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# Analysis adding value and profit margin on smallholder dairy farming at Batu City, East Java

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Abstract. Study was held on the smallholder dairy farming at Batu City, East Java. This research addressed to examine dairy farming value added and profit margin. Multistage sampling method was a technique to select 33 farmers who grouped into 3 scales involving scale -1 (having 5–5.5 Animal Unit (AU), n = 9), scale-2 (owning 6–7 AU, n = 7), and scale-3 (controlling 7.5–8.5 AU, n = 17). Primary and secondary data collection was about two months (April-June 2019). Descriptive analysis using economic formulation method was employed to analyse the data. Results reported that respondents were male farmers aged 50-59 years old with secondary school education and length experience (21-30 years) in raising dairy cattle and they came from medium family member (4-5 persons). Farmers who raised 6-7 AU (scale-2) achieved the highest value added about 45.23%, followed by 43.30% for scale-3 and 37.46% for scale-1. Similarly, profit margin was best-performing in scale-2 (25.33%) compared to scale-3 (24.75%) and scale-1 (22.27%).

#### **1. Introduction**

Batu city has a cool climate as located at altitude of about 800 meters above sea level. This city has already renown for tourist destination with hundred amazing place. In fact, only 10% land was available for community, while 90 % was forest area. Obviously, the majority labor focused activities related to tourism sector. About 38% workera was absorbed in trading, services sector can provide 25% job for labor market, and only 7.6% has consistently working in agriculture, forestry, and animal husbandry [1]. It is however amazing since dairy farming sector was still existing and preserving as favourable livelihood and it was very useful for rural communities in providing employment opportunity and generating household incomes. [2] stated that the present of dairy cattle was excellent farming compared to other livestock farming, It was about 5,195 dairy cattle, composed 2,805 heads for Junrejo and 3,950 heads for Bumiaji sub-district.

In regard to dairy farming livelihood, previous studies discovered that this farming become imperative for villager livelihood since it can provide daily earning from selling fresh milk. This venture represents as prospective farming and contributes the good income for farmers' household [3]. Particularly, in the area where land holding is inadequate and unbalanced and therefore, smallholder dairy farming might become an alternative income enhancement [4] Farmers who kept 3-5 AUs can contribute about 39% to household Income [5]. Profit of dairy cattle per Animal Unit in monthly basis was about IDR 767,271 [6], IDR 166,667/AU/month in West Java [7]. Study in in Budur Province of Turkey found net profit USD 188.28/AU/year [8].

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However, farmers have high dependency on cooperatives and milk processing industry in distributing and marketing of fresh milk and this can impact on the low performance of the smallholder dairy farming [9]. This circumstance also has consequence on less economic sustainable category for small-scale dairy farming in which they are reluctant to participate in increasing the dairy farming value chain [10]

Value chain map can be used to identify function and contribution of actors along the chain [11] This chain can identify economic performance and margin of each stakeholder. [12] emphasised on structure and dynamic of the value chain, the structure of value chain consists of the five elements namely end markets, venture and environment supporting factors, vertical connections, horizontal relationships, and supporting markets. Dynamic value chain refers to up-grading, value chain governance, firm power for internal relationships, collaboration and competitiveness between firms, and technology transfer and learning among firms. Therefore, case study proposed to investigate the ading value and profit margin of the small holder dairy farming.

#### 2. Materials and methods

Bumi Aji Sub-district of Batu City was the location of research. Multistage sampling method was a technique to select 33 farmers who grouped into 3 scales involving scale -1 (having 5–5.5 Animal Unit (AU), n = 9), scale-2 (owning 6–7 AU, n = 7), and scale-3 (controlling 7.5–8.5 AU, n = 17). Primary and secondary data collection was about two months (April–June 2019). Primary data is data obtained directly from the farmer by interviews and structured questionnaire on production cost and revenue from rearing dairy cattle. Secondary data are obtained from the appropriate institutions such as the Department of Animal Husbandry, Central of Statistics, local government, and related institutions. Data analysis involved descriptive technique to identity the profile of smallholder dairy cattle (answering the first research objective). Also, applying value added equation to measure the adding value 0n-farm sector (answering the second research objective). and economic formulation (i.e. income, profit margin) to calclate profit margin of smallholder dairy farming (nswering the third research objective).

# 3. Results and discussion

In general, farmers was represented by male aged 41–60 years old in scale-1 (51%), scale-2 (80%) and scale-3 (72%). Similar trend was on the number of family members in which majority farmers involved in the medium numbers of household members ranged between 4–6 persons. Secondary high school has more prevalent in scale-2 (70%) and scale-3 (44%) with exception for scale-1 (13%). Mostly farmers in scale-1 however, had high school attainment than those of farmers in scale-2 (13%) and scale-3 (31%). Farmers in scale-2 and scale-3 had length experience (21–30 years) than scale-1 (11–20 years) in running dairy farming.

# 3.1. On-farm adding value of smallholder dairy farming

On-farm adding value was the margin between output price and input cost (variable input) of dairy cattle. Output price calculated dairy cattle produce including both fresh milk and calves on the yearly basis. Study discovered that total output increased in line with the rising farm-scale with exception for scale-2 (Table 1). Total output per animal unit (AU) composed with selling fresh milk and calves and ranging between IDR 75,350–IDR 809,834. It was less number about IDR 67,010–IDR 72,650 of the output from fresh milk only. The farming in scale-3 showed the highest number both IDR 809,834 (Total output) and IDR 72,659 (Fresh milk only). About 7 lactating cows were raising with the high milk productivity of 13.41 litre per cow may become the advantage factor to have higher output.

Input cost counted variable input expenses to produce output in form of the primary dairy cattle product. Total input cost has fluctuated and tended to increase along the farm-scales. The input cost per animal unit (AU) ranged between IDR 51,884–IDR 56,512. Farming in the scale-2 was the more efficient input cost about IDR 51,884 compare to scale-1 (IDR 55,826) and scale-1 (IDR 56,512).

Farmers have experienced long time about 21–30 years in operating their farm, therefore they have ability to deal with any problem in dairy cattle production.

Adding value on-farm sector was fluctuating along the farm-scales and proning to decrease into 43.30% in the scale-3. On-farm sector of small dairy farming can add the value ranging between 37.46% and 45,23%. The high added value was on scale-2 which can obtain 45.23% than those 43.30% for scale-3 and 37.46% for scale-3. The best adding value (45.23%) in scale-2 means that IDR 100,000 expenses on input will increase the value of dairy cattle output about IDR 45,230. Majority (80%) farmers in the scale-2 have secondary school and therefore they have capability to improve the knowledge in raising dairy cattle in order to make efficient input cost and increasing dairy cattle productivity.

	Scale-1		Scale-2		Scale-3	
Explanation	IDR/Day	IDR/AU	IDR/Day	IDR/AU	IDR/Day	IDR/AU
Dairy cattle output						
Fresh milk output	327,000	68,410	382,629	67,010	508,553	72,650
Calves output	39,815	8,330	47,619	8,340	58,333	83,34
Total Output	366,815	76,740	430,248	75,350	566,886	809,834
Dairy cattle input						
Concentrate feed	105,129	19,724	108,975	18,765	155,207	19,696
Forage feed	116,422	21,843	121,124	20,857	172,909	21,943
Electricity and water	1,000	188	1,700	262	2,200	279
Labour	70,000	13,133	70,000	10,769	105,000	13,325
Transportation	5,000	938	8,000	1,231	10,000	1,269
Total input costs	297,551	55,826	309,799	51,884	445,316	56,512
Adding value (IDR)	69,264	20,914	120,449	23,466	121,570	24,472
Adding value (%)	23.28	37.46	38.88	45.23	27.3	43.3
Adding value of fresh milk only (IDR)	29,449	12,584	71,386	15,126	63,237	16,138
Adding value of fresh milk only (%)	9.9	22.54	23.04	29.15	14.2	28.56

Table 1. Adding value of smallholder dairy farming by farm-scales.

Note: scale-1: 5–5.5 AU; scale-2: 6–7 AU; scale-3: 7.5–8.5 AU

Adding value from milk only was going up to 29.15% on scale-2, and down into 28.56% on scale-3 (Table 1). The best adding value proved in scale-2 about 29.15%. It can intepreted that every IDR 100,000 input cost can add the value of fresh milk around IDR 29,150. The good management in rearing dairy cattle can make efficient input cost and hence increase the output price of fresh milk.

#### *3.2. The profit margin of small scale dairy farming*

The revenue of smallholder dairy farming was grouped into Total Dairying Revenue (TDR) and Milk Revenue Only (MRO). TDR and MRO were fluctuating along with farm-scales and tending to incline on the scale-3 (Table 2). The farming in scale-3 had the best revenue both IDR 80.904 (TDR) and IDR 72,659 (MRO). Total Production cost indicated fluctuation trend and tend to ncrease in scale-3. The efficient production costs was performed by scale-2 about IDR 56,266 per animal unit. Likewise the variable expenses were lowest in scale-2 (IDR 51,884) in comparison with scale-1 (IDR 55,826) and scale-3 (IDR 56,512). Profit per animal unit fluctuated along the farm-scales and tend to increase. The best profit about IDR 20,041 occured on scale-3, and the lowest one experienced in scale-1 approximately IDR 17,087.

Profit margin was fluctuating and tending to going down in scale-3. The higher profit margin was on scale-2 about 25.33%. This finding explains that every IDR 100,000 revenue on scale-2 will provide profit about IDR 25,330. However, profit margin from milk only was going up with the increase of dairy farm-scale as seen in Table 2. This is about 12.80,for scale-1 and incline to 16.03%

for scale-2 and 16.12% for scale-3. Hence, scale-2 obtained the larger profit margin from milk only about 16.12%. It means that every IDR 100,000 revenue for selling fresh milk will provide profit IDR 16,030.

Explanation	Scale-1		Scale-2		Scale-3	
	IDR/AU	%	IDR/AU	%	IDR/AU	%
Revenue						
Selling fresh milk	68,410	89.15	67,010	88.93	72,650	89.71
Sellng calves	8,330	10.85	8,340	11.07	8,334	10.29
Total revenue	76,740	100	75,350	100	80,984	100
Production cost						
Total fixed cost	3,827	6.42	4,382	7.79	4,431	7.27
Total variable cost	55,826	93.58	51,884	92.21	56,512	92.73
Total Production cost	59,653	100	56,266	100	60,943	100
Profit	17,087		19,084		20,041	
Profit Margin (%)	22.27		25.33		24.75	
Profit from milk only	8,757		10,744		11,708	
Profit Margin from milk only (%)	12.8		16.03		16.12	

**Table 2.** Profit and profit margin of smallholder dairy farming by farm-scales.

Profit margin was fluctuating and tending to going down in scale-3. The higher profit margin was on scale-2 about 25.33%. This finding explains that every IDR 100,000 revenue on scale-2 will provide profit about IDR 25,330. However, profit margin from milk only was going up with the increase of dairy farm-scale as seen in Table 2. This is about 12.80,for scale-1 and incline to 16.03% for scale-2 and 16.12% for scale-3. Hence, scale-2 obtained the larger profit margin from milk only about 16.12%. It means that every IDR 100,000 revenue for selling fresh milk will provide profit IDR 16,030.

# 3.3. The revenue of dairy farming

The revenue of smallholder dairy farming was grouped into Total Dairying Revenue (TDR) and Milk Revenue Only (MRO) as presented in Figure 1. The revenue for dairy cattle fluctuated and tended to increase in scale-3. The finding confirmed that the TDR per animal unit (AU) was highest in the scale-3 (IDR 80,984), and followed by scale-1 (IDR 76,740) and scale-2 IDR 75,350). Selling fresh milk per animal unit has similar tren which fluctuating and going up in scale-3. The best MRO per animal unit (AU) was on the scale-3 (IDR 72,650), and followed by scale-1 (IDR 68,410) and scale-2 IDR 67,010).  $\backslash$ 



Figure 1. Revenue of small scale dairy farming by strata

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The structure of the TDR was dominated by revenue from selling fresh milk with ranged between 88.93%–89.71%.. The revenue of selling fresh milk in scale-3 was outweigh scale-1 (89.15%) and scale-2 (88.93%).The revenue from selling calves was more higher in scale-2 (11.07%) compared with scale-1 (10.85%) and scalle-3 (10.29%).

#### 3.4. The fixed cost structure for smallholder dairy farming

Fixed costs increased along with the inclined of the farm-scales as seen in the Table 2. The efficient fixed costs per animal unit was on scale-1 about IDR 3,827 in comparison with those IDR 4,382 and IDR4,431 for scale-2 and scale-3, respectively.



Figure 2. Fixed costs structure of smallholder dairy farming.

The structure of fixed cost was dominated by land rent expenses with scale-1 indicated more efficient (4.20%) than other scales. Also, depreciation expenditure in this scale-1 was in the second order with the lowest cost was about 1.64\%. The lowest structure of the fixed costs was land and building taxes has the little cost of 0.35% on scale-.

#### 3.5. The structure of variable costs in smallholder dairy farming

Variable cost was fluctuating and tending to increase in scale-3 as seen in Figure 3. The variable expenses were lowest in scale-2 (IDR 51,884) in comparison with scale-1 (IDR 55,826) and scale-3 (IDR 56,512). The largest variable cost in scale-3 because more forage and concentrate need to feed this livestock.

The streucture of variable cost was dominated by forage expenses with scale-3 indicated more efficient (36.01%) than other scales. Alaso, concentrate feed expendiiture in this scale was in the second order with the lowest cost was about 32.32%. The third highest of variable costs was labour expenditure with scale -2 has the little cost of 19.24%.

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Figure 3. Structure variable costs for smallholder dairy farming.

# 4. Conclusion and suggestion

Research on smallholder dairy farming found that Farmers were male aged 50–59 years old with secondary school education and length experience (20–30 years) in raising dairy cattle and they came from medium family member (4–5 persons). Farmers who raised 5–7 AU (scale-2) achieved the highest value added about 57.36%, followed by 43.30% for scale-3 and 37.46% for scale-1. Profit margin was best-performing in scale-2 (30.63%) compared to scale-3 (24.75%) and scale-1 (22.27%).

It was suggested that the utilisation of qualified forage need to be improved to increase milk productivity. The ratio between fodder and cocentrate feed need to be evaluated for the appropriate comparison. The clean and healthy environment required to be promoted in order to achieve good and safety milk products.

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