

Credit Constraint and Value Chain Financing in Transforming Dairy and Potato Value Chains in China

Dong Chong and Li Luyi

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Major Changes in Dairy and Potato Value Chains in China

Dairy value chain	<ul style="list-style-type: none">1) Diet change - Dairy demand soaring and production rising2) Food safety requirement: the concerns over milk quality and safety; lack of traceability system3) Vertical integration – emerging large dairy processors4) Up-scaling of farmers, dis-intermediation, and branding in processors
Potato value chain	<ul style="list-style-type: none">1) Up-scaling, increasing mechanization, and expansion of irrigation area in potato production2) Long distance shipping and specialization of traders

What Remains Unclear?

- To what extent dairy and potato value chains are transforming in China?
- If credit constraint exists in agricultural value chain during the process of transformation and upgrading which lead to large number of financial demand? And if yes, which segment or actor suffers credit constraint more serious?
- Did the value chain finance play a role in easing the credit constraint? If yes, who benefit from VCF?
- Often because of a lack of good primary data. This is the purpose of this study.

Data Collection

Actor	Dairy Value Chain		Potato Value Chain		
	Inner Mongolia	Beijing	Inner Mongolia	Hebei	Beijing
Household	486	-	292	210	-
Milk Collection Center or Village Trader	32	-	56	46	-
Processor	28	-	-	-	-
Wholesaler	8	15	-	-	61
Traditional retailer	31	51	-	-	140
Supermarkets	22	41	-	-	45

Dairy

Potato



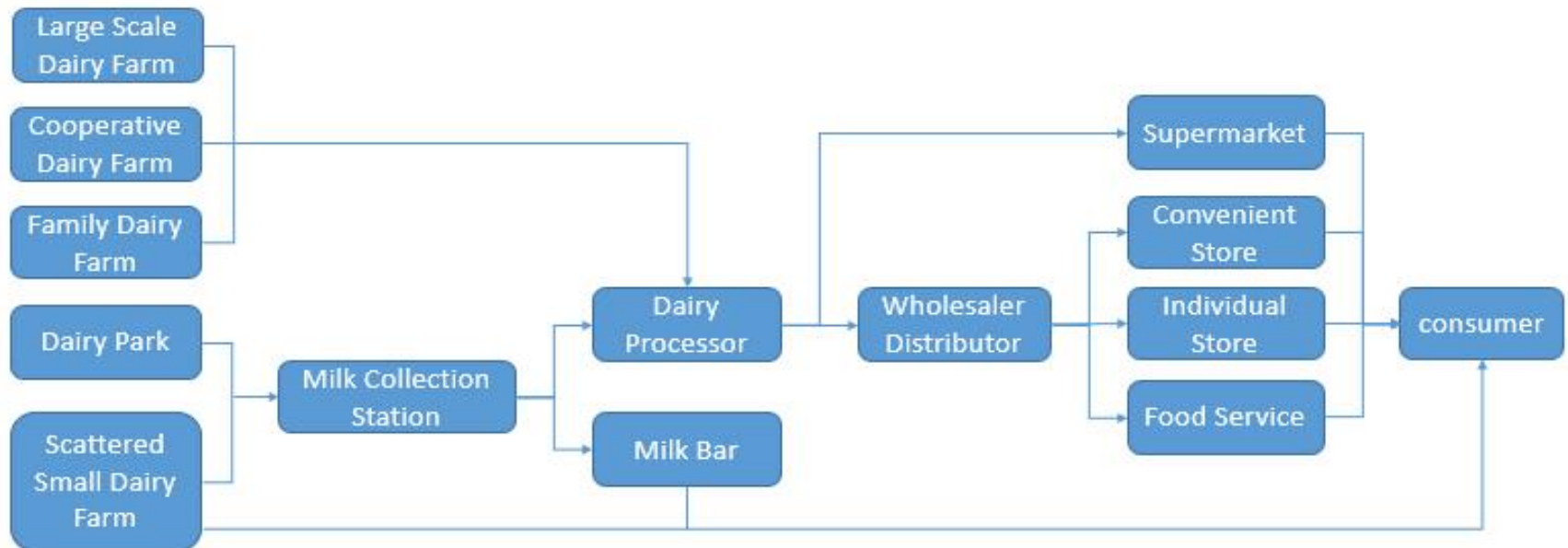
Zhangjiakou in Hebei Province



Dairy Value Chain in China



Dairy Value Chain in China



Overview of Dairy Sector in China

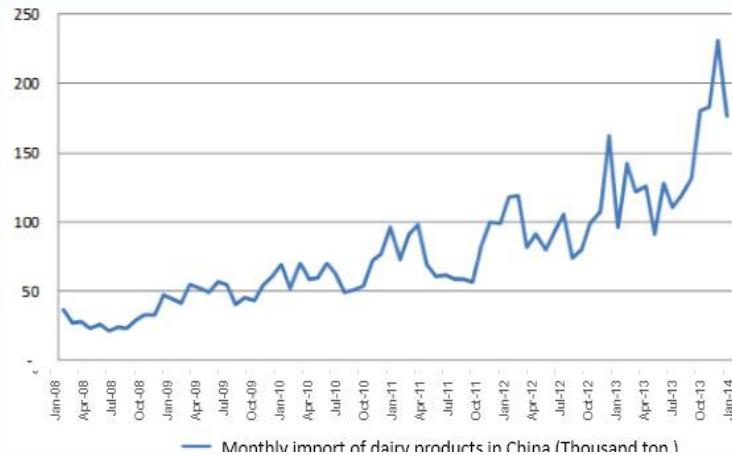


Figure 1 Monthly Import of Dairy Products in China, 2008 TO 2014

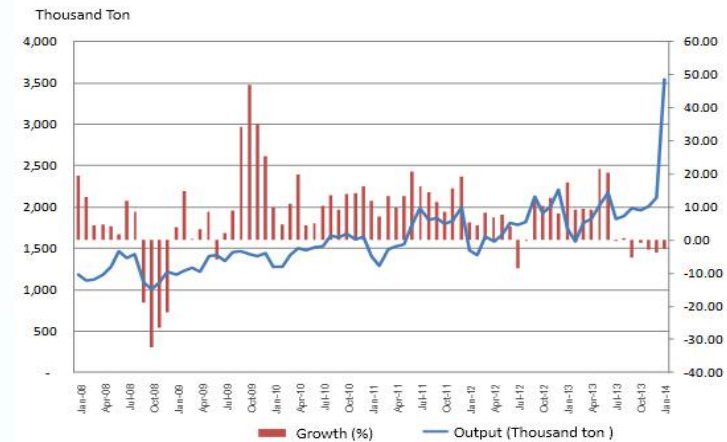


Figure 2. China liquid milk production, 2008 to 2014

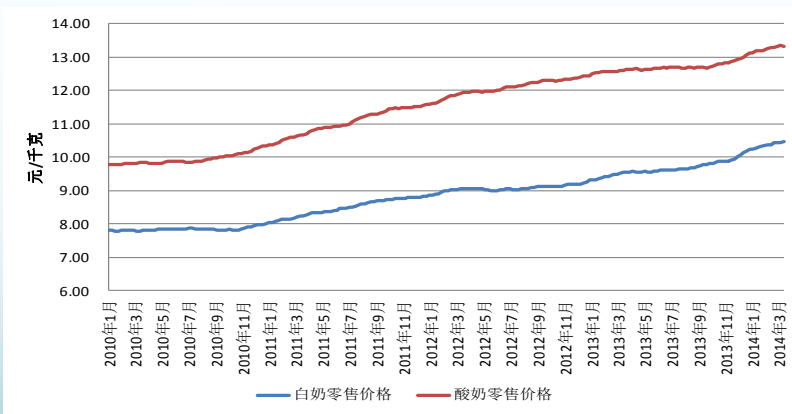


Figure 3 Price of Yoghurt and Liquid Milk in Retailer, 2010 to 2014



Figure 4. Average raw milk price in top 10 raw milk production provinces, 2008-2014

Credit Constraint and Financing Imbalance in Dairy Value Chain

Table 1. Stakeholders' Application for Loans in Dairy Chain

	Percentage of loan application in the past year (%)	The Most Important Reason for Not Applying for Loans from Formal Financial Institutes	Percentage of primary reason (%)	Percentage of loans granted	Percentage of full loans granted
Small Household	11.46	Financing is unnecessary because the existing finance is enough.	35.51	30.2	17.4
Medium Household	16.67	Financing is unnecessary because the existing finance is enough.	36.51	50	35.7
Large Household	46.3	Financing is unnecessary because the existing finance is enough.	25	84.3	60.8
Total Household	18.45	Financing is unnecessary because the existing finance is enough.	35.21	43.9	29.5
Milk collection center	43.8	Financing is unnecessary because the existing finance is enough.	24	46.9	37.5
Milk processor	17.9	Financing is unnecessary because the existing finance is enough.	39.3	17.9	10.7
Distributor	8.7	Financing is unnecessary because the existing finance is enough.	65.2	21.7	17.4
Traditional retailer	3.13	Financing is unnecessary because the existing finance is enough.	72.2	7.32	5.88

Table 2. Borrowing Behaviors of Dairy Value Chain Stakeholders

	% of loans over the past six years	The Most Important Source of Loans	% of funding from primary source	Loan cycle(Month)	Interest rate (%)
Small Household	41.45	Relatives and friends	77.3	10.29	18.39
Medium Household	38.54	Relatives and friends	58.2	11.37	16.01
Large Household	83.51	Commercial banks & rural credit cooperatives	71.78	12.9	13.32
Total Household	42.95	Relatives and friends	66	11.64	16.25
Milk collection center	62.5	Commercial banks	63	16.8	8.6
Milk processor	21.4	Commercial banks	85.2	27	6.125
Distributor	26.1	Commercial banks	50	15.75	9.63
Traditional retailer	13.64	Relatives and friends	33.3	16.8	9

Table 3. Purposes of Loans by Dairy Value Chain Stakeholders

	Primary purpose	Percentage (%) of loans for primary purpose	Secondary purpose	Percentage (%) of loans for secondary purpose
Small Household	Crop production	39.6	Daily operation	12.5
Medium Household	Crop production	38	Buying cows	14.1
Large Household	Buying cows	45.1	Buy concentrated feed	37.7
Total Household	Crop production	37.31	Buying cows	9.5
Milk collection center	Buying concentrated feed and other agricultural means of production	50.28	Buying cows and building pens	14
Milk processor	Buying assets and equipments	87.1	Daily operation	12.9
Distributor	Daily operation	63	Buying assets and equipment	37
Traditional retailer	Daily operation	67	Buying assets and equipments	33

Table 4. Sources of Start-up Fund of Dairy Value Chain Stakeholders

	Primary source	Percentage of funds from primary source	Secondary source	Percentage of funds from secondary source
Small Household	Personal savings	67.82	Relatives and friends	12.64
Medium Household	Personal savings	74.76	Relatives and friends	12.62
Large Household	Personal savings	64.71	Commercial banks and rural credit cooperatives	23.53
Total Household	Personal savings	71.63	Relatives and friends	11.63
Milk collection center	Other incomes	48.8	Personal savings	12.25
Milk processor	Personal savings	57.69	Loans from commercial banks and loan sharks	28.58
Distributor	Personal savings	95.7	Relatives and friends	13
Traditional retailer	Personal savings	40.2	Selling on credit & paying debts in kind or by labour	14.6

Table 5. Distribution of Sources of Working Capitals of Dairy Value Chain Stakeholders

	Primary source	Percentage of working capitals from primary source	Secondary source	Percentage of working capitals from secondary source
Small Household	Savings & incomes	98.3	Commercial banks and rural credit cooperatives	1.7
Medium Household	Savings & incomes	97.5	Commercial banks and rural credit cooperatives	2
Large Household	Savings & incomes	82.61	Loans from commercial banks and loan sharks	13
Total Household	Savings & incomes	94.61	Commercial banks and rural credit cooperatives	5
Milk collection center	Savings & incomes	88.23	Loans from commercial banks and loan sharks	64
Milk processor	Savings & incomes	85.71	Loans from commercial banks	50
Distributor	Savings & incomes	82.22	Savings of family members	38.33
Traditional retailer	Savings & incomes	48.89	Savings of family members	27.27

Table 6. Distribution of Trade Credits of Dairy Value Chain Stakeholders

	% of sales on credit	Cycle of sale on credit	% of advance receipt	Cycle of advance payment	% of purchase on credit	Cycle of purchase on credit	% of advance payment	Cycle of advance payment
Small Household	74	31.27	1	-	61	50.90	2	-
Medium Household	73	32.97	1	-	69	41.73	3	-
Large Household	73	34.19	5	-	73	37.56	0	-
Total Household	74	32.27	1	-	64	46.33	2	-
Milk collection center	100	30	0	-	100	31.9	0	-
Milk processor	10.7	71.5	21.4	9.7	43.75	24.8	25	32.9
Distributor	82.7	25.2	0	-	0	-	74	2.1
Traditional retailer	6.1	9.9	0	-	6.1	14.9	0	-

Major Findings from the Whole Chain

- Upstream, households and MCC, are undergoing transformation and upgrading, with greater financing demands and urgent desire for financing.
- Trade credit is an important form of value chain finance, working in each actor of the whole chain.
- Small and medium scaled household may suffer financial demand repression, while large household and MCC can get some value chain financing support to solve financial demand in start-up funding and working capital.
- Core processor enterprises play roles in value chain financing and specially provide help to the upstream segments.
- Midstream and downstream in dairy value chain operates stably under the lead of milk processors, no severe credit constraints.

Credit Constraints and Financing Behaviors of Farm Households in Dairy Value Chain

Table 7. Distribution of Reasons for Households' No Application for Loans

	The first reason	% of the first reason	The second reason	% of the second reason	The third reason	% of the third reason
Small Household	Financing is unnecessary because the existing finance is enough.	35.51	Can borrow money from relatives and friends	25.54	Dislike borrowing money	11.59
Medium Household	Financing is unnecessary because the existing finance is enough.	36.51	Can borrow money from relatives and friends	24.87	Dislike borrowing money	20.63
Large Household	Financing is unnecessary because the existing finance is enough.	25	Can borrow money from relatives and friends	21.43	Dislike borrowing money	17.86
Total Household	Financing is unnecessary because the existing finance is enough.	35.21	Can borrow money from relatives and friends	25.63	Dislike borrowing money	16.9

Table 8. Sources of Funding to Buy Cows

Scale of operation	S	M	L	T	S	M	L	T	S	M	L	T
Start-up year	1998	1999	2006	1999								
Start-up year				2007				2013				
Personal savings	73	65	67	69.21	64	60	100	64.64	86	64	60	74.95
Loans from commercial banks	3	0	0	1.53	3	0	0	1.53	3	4	20	4.53
Loans from rural credit cooperatives	8	15	0	10.46	12	17	0	13.34	6	4	20	6.06
Loans from relatives and friends(interest-free)	12	10	0	10.37	9	7	0	7.56	0	8	0	3.40
Loans from local lender	1	5	33	4.78	6	3	0	4.33	0	8	0	3.40
Loans from drovers or milk collection centers	2	5	0	3.15	3	10	0	5.78	0	12	0	5.10
Government subsidy	0	0	0	0.00	0	0	0	0.00	3	0	0	1.53
Subsidies from milk collection centers	1	0	0	0.51	3	3	0	2.80	3	0	0	1.53
Average amount of loans	13,633	36,000	232,967	37,416	10,417	19,292	40,300	16,135	37,215	49,140	29,333	41,772
The ratio of loans to overall expenditures	77	76	93	77.62	63	78	57	69	66	78	67	71.17

Table 9. Trade Credits of Households' Purchasing Daily Means of production

Scale of operation	Small	Medium	Large	Total
Purchasing trading credits from value chain upstream				
Ratio of land rent advance payment	1	4	0	2
Ratio of purchase on credit at the moment of land rent payment	26	26	25	25
Ratio of real-time payment of land rent	73	70	75	73
Ratio of advance payment of seeds, pesticides and fertilizers	0.5	2	4	1
Ratio of buying on credit seeds, pesticides and fertilizers	25.5	27	21	26
Ratio of real-time payment of seeds, pesticides and fertilizers	74	71	74	73
Ratio of advance payment of concentrated feed	2	3	0	2
Ratio of purchase on credit of concentrated feed	61	69	73	64
Ratio of real-time payment of concentrated feed	37	28	27	34
Selling trading credits to value chain downstream				
Ratio of advance receipt	1	1	5	1
Ratio of sales on credit	74	73	73	74
Ratio of real-time payment	25	26	22	25

Integration and trade credit in concentrated feed consumption

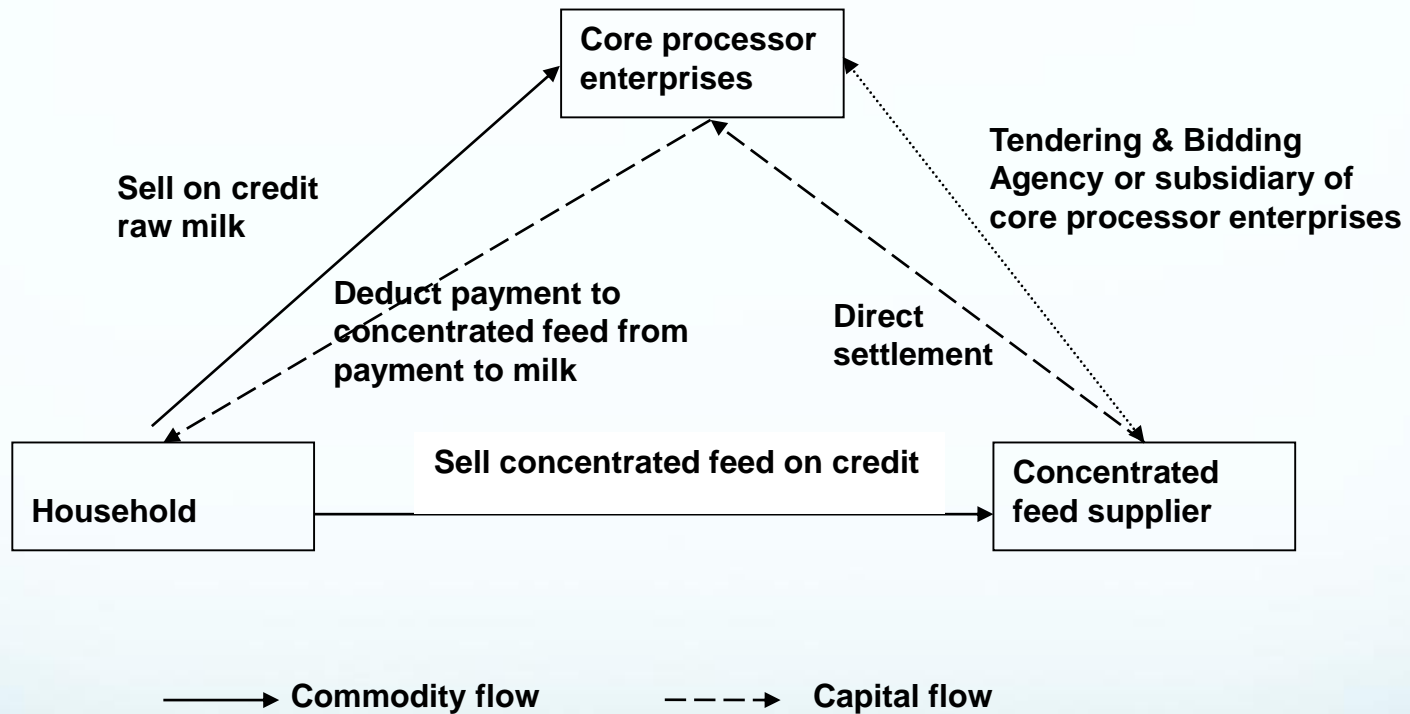


Fig.5 Core enterprise's integration of households and concentrated feed suppliers

Insurance for Dairy Farmers in Dairy Value Chain

	2013				2007			
	Small	Medium	Large	Total	Small	Medium	Large	Total
Ratio of buying insurances	88.4	80.6	74.2	82.6	30.3	36.2	31.3	33.5
Agricultural (corn)insurance	42.9	38.6	31.8	39.6	46.2	45.1	36.8	44.4
Dairy insurances	0.73	0.57	3.4	0.98	1.9	0	10.5	1.9
Insurances for family members	51.6	56.3	55.7	54.2	50	51.6	47.4	50.6
Property insurances	4.8	4.5	9.1	5.2	1.9	3.3	5.3	3.1
Reasons for not buying insurances								
Unnecessary	26.7	26.2	44.4	28.8	13.9	26.2	25	22.1
Want to buy and don't know how to buy	60	33.3	22.2	37.9	44.5	30.8	33.3	35.4
Too many formalities involved	0	4.8	11.1	4.6	2.8	3.1	0	2.7
Too high premium	6	14.3	11.1	12.1	11.1	9.2	25	11.5
Too low claim ratio	0	4.8	0	3	0	4.6	0	2.7
Ratio of disaster occurrences	20.5	17.4	26.2	19.4	18.4	22.7	33.3	22.4
Ratio of claims launched	47.7	56.3	31.3	49.5	57.1	100	100	88.5

Credit Constraints and Financing Behaviors of Milk Collection Centers

Table 11. Financing Behaviors of Milk Collection Centers to Buy Productive Assets and Equipment

Milk collection center's behaviors	Milking room	Cooling room	Warehouse or refrigeration system	Refrigeration tank	Milking device
% of credit	52	40	24	28	20
Source of loan					
Rural credit cooperative or commercial bank	30.8	20	16.7	28.6	40
Relatives and friends	30.8	50	50	14.3	0
Milk processor	38.5	30	33.3	28.6	60
Average amount of loan	9.11			3.68	
Average interest rate	16.08			14.67	

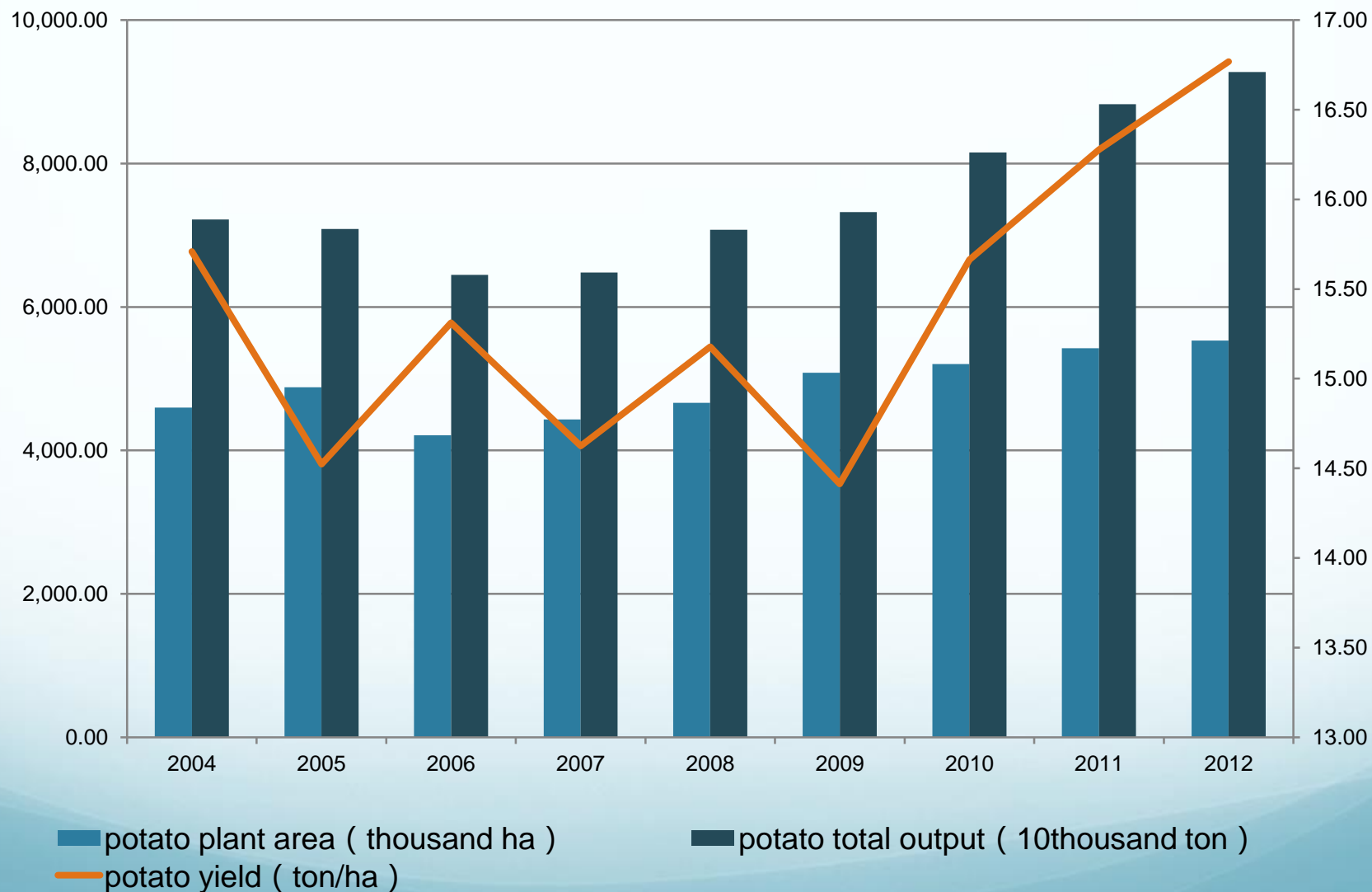
Major Findings on Farmers and MCCs

- From reasons for households' no application for loans: small and medium scaled household may suffer financial demand repression.
- From funding for buying cows, the household suffered credit constraints eased from start-up year to 2013, the % of credit from formal finance institutes and value chain financing increased obviously.
- From the trade credit, to some extent, the trade credit help to promote technology adoption such as concentrated feed. The core processor enterprise contribute a lot while integrating the value chain.
- From the insurance for households, huge space for improving households' cognition of insurances; dairy insurance clauses should be designed more in line with households' demands.
- MCC gets most value chain financing compared with others in the past years.
- Because of the transformation and upgrading of dairy value chain, MCC can hardly get value chain financing than before and suffered credit constraints, while new operating entities such as cooperatives and family dairy farms getting more policy support.

Potato Value Chain in China



Overview of Potato in China



Sources of Credit in Potato Value Chain

	Small-scale farmers		Medium farmers		Large-scale farmers		Wholesaler	
	2012	2007	2012	2007	2012	2007	2012	2007
Relatives and friends	57.81	64.58	63.24	53.76	57.89	53.93	82.22	75
Rural credit cooperatives	29.69	27.69	26.47	35.43	28.95	32.69	6.66	0
Commercial banks	3.13	0	1.47	1.08	2.63	7.99	8.89	12.5
Private lending	6.25	7.66	8.82	8.6	10.52	2.63	2.22	12.5
others	3.12	0	0	1.08	0	2.63	0	0

Trade Credit in Potato Value Chain

	Small Household		Medium Household		Large Household		Broker		wholesaler	
	2012	2007	2012	2007	2012	2007	2012	2007	2012	2012
Down payment obtained from downstream (%)	1.09	1.11	0.97	1.12	4.62	3.39	6.68	-	3.64	1.09
Payment delayed by downstream (%)	1.32	0	1.16	2.63	1.85	0	16.68	-	10.92	1.32
Pay the upstream down payment (%)	-	-	-	-	-		10	-	3.64	-
Payment owed to upstream	28.09	28.09	31.4	31.16	27.93	16.51	6.68	-	5.46	28.09

Land Rental and Source of Funding for Potato Production

	Small Household		Medium Household		Large Household		Total	
	2012	2007	2012	2007	2012	2007	2012	2007
Land rent fee (Yuan)	113.68	74.99	944.11	240.85	13597.23	1496.65	1915.88	330.95
% of having loans and trade credits in land rental	35.49	27.76	20.47	36.04	13.03	11.11	22.09	29.11
Land renting on credit (%)	2.75	1.1	5.29	2.88	3.57	0.89	3.98	1.79
Land renting by borrowing money (%)	9.34	4.39	7.21	7.69	4.46	2.68	7.37	5.92

Machinery Procurement and Sources of Funding for Potato Farmers

	Small Household		Medium Household		Large Household		Total	
	2012	2007	2012	2007	2012	2007	2012	2007
borrowing when purchasing tractors (%)	37.37	65.85	40.86	56.73	26.79	48.84	36.45	58.52
borrowing when purchasing soil ridging machine (%)	13.16	16.67	10	7.41	8.9	0	9.47	9.23
borrowing when purchasing lamination soil ridging machines (%)	0	0	0	0	0	0	0	0
borrowing when purchasing seeding machine (%)	8.7	12	6.15	3.45	22.22	8.33	9.3	7.58
borrowing when purchasing fertilizer applicator (%)	0	0	0	33.33	100	NA	11.11	20

Table 16. Agricultural Material Purchasing and Source of Funding

	Small Household		Medium Household		Large Household		Total	
	2012	2007	2012	2007	2012	2007	2012	2007
Credit ratio (%)	28.09	28.09	31.40	31.16	27.93	16.51	29.44	26.75
Credit interest	10.95	10.60	11.39	11.09	12.42	10.80	11.56	10.93
Ratio of borrowing (%)	15.82	17.37	21.00	29.69	34.62	44.76	22.04	28.66
Interest rate	10.07	10.55	12.29	9.48	13.53	11.33	12.7	10.52

Table 17. Financial Demands and Supply by farmers

Fund (Yuan)	Small Household		Medium Household		Large Household		Total	
	2012	2007	2012	2007	2012	2007	2012	2007
Funds needed for production (Yuan)	2508.64	1531.44	6654.37	3062.55	20791.75	8626.71	8305.48	3775.11
Owned Fund (Yuan)	2086.71	1158.53	4792.74	2233.85	9986.07	4059.22	4955.74	2180.65
Proportion of the borrowing fund (%)	16.82	24.35	27.98	27.06	51.97	52.95	40.33	42.24

Table 18. Credit Demand and Degree of Satisfaction by farmers

	Small Household		Medium Household		Large Household		Total	
	2012	2007	2012	2007	2012	2007	2012	2007
Ratio of farmers with occurrence of borrowing behaviors	34.07	35.71	32.69	45.67	33.93	35.71	33.47	39.84
In which, the demand completely unable to meet	1.59	10.96	4.23	13.64	0.00	14.89	2.33	13.04
In which, the demand not completely satisfied	14.29	24.66	8.45	23.64	21.05	21.28	13.37	23.48

Table 19. Financing Source of Potato Farmers

	Small Household		Medium Household		Large Household		Total	
	2012	2007	2012	2007	2012	2007	2012	2007
Relatives and friends	57.81	64.58	63.24	53.76	57.89	53.93	60.08	57.72
Rural credit cooperatives	29.69	27.69	26.47	35.43	28.95	32.69	28.19	32.01
Commercial banks	3.13	0	1.47	1.08	2.63	7.99	2.33	2.23
Private lending	6.25	7.66	8.82	8.6	10.52	2.63	8.27	6.93

Major Findings on Potato Farmers

- The improvement of mechanization rate, the increase of land transfer proportion and the upgrading irrigation methods.
- With the change of the operation mode and the rise in prices of agricultural inputs, capital investment needed by farmers for potato production requires was also increasing.
- With the increase in the scale, the proportion of farmers' agricultural production funds from the loan also increased.
- Private lending was still the main source of funding, and among the formal institutions loans, the rural credit cooperatives' support for agricultural production was far greater than commercial banks.
- The Usage Condition of Potato Production Funds, also main parts of cost:
 - ✓ agricultural material procurement
 - ✓ land rental fees
 - ✓ the machinery and labor input

Financing Behaviors of Traders in Potato Value Chain

Table 20. Investment Funds and Financing

	Broker	Wholesaler	Total
The initial capital (10,000Yuan)	1.23	2.31	1.67
In which, the owned fund (10,000Yuan)	0.98	1.45	1.23
Borrowing (10,000Yuan)	0.25	0.86	0.44
Ratio of brokers who get borrowings (%)	14.54	24.45	17.57
Additional funds (10,000 Yuan)	1.43	7.76	5.84
In which, the owned fund (10,000Yuan)	1.23	4.67	3.43
Borrowing (10,000Yuan)	0.2	3.09	2.41

Table 21. Working Capital and Sources

Procurement fund	Rural brokers				Urban wholesalers				All samples		
	2012 busy season	2013 off season	2007 busy season	2008 off season	2012 busy season	2013 off season	2007 busy season	2008 off season	2012 busy season	2013 off season	2007 busy season
Total amount (10,000 Yuan)	20.85	21.2	37.5	37.25	68.59	39.10	32.85	16.67	65.08	37.60	33.02
Self-owned fund (10,000)	17.22	16.78	9	16.39	25.86	14.70	14.62	11.52	25.21	14.83	14.41
Borrowed fund (10,000 Yuan)	10.5	10.5	5	8.72	20.76	7.41	4.88	2.83	20.12	7.66	4.88
Borrowing occurrence rate (%)	13.51	13.51	5.4	4.32	59.84	21.43	22.22	20.14	49.69	18.40	18.40

Major Findings on Wholesalers

- When brokers purchased transport vehicles, the ratio of purchasing on credit was less than the proportion of purchasing by loans, and the loans were mainly private lending. Nearly 20% of brokers used the obtained loans for initial investment and additional investment.
- There was certain purchasing or selling on credit behaviors when brokers were purchasing and selling potatoes. Among this, 5% of brokers would pay farmers the down-payment, and 6% of brokers would delay the payment to farmers. While selling, 13% of brokers would get delayed payment from downstream, and 5% of the brokers would get prepayments from downstream.
- The survey data found that regardless of the off season or busy season, 20% -25% of the borrowing needs were not met. The main reason not to borrow from the bank was the procedure operation factors rather than interest. Private lending was still the main source of borrowing for brokers.

Conclusions

- China's dairy and potato value chain is undergoing the transition from traditional value chain to the modern one, which means the improved scale of operation, better professional and mechanical production, shortened value chain and the reduced segments of the chain.
- In dairy value chain, traditional agricultural financial supply is imbalanced distributed across various entities on value chain. This problem has been around in both dairy and potato industry. The producers and village trader/MCC at the value chain upstream are greater and pressing demands for financing. The country's financial support for agriculture finance mainly occurred in the production segments in potato value chain, while the intermediate segment lacked financial support, which was likely to cause the disjunction of the supply chain link.
- In potato value chain, although rural credit cooperatives broadened the sources of financial support for farmers, no data showed that the farmers' loan interest was lower than that in the links in midstream and downstream.

Conclusions (continued)

- In dairy value chain, medium and small households also have insatiable demands for loans. the presence and prosperity of value chain entities (like milk collection center and cow raising area) that provide professional and commercial services have solved unaffordability of dedicated assets—the problem haunting medium-sized and small households. But with the problem solved, these entities can achieve up-scaled and professionalized agricultural services without purposefully increasing their own scale of operation.
- In potato value chain, the proportions of famers of all scales who were unable to borrow money had greatly reduced, and the proportion of small farmers that can borrow all the required funds has increased. The improvement of farmers' own economic conditions could provide more self-owned financial support for their agricultural production.
- In dairy value chain, the value chain financing is more common, such as the trading credits which are still very important for every actor on the whole value chain during the operation. Core processor enterprises play an important role to integrate the value chain.
- In potato value chain, the proportion of value chain finance was not high. The percentage of trade credit is obviously lower than in dairy value chain. Although the core modern retailer enterprises led to integrating of the value chain, but it is not powerful enough to help the actors to decrease the trading risk and cost.