109
sales_direct_num	2.3	3.6	107	2.1	3.6	97
sales_direct_price	825.1	227.7	119	777.5	241.8	109
sales_direct_amt	116.6	265.7	120	48.1	118.6	109
sales_direct_yrs	4.0	4.7	120	4.0	3.8	107
sales_direct_qual_nevrej	0.5	0.5	117	0.5	0.5	105
sales_direct_prem	0.1	0.3	121	0.1	0.2	109
Sells to Trader						
	Mean	Sd	Obs	Mean	Sd	Obs
sales_trader_trans	6.3	1.9	330	6.6	1.4	305
sales_trader_num	1.5	1.9	329	1.6	2.1	302
sales_trader_price	656.3	258.4	136	631.2	215.0	145
sales_trader_amt	54.5	142.1	330	54.7	166.0	304
sales_trader_yrs	2.9	3.3	326	3.1	3.3	300
sales_trader_qual_nevrej	0.7	0.4	304	0.7	0.4	280
sales_trader_prem	0.1	0.2	330	0.1	0.2	304
Sells to Transporter						
	Mean	Sd	Obs	Mean	Sd	Obs
sales_transp_trans	6.6	1.3	119	6.7	1.0	66
sales_transp_num	1.5	2.1	118	1.3	1.2	64
sales_transp_price	763.4	295.1	119	815.5	305.0	66
sales_transp_amt	51.9	134.5	119	73.2	215.1	63
sales_transp_yrs	4.7	6.0	119	2.6	2.7	67
sales_transp_qual_nevrej	0.7	0.5	115	0.7	0.5	65
sales_transp_prem	0.0	0.2	118	0.1	0.3	67

1.1.5. Labor

Table 14: Labor

	Full Sample			Central Shed			SW Shed		
	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs
Ad Male Labor	0.96	0.2	1549	0.96	0.2	1211	0.97	0.2	338
Ad Female Labor	0.19	0.4	1549	0.21	0.4	1211	0.12	0.3	338
Child Male Labor	0.06	0.2	1549	0.07	0.3	1211	0.04	0.2	338
Child Female Labor	0.02	0.1	1549	0.03	0.2	1211	0.01	0.1	338
Hired Labor	0.56	0.5	1544	0.52	0.5	1206	0.68	0.5	338

Table 14 shows the distribution of labor within households and also the difference between the two milk sheds. Almost all households use adult male labor. About a fifth of households use adult female labor in the central milk shed but this decreases to just above a tenth of the households in the southwest. There is also less child labor in the southwest for both boys and girls and more hired labor. This distribution of labor makes sense as the southwest is becoming a large dairy producing region and households are seeing it more as a business than a family chore.

Table 15: Labor Hours

Sells to...	Neighbor			Direct			Trader			Transporter			Other		
	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs	Mean	Sd	Obs
Total Ad Male Labor	6.41***	4.8	386	8.39*	5.4	230	8.43***	5.1	637	8.21	4.9	186	8.00	5.8	110
Total Ad Female Labor	0.55***	1.7	386	0.11***	0.6	230	0.34	1.5	637	0.29	0.9	186	0.49	1.6	110
Total Child Male Labor	0.52***	2.0	386	0.27	1.7	230	0.15***	1.1	637	0.19	1.3	186	0.44	2.1	110
Total Child Female Labor	0.07	0.6	386	0.01	0.1	230	0.03	0.5	637	0.00	0.0	186	0.16**	1.3	110
Total Hired Labor	3.40***	4.7	386	5.74***	4.8	230	5.15	5.5	637	6.74***	5.7	186	4.05*	4.8	110

Figure 10 shows the average hours by each labor source for our five sales outlets. Adult men work slightly less when the household sells to the neighbor. However, compared to other adult women, those who sell to the neighbor work the most. Male children also work the most if the household sells to the neighbor. Female children work the least. Hired labor varies across all sales outlets and is lowest when selling to a neighbor which is expected.

Figure 11 shows the average hours by each sales outlet and the distribution of those hours. Households who sell to neighbors report the lowest amount of total labor while those who sell to the transporters report the highest.

Figure 10: Labor by Sales Outlet

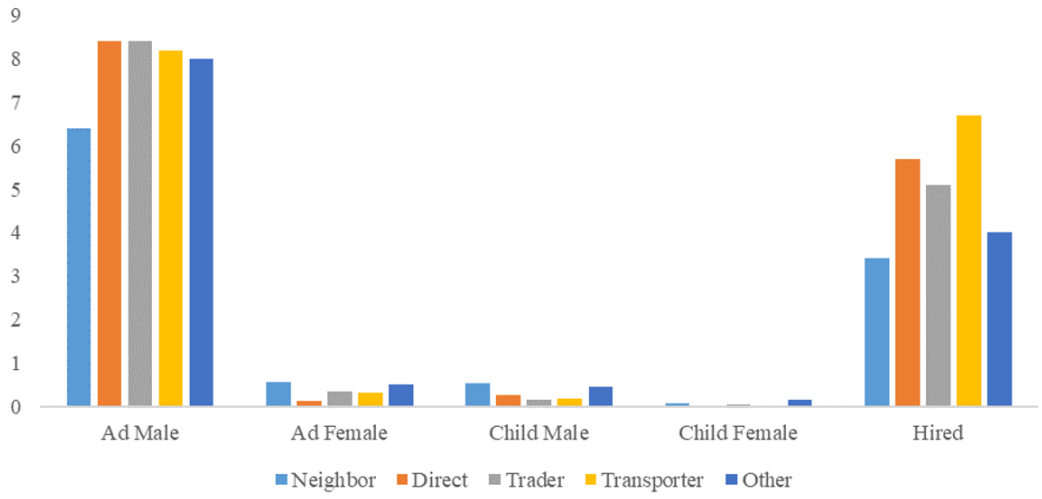
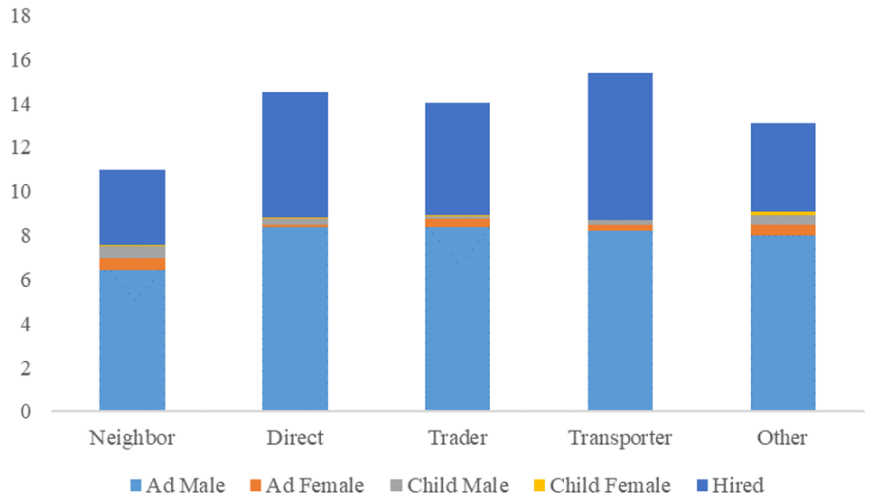


Figure 11: Labor Within Sales Outlet



1.1.6. Analysis

Table 16 looks at what characteristics influence the likelihood of selling to particular outlet. We see that having more transactions within the last week lowers the likelihood of selling to a neighbor. The number of suppliers increases the likelihood of selling to a neighbor and decreases the likelihood of selling to a transporter.

Table 16: Likelihood of Selling to Certain Outlet

Sells to...	Neighbor		Direct		Trader		Transporter	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female Dec. on Recent Sales	0.086**	0.087**	-0.051	-0.061	-0.010	-0.003	-0.026	-0.023
	(0.038)	(0.038)	(0.041)	(0.042)	(0.043)	(0.043)	(0.039)	(0.040)
Avg Price/L in Last Week	0.000***	0.000***	0.000***	0.000***	-0.000***	-0.001***	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log of Recent Amt Sold (Lts)	-0.107***	-0.108***	0.064***	0.065***	0.025**	0.026**	0.017*	0.017*
	(0.009)	(0.009)	(0.010)	(0.010)	(0.011)	(0.011)	(0.010)	(0.010)
KM to Neighbor	-0.023	-0.021	0.015	0.011	0.002	0.002	0.007	0.008
	(0.017)	(0.017)	(0.019)	(0.019)	(0.020)	(0.020)	(0.018)	(0.018)
KM to MCC	0.014***	0.014***	-0.006***	-0.006***	-0.003	-0.003	-0.006***	-0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
KM to Market	-0.008***	-0.008***	0.006**	0.007**	-0.003	-0.003	0.005**	0.005*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
KM to Murram	-0.018***	-0.018***	0.004	0.007	-0.000	-0.001	0.014***	0.012**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Head Completed Primary	-0.017	-0.008	-0.022	-0.029	0.006	0.004	0.033	0.034
	(0.029)	(0.029)	(0.032)	(0.032)	(0.033)	(0.033)	(0.030)	(0.031)
head_age	0.000	0.001	-0.001	-0.001	-0.001	-0.002	0.002*	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
head_married	0.047	0.056	0.078*	0.069	-0.060	-0.063	-0.065	-0.061
	(0.042)	(0.042)	(0.045)	(0.046)	(0.047)	(0.048)	(0.043)	(0.044)
consump_log	-0.121***	-0.120***	0.015	0.006	-0.026	-0.027	0.132***	0.141***
	(0.027)	(0.027)	(0.029)	(0.030)	(0.031)	(0.031)	(0.028)	(0.028)
R^2	0.299	0.306	0.103	0.116	0.067	0.066	0.077	0.077
Observations	797	779	797	779	797	779	797	779
Exclude Price Outliers	No	Yes	No	Yes	No	Yes	No	Yes

Notes. OLS regressions with fixed effects at the sub-county level. ***, **, * indicate two-sided significance levels at 1, 5, and 10 %, respectively.