THE UNIVERSITY of ADELAIDE

The Centre for Global Food and Resources

The IndoDairy Smallholder Household Survey
From Farm-to-Fact

Factsheet 13.1: Profitability Comparison - Household and Farm Characteristics

Background

In the IndoDairy Smallholder Household Survey (ISHS) '*Farm-to-Fact'* series, characteristics of dairy farmers in West Java, including comparisons between the four districts Bogor, Cianjur, Bandung and Garut have so far been assessed.

In Factsheet 13, farmers were categorised into profit-based quartiles. The factsheet identified a set of farmers that are able to achieve higher profit per cow with efficient management and control of costs. Table 1 below shows the average profitability for each quartile.

In this factsheet the same household and farm characteristics presented in Factsheet 3 will be evaluated, however, this time looking for significant differences to help explain the profit quartiles.

Table 1. IndoDairy profitability quartiles.

	Average profit per cow per year	
Quartiles	**IDR**	**USD[1]**
Quartile 1	-687,253	-47.52
Quartile 2	8,652,920	598.42
Quartile 3	13,700,000	947.47
Quartile 4	23,800,000	1645.97

[1]Exchange rate 1 USD = 14,459.50 Indonesian Rupiah on 27July 2018.

Household characteristics

A detailed summary of household and dairy business characteristics by profit quartiles is shown in Table A1 to A3 in the Appendix. The section below summarises characteristics that are and are not different between quartiles.

Significant difference

The following characteristics were significantly different between profit quartiles ($p < 0.05$):

Age of household head and spouse

- Primary and Secondary Decision Makers for Quartile 1 (Q1) and 2 (Q2) households were significantly older than Quartile 3 (Q3); by approximately 4 years.
- Quartile 4 (Q4) households tended to be younger than Q1 and Q2 but older than Q3 households.

Proportion of household income from dairy farming

- The proportion of household income derived from dairy farming progressively increased from 76% in Q1 to 84% in Q4.

Australian Government Australian Centre for International Agricultural Research
Dairy Australia
Ministry of Agriculture Indonesia
IPB University Bogor Indonesia
Australian Aid

Slight difference

The following characteristics trended towards significance between profit quartiles ($p < 0.10$):

Off-farm proportion of income

- Q4 farmers derived a smaller proportion of their household income from off-farm sources (9%) compared to Q1 (15%).

No difference

The following characteristics were not significantly different between profit quartiles ($p > 0.10$):

- Household size
- Number of household assets owned
- House ownership
- Household head gender
- Education of household head and spouse
- Main occupation
- Years of dairy experience
- Main source of capital

Farm characteristics

A detailed summary of farm characteristics by profit quartiles is shown in Table A4 in the Appendix.

Significant difference

The following characteristics were significantly different between profit quartiles ($p < 0.05$):

Milk production per cow per day

- There was a progressive increase for milk produced per cow per day from Q1 (13.8 litres) to Q4 (17.2 litres) as shown in Figure 1.
- Q1 and Q2 farmers were producing significantly less than Q3 and Q4 quartiles.

Number of dairy cattle

- Number of dairy cattle was lowest in the Q4 (most profitable farmers) and highest in the Q1 (least profitable farmers) with 4.3 and 7.4, respectively.
- Q4 farmers had significantly smaller herds than Q1 and Q2 farmers.
- The number of lactating cows was highest in Q1 (3.3) and smallest in Q4 (2.1).

Proportion of milking cows of total herd

- Farmers in the Q1 (least profitable) had the smallest proportion of currently lactating cows in their herd (47%).
- Q2 and Q3 had the highest proportion (56% respectively).
- Q4 farmers tended to have just over half their herd currently lactating (53%).

Time to travel to artificial insemination (AI) technician

- Q1 farmers reported the shortest travel time (15.6 minutes).
- Q3 farmers travelled the longest amount of time (22.5 minutes).
- Despite the difference being significant, it is unlikely to have substantive impacts on profitability as a shorter time for the most profitable farmers is expected. Additionally, there is only a seven-minute difference between the most extreme times.

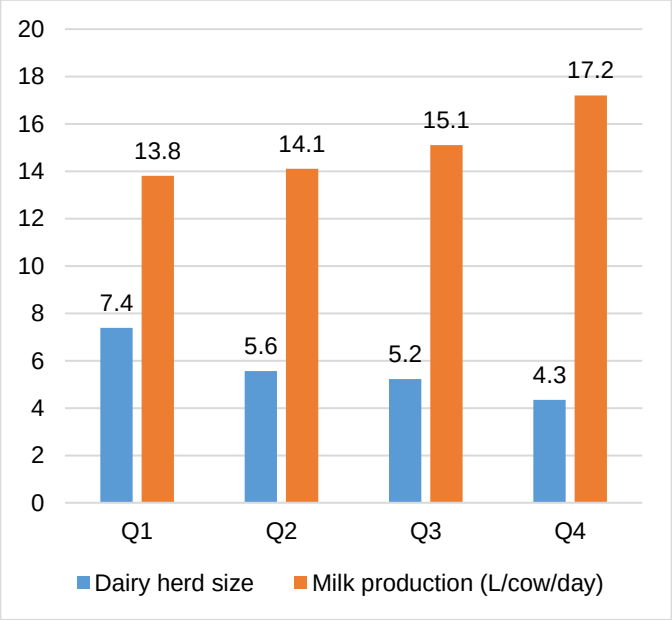

Figure 1. Daily milk production and dairy herd size by profit quartiles.

Slight difference

The following characteristics trended towards significance between profit quartiles ($p < 0.10$):

Number of calves and bulls

- Q1 farmers had the largest number of bulls and calves (2), while Q4 farmers had the smallest numbers.
- However, as a proportion of the herd bulls and calves compromised a similar amount across all quartiles; on average 25% to 28%.

No difference

The following characteristics were not significantly different between profit quartiles ($p > 0.10$):

- Altitude
- Total farm milk production
- Number of other ruminant livestock (beef cattle, buffalo and goats)
- Number and size of land plots
- Distance to:
  - Traditional markets
  - Milk collection centres
  - Dairy co-operatives
  - Free grass
  - Agricultural plots
  - Veterinary or animal health officer

Summary

This factsheet highlights significant differences across profit quartiles on household and farm characteristics. Key insights include:

- **Primary and Secondary Decision Makers for Q1 (least profitable) and Q2 households were significantly older thanQ3 by approximately 4 years. Q4 (most profitable) households tended to be younger than Q1 and Q2 but older than Q3 households.**
- **Number of dairy cattle was lowest in the Q4 and highest in the Q1 with 4.3 and 7.4, respectively. Therefore, Q4 farmers had significantly smaller herds than Q1 and Q2 farmers.**
- **Dairy farmers in the Q4 were able to produce more milk per cow (17.2 litres per day) with the least number of dairy cattle (4.3). This reiterates our findings from the previous factsheet, which indicated that the farmers in the Q4 were able to monitor and control their costs effectively and also achieved higher levels of milk production with a lower dairy herd size.**
- **Farmers in the Q1 had the smallest proportion of currently lactating cows in their herd (47%) while farmers in Q2 and Q3 had the highest proportion (56% respectively).**
- **Q1 farmers reported the shortest travel time (15.6 minutes) to artificial insemination technician, while Q3 farmers travelled the longest amount of time (22.5 minutes).**

In the next factsheets, animal characteristics and farm management practices will be further explored.

Appendix to Factsheet 13.1

This appendix provides summary statistics for household and farm characteristics by profit quartiles. Standard deviations (SD) are included where relevant.

Statistical significance between quartiles were determined using ANOVA (for binary and continuous variables) and Pearson's Chi-squared test (for categorical variables). For categorical variables with small observations ($n < 5$), Fisher's exact test was used to confirm the Chi-squared test. ANOVA and Chi-squared tests results are shown in the right-hand column, under the Total. Pairwise comparisons were performed for continuous and binary variables using Tukey tests when the ANOVA test was trending towards significant ($p < 0.10$). Quartiles with the same letter are not significantly different at the 5% level ($p > 0.05$).

Table A1. Household summary statistics and socio-demographic characteristics (n = 600).

	Quartile 1			Quartile 2			Quartile 3			Quartile 4			Total		
Variable	**Value[1]**	**SD[2]**	**Sig[3]**	**Value[1]**	**SD[2]**	**Sig[3]**	**Value[1]**	**SD[2]**	**Sig[3]**	**Value[1]**	**SD[2]**	**Sig[3]**	**Value[1]**	**SD[2]**	**Sig[3]**
Number of households	150			150			150			150			600		
Number of people per household:	3.87	1.49		4.08	1.52		3.97	1.24		3.86	1.47		3.95	1.44	
Adults[4]	2.63	0.94	a	2.71	0.98	a	2.50	0.84	a	2.48	0.90	a	2.58	0.92	*
Children	1.25	1.04		1.39	1.03		1.49	1.02		1.39	1.01		1.38	1.03	
House ownership:															
Owned	84.7%			82.7%			84.7%			83.3%			83.8%		
Rented	1.3%			0.7%			2.0%			2.0%			1.5%		
Other	14.0%			16.7%			13.3%			14.7%			14.7%		
Number of assets owned:															
Mobile phone	1.95	1.48		1.80	1.39		1.63	1.14		1.65	1.10		1.76	1.29	
Internet access	0.85	1.08		0.76	1.05		0.70	0.95		0.67	0.86		0.75	0.99	
Motorbike	1.57	1.13		1.49	1.10		1.45	1.05		1.36	0.98		1.47	1.07	
Car	0.24	0.64		0.09	0.31	a	0.08	0.39	a	0.09	0.35	a	0.13	0.45	***
Truck	0.00	0.00		0.00	0.00		0.01	0.08		0.00	0.00		0.00	0.04	
Television	1.26	0.67		1.15	0.53		1.15	0.48		1.18	0.49		1.19	0.55	
Refrigerator	0.47	0.67	a	0.39	0.52	a	0.33	0.47	a	0.47	0.68	a	0.42	0.59	*
Washing machine	0.23	0.44	b	0.15	0.35	ab	0.12	0.33	b	0.17	0.37	ab	0.17	0.38	*

[1]Value is either percentage or mean; [2]SD = Standard Deviation; [3]Sig = Significance; * p < 0.10, ** p < 0.05 and *** p < 0.01 indicate significance at the 10%, 5% and 1% levels, respectively; [4]Adults are ≥ 18 years of age; Pairwise comparisons were performed for continuous and binary variables using Tukey tests when the ANOVA test was trending towards significant (p < 0.10). Quartiles with the same letter are not significantly different at the 5% level (p > 0.05).

Table A2. Primary and secondary decision maker summary statistics by profit quartile.

Variable	Quartile 1			Quartile 2			Quartile 3			Quartile 4			Total		
	Value[1]	SD[2]	Sig[3]	Value[1]	SD[2]	Sig[3]	Value[1]	SD[2]	Sig[3]	Value[1]	SD[2]	Sig[3]	Value[1]	SD[2]	Sig[3]
Primary decision maker information (n = 600)															
Gender:															
Male	96.0%			95.3%			99.3%			95.3%			96.5%		
Female	4.0%			4.7%			0.7%			4.7%			3.5%		
Age	48.70	12.01	b	48.10	11.17	ab	44.82	11.03	a	46.54	11.82	ab	47.04	11.59	**
Education (years)	6.65	3.37		6.26	3.19		6.06	3.01		6.56	2.88		6.38	3.12	
Main Occupation:															
Dairy farming	80.7%			84.0%			87.3%			88.7%			85.2%		
Farmer or fishermen	6.0%			5.3%			2.0%			1.3%			3.7%		
Self-employed/employer	2.0%			0.7%			0.0%			0.7%			0.8%		
Wage/salaried employee	8.0%			8.7%			8.0%			8.7%			8.3%		
Unpaid family/community worker	1.3%			0.0%			1.3%			0.0%			0.7%		
Unemployed	0.7%			1.3%			0.7%			0.7%			0.8%		
Other	1.3%			0.0%			0.7%			0.0%			0.5%		
Secondary decision maker information (n = 563)															
Gender:															
Male	0.0%			0.0%			0.0%			0.7%			0.2%		
Female	100.0%			100.0%			100.0%			99.3%			99.8%		
Age	43.05	10.43	b	42.01	9.42	b	38.86	9.87	a	41.09	10.52	ab	41.23	10.16	***
Education (years)	6.50	3.17		6.50	2.71		6.55	2.72		6.91	2.62		6.63	2.81	
Main Occupation:															
Dairy farming	23.6%			26.6%			25.2%			17.7%			23.3%		
Farmer or fishermen	5.0%			3.6%			2.0%			1.5%			3.0%		
Self-employed/employer	10.0%			7.9%			10.2%			12.5%			10.1%		
Wage/salaried employee	9.3%			12.2%			13.6%			9.6%			11.2%		
Unpaid family/community worker	40.0%			33.8%			36.7%			44.9%			38.8%		
Unemployed	11.4%			12.2%			12.2%			12.5%			12.1%		
Retired	0.7%			0.7%			0.0%			0.7%			0.5%		
Other	0.0%			2.9%			0.0%			0.7%			0.9%		

[1]Value is either percentage or mean; [2]SD = Standard Deviation; [3]Sig = Significance; * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$ indicate significance at the 10%, 5% and 1% levels, respectively; Pairwise comparisons were performed for continuous and binary variables using Tukey tests when the ANOVA test was trending towards significant ($p < 0.10$). Quartiles with the same letter are not significantly different at the 5% level ($p > 0.05$)

Table A3. Dairy business information summary statistics by profit quartile (n = 600).

	Quartile 1			Quartile 2			Quartile 3			Quartile 4			Total		
Variable	**Value[1]**	**SD[2]**	**Sig[3]**	**Value[1]**	**SD[2]**	**Sig[3]**	**Value[1]**	**SD[2]**	**Sig[3]**	**Value[1]**	**SD[2]**	**Sig[3]**	**Value[1]**	**SD[2]**	**Sig[3]**
Would you say the dairy business is for your household:															
The main business activity	89.3%			90.7%			92.0%			90.7%			90.7%		
A secondary business	10.0%			9.3%			8.0%			9.3%			9.2%		
Third or fourth	0.7%			0.0%			0.0%			0.0%			0.2%		
Proportion of household income (%):															
Dairy farming	75.83	35.76		78.57	38.03		80.19	43.01		83.87	24.91		79.61	36.07	
Off-farm[4]	14.60	31.43	a	8.05	17.82	a	9.95	21.39	a	8.53	19.12	a	10.28	23.16	*
Crops	0.99	6.09		0.17	1.08		0.43	1.88		1.42	7.46		0.75	4.95	
Horticulture	7.16	19.84		11.58	31.42		6.99	29.86		5.34	12.30		7.77	24.66	
Aquaculture	0.07	0.62		0.02	0.26		0.00	0.00		0.00	0.00		0.02	0.33	
Other Livestock	1.35	6.18		1.61	8.28		2.44	21.00		0.83	8.24		1.56	12.39	
Dairy business experience (years)	19.37	10.83		20.10	10.16		17.53	9.74		19.33	10.75		19.08	10.40	
Main source of capital in last 12 months:															
Personal	74.7%			82.7%			84.0%			84.7%			81.5%		
Loan	21.3%			14.0%			16.0%			12.7%			16.0%		
Partnership	89.3%			90.7%			92.0%			90.7%			90.7%		
Inheritance	10.0%			9.3%			8.0%			9.3%			9.2%		

[1]Value is either percentage or mean; [2]SD = Standard Deviation; [3]Sig = Significance; * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$ indicate significance at the 10%, 5% and 1% levels, respectively; [4] Off-farm: Pairwise comparisons were performed for continuous and binary variables using Tukey tests when the ANOVA test was trending towards significant ($p < 0.10$). Quartiles with the same letter are not significantly different at the 5% level ($p > 0.05$).

Table A4. Farm summary statistics by profit quartile (n = 600).

	Quartile 1			Quartile 2			Quartile 3			Quartile 4			Total		
Variable	**Value[1]**	**SD[2]**	**Sig[3]**	**Value[1]**	**SD[2]**	**Sig[3]**	**Value[1]**	**SD[2]**	**Sig[3]**	**Value[1]**	**SD[2]**	**Sig[3]**	**Value[1]**	**SD[2]**	**Sig[3]**
Average altitude (km)	1.26	0.33		1.30	0.26		1.30	0.29		1.25	0.31		1.28	0.30	
Daily milk production															
Total farm (L/day)	37.47	39.46		37.86	33.64		41.20	40.38		39.58	25.77		39.02	35.24	
Per lactating cow (L/cow/day) (n=1626)	13.83	4.58	a	14.14	4.38	a	15.11	4.31		17.16	4.35		14.89	4.57	***
No. of livestock (ruminants)															
Dairy cattle	7.39	7.07		5.56	4.27	a	5.23	4.35	a	4.34	3.03	a	5.63	5.02	***
Beef cattle	0.47	4.11		0.05	0.38		0.05	0.32		0.01	0.12		0.15	2.08	
Buffalo	0.99	8.25		0.09	0.50		0.09	0.63		0.24	1.16		0.35	4.19	
Goats/sheep	0.21	1.49		0.03	0.29		0.05	0.41		0.15	0.90		0.11	0.91	
No. of dairy cattle managed															
Lactating cows	3.28	3.56	a	2.92	2.29	a	2.75	2.29	ab	2.07	1.46	b	2.75	2.55	***
Dry cows	0.50	0.93	b	0.26	0.56	a	0.27	0.83	a	0.30	0.74	ab	0.33	0.78	**
Replacement cows	1.53	1.90		1.03	1.14	a	0.89	1.02	a	0.74	0.90	a	1.05	1.33	***
Other dairy cattle (calves and bulls)	2.07	2.50		1.35	1.64	a	1.34	1.67	a	1.23	1.22	a	1.50	1.84	***
Proportion of milking cows of total herd (%)	47.21	18.70	b	56.41	20.24	a	56.23	19.72	a	53.10	23.28	ab	53.24	20.84	***
Number of land plots per farm	2.25	1.37		2.32	1.38		2.05	1.25		2.10	1.29		2.18	1.32	
Land tenure ownership and usage (ha)															
Total managed	0.82	3.69		0.42	0.66		0.38	0.74		0.35	0.57		0.49	1.94	
Total owned	0.38	2.38		0.13	0.34		0.11	0.54		0.15	0.36		0.19	1.25	
Total used for dairy production[4]	0.23	0.60		0.26	0.50		0.20	0.39		0.20	0.47		0.22	0.50	
Distances in minutes to:															
Traditional market (n=598)	21.45	14.17		25.20	15.50		25.37	18.06		25.11	18.51		24.29	16.70	
Milk collection point (n=592)	7.84	5.35		7.82	6.22		8.72	7.70		8.09	6.32		8.12	6.45	
Dairy co-operatives (n=593)	30.30	24.46		33.78	24.11		35.77	26.22		33.53	27.11		33.35	25.51	
Free grass (n=588)	21.32	19.62		21.25	16.93		23.01	20.63		20.57	18.28		21.53	18.87	
Your agricultural plots (n=582)	9.12	12.93		10.56	13.91		10.01	11.60		8.41	9.09		9.53	12.03	
House of inseminator (n=439)	15.63	13.30	a	19.96	18.17	ab	22.51	21.97	b	16.50	13.44	ab	18.61	17.22	***
Livestock clinic/veterinary doctor (n=381)	25.04	21.91		27.54	22.56		26.20	22.99		27.60	21.32		26.59	22.15	

[1]Value is mean. [2]SD = Standard Deviation. [3]Sig = Significance; * p < 0.10, ** p < 0.05 and *** p < 0.01 indicate significance at the 10%, 5% and 1% levels, respectively; [4]Land used for dairy production includes for grazing dairy cattle and growing forages; Pairwise comparisons were performed for continuous and binary variables using Tukey tests when the ANOVA test was trending towards significant (p < 0.10). Quartiles with the same letter are not significantly different at the 5% level (p > 0.05).