Dairy cattle farming: how the performance of household labour participant in the farm chain

H D Utami, B A Nugroho, U Wisaptiningsih and H Nugroho
Faculty of Animal Science, Brawijaya University, Jl. Veteran Malang, Indonesia
Email: hrdwutami4@ub.ac.id

Abstract. A Case study was held at smallholder dairy farming at Malang, East Java Province of Indonesia. The research aimed to investigate the value-generating between the household labours in terms of the time allocation and its productivity in engaging dairy cattle. Multi-stage sampling method was a technique to obtain the three strata of dairy farming, including stratum-1 (n=12), stratum-2 (n=8) and stratum-3 (n=6) with average owning about 5.22 AU, 6.5 AU and 7.88 AU, respectively. Data collection used survey method for primary data, whereas secondary data were provided by related institutions. Descriptive analysis using the formulation productivity were applied to analyse the data. Results discovered that productivity per Animal unit stratum-3 confirms the highest one (IDR 20,041) than those stratum-2 (IDR 19,084) and stratum-1 (IDR 17,087). This farm also devoted the efficient in rearing dairy cattle about 1.36 hours/AU compared to 1.41 hours (stratum-2) and 1.42 hours (stratum-1). In addition, the largest productivity per hours was on stratum-3 about IDR 14,736 in comparison with about IDR 13,535 for stratum-2 and IDR 12,033 for stratum-3. Regarding gender however, stratum-2 exhibited the highest productivity, namely IDR 13,567 and IDR 647 for men and women labour, respectively.

1. Introduction
Evidence showed that profitable dairy farming is likely attracting for rural people to running this farm as the livelihood [1] since the benefits in providing daily cash income [2]. Majority households labour are both involved in management and production of dairy cattle. Women still contribute more burdens in dairy daily activities for instance milking, feeding animal cleaning barn and marketing of milk product more than men, children and hired labour [3]. Some previous study however, discovered constraints relating to women participation in dairy farm practice include cultural values, normative patterns and customs [4]. In addition, the socioeconomic status in which the women from affluent families afforded labour which in turn reduced their involvement in livestock management activities [5]. Women in Tanzania tend to own fewer tropical livestock units (TLUs) than men and provided on average less of their labour time to animal production and husbandry, they allocate more time to the sale of milk and tend to more commercially oriented [6]. Likewise, Women in Tanzania [7] showed the greater involvement in sale of milk and allocate higher labour in selling milk than men in Kilosa, Handeni and Mvomero districts. Either small or more hours’ women allocating in dairy activities however, they have
created an opportunity, offered the importance beneficiaries in improving their roles in running dairy cattle farming as well as their wellbeing that potentially have positive effects on the next generation. Reference [8] added that even though women did not capture decision making over money from milk sales, the high share of female on selling livestock products, including milk becomes pathway for poverty alleviation. Regarding dairy farming productivity, [9] suggested the strong extension program to improve women skill and knowledge and leads to maximize the smallholder dairy farm productivity. Whereas [10] argued the importance of farming scales, number of livestock, yielding per hectare, productivity, energy, and venture capital towards the dairy farming efficiency. Reference [11] focused on market quality for milk and inputs should be enhanced, either by establishing or strengthening producer organisations, to reduce transaction costs, secure milk delivery possibilities and increase empowerment of farmers. This study has been carried out to insight into evidence in distinguishing women spend time in dairy farming activities compare those from man household labour. Also, the women and man family labour productivity in operating their farming required to be explored.

2. Research method
The research aimed to investigate the value-generating between the household labours in terms of the time allocation and its productivity in engaging dairy cattle. Multi-stage sampling method was technique to obtain the three strata of dairy farming, including stratum-1 (n=12), stratum-2 (n=8) and stratum-3 (n=6) with average owning about 5.22 AU, 6.5 AU and 7.88 AU, respectively. Data collection used survey method for primary data, whereas secondary data were provided by related institutions. Descriptive analysis using the formulation productivity were applied to analyse the data. Primary data was obtained directly from the farmer by interviews and structured questionnaire on the household labour devoted their time on dairy activities and the productivity that can be obtained.

3. Results and discussion
Study has the interesting discovering towards distinguishing household labour in operating dairy farming based on gender. The difference farming scale has also relating to the men and women labour allocation their time and leads to their productivity on dairy farming activities. Detail of the results will have discussed in the following paragraphs.

3.1. Household labour allocation in dairy farming
Table 1 showed the labour spend on dairy farming activities, which farmer in stratum-3 used the efficient time in their allocating in rearing dairy cattle about 1.36 hours/animal unit.

| Explanation                     | Stratum-1 | %    | Stratum-2 | %    | Stratum-3 | %    |
|--------------------------------|-----------|------|-----------|------|-----------|------|
| Man labour (minute/farm)        | 387.25    | 85.11| 465.30    | 84.60| 351.21    | 54.67|
| Woman labour (minute/farm)      | 67.75     | 14.89| 84.70     | 15.40| 83.39     | 12.98|
| Hired Labour (minutes/farm)     | -         | -    | -         | -    | 207.82    | 32.35|
| Total labour Allocation (minutes/farm) | 455.00 | 100  | 550.00    | 100  | 642.42    | 100  |
| Man labour (hours/AU)           | 1.42      | 1.41 | 1.41      | 1.36 |           |      |
| Woman labour (hours/AU)         | 0.21      | 0.22 | 0.22      | 0.18 |           |      |

The existence of hired labour contributes 32.35% and household labour supplies 67.65% in daily dairy tasks. Hence, both women and men family labours had the lowest (12.98% vs 54.67%) contribution than those for stratum-2 (15.40% vs 84.60%) and stratum-3 (14.89% vs 85.11%). The most time was devoted on collecting forage and milking for man household labour, whereas women family worker dominated on feeding cattle and keep clear the housing activities. This finding was consistent
with study of [3] in which women still contributed more burdens in dairy daily activities for instance milking, feeding animal cleaning barn.

Based on time allocation per hour, women labour in stratum-3 devoted less time (0.18 hours) in daily dairy works in comparison with stratum-1 (0.21 hours) and stratum-2 (0.22 hours). Likewise, it was only a little time (0.74 hours) of men family labour in stratum-3 involving in dairy activities compared to stratum-2 (1.19 hours) and stratum-1 (1.21 hours). Therefore, the involvement of casual labour in stratum-3 will efficient time for the household labour allocation and leads to increase their time productivity in dairy activities.

3.2. Profit and loss statement for smallholder dairy farming

Table 2 explained that the highest revenue per animal unit (AU) occured on stratum-3, whereas stratum-2 experiences with the lowest return about IDR 75,350. The efficient expenses were on stratum-2 (IDR 56,266), followed by stratum-1 (59,653) and stratum-3 (IDR 60,943). The income increased in-line with the adding of dairy cattle number, starting from IDR 17,087 in stratum-1, IDR 19,084 for stratum-2 into IDR 20,041 in stratum-3. It was interesting finding that the best profit showed in the stratum-3, even though this farm used more cost in operating dairy cattle farming.

| Explanation                  | Stratum-1 (IDR/AU) | %  | Stratum-2 (IDR/AU) | %  | Stratum-3 (IDR/AU) | %  |
|------------------------------|--------------------|----|--------------------|----|--------------------|----|
| **Revenue**                  |                    |    |                    |    |                    |    |
| 1. Selling fresh milk        | 68,410             | 89.15 | 67,010             | 88.93 | 72,650             | 89.71 |
| 2. Selling calves            | 8,330              | 10.85 | 8,340              | 11.07 | 8,224              | 10.29 |
| **Total revenue**            | 76,740             | 100 | 75,350             | 100 | 80,984             | 100 |
| **Production cost**          |                    |    |                    |    |                    |    |
| 1. Total fixed cost          | 3,827              | 6.42 | 4,383              | 7.79 | 4,431              | 7.27 |
| 2. Total variable cost       | 55,826             | 93.58 | 51,884             | 92.21 | 56,512             | 92.73 |
| **Total production costs**   | 59,653             | 100 | 56,266             | 100 | 60,943             | 100 |
| **Profit**                   | 17,087             | 19,084 | 20,041             | 24.75 | 22,720             | 12.80 |
| **Profit margin (%)**        | 22.27              | 25.33 | 24.75              | 16.12 |
| **Profit margin milk only**  | 8,757              | 10,744 | 11,708             | 16.12 |
| **Profit Margin milk only (%)** | 12.80          | 16.03 | 16.12              | 16.12 |

Regarding profit margin, the largest one was achieved in stratum-2 about 25.53% with the slightly different for stratum-3 of 24.75% and the lowest was reported in stratum-1 about 22.27%. It can be interpreted that the revenue about IDR 1,000,000 will provide the highest income about IDR 255,300 for stratum-2 compared to 247,500 for stratum-3 and IDR 222,700 for stratum-2. Profit margin from milk only for stratum-3 (16.12%) indicated little bit different than those for stratum-2 (16.02%), while it was the lowest profit margin in stratum-1 (12.80%).

3.3. Labour productivity per Animal Unit (AU) in dairy farming tasks

Base on animal unit, the daily household labour productivity per farm enhanced from IDR 17,087 into IDR 20,041 as the increase the number of dairy cattle controlled (figure 1). In contrast, the men labour productivity decreased from IDR 14,543 into IDR 10,956 along with the improvement of dairy cattle number. The similar trend occurred for women labour. In which women worker productivity reduced in-line with the adding of dairy cattle number, starting from IDR 2,544 in stratum-1, decreased to IDR 2,939 in stratum-2 and IDR 19,084 in stratum-3.
Figure 1. Labour productivity in smallholder dairy farming activities.

Figure 1 describe the best productivity for men in comparison those for women household labour in allocating their time in dairy farming activities. The highest men worker productivity exhibited in stratum-3 about IDR 20,041/AU/day. Whereas women in stratum-2 have proved to achieve the largest productivity per animal unit about IDR 19,084 per day. The small hour’s women participation in dairy activities, however, still have an important role as a pathway for poverty alleviation [8].

3.4. Productivity per hour in dairy farming
The labour productivity per hour tends to small increase from IDR 12,033 into IDR 14,736 as the increase in the number of dairy cattle controlled figure 2.

Figure 2. Labour productivity per hour in smallholder dairy farming activities.

The man labour productivity exhibited the fluctuate trend with starting IDR 12,019 in stratum-1 increase to IDR 13,567 in stratum-2, then decrease to IDR 8,108 in stratum-3. Also, women labour productivity has fluctuation trend and tend to decrease. It was about IDR 534 in stratum-1, increased to IDR 647 in stratum-2, and finally decreased into IDR 468 in stratum-3.
Women labour productivity per hour discovered lowest compared to those for man family worker regardless of the stratum since they devoted only little hours in daily activities in running dairy farming. Even though women labour posits only little hours, however, this has potential to create opportunity, offer the importance beneficiaries in improving their roles in running dairy cattle farming as well as their wellbeing that have the potential to have positive effects on the next generation.

4. Conclusions
Study on smallholder dairy farming discovered the following findings.
1. Productivity per Animal unit stratum-3 confirmed the highest one (IDR 20,041) than those stratum-2 (IDR 19,084) and stratum-1 (IDR 17,087).
2. This farm also devoted the efficient in rearing dairy cattle about 1.36 hours/AU compared to 1.41 hours (stratum-2) and 1.42 hours (stratum-1).
3. The largest labour productivity per hours was on stratum-3 about IDR 14,736 in comparison with about IDR 13,535 for stratum-2 and IDR 12,033 for stratum-3.
4. Regarding gender however, stratum-2 exhibited the highest productivity, namely IDR 13,567 and IDR 647 for men and women labour, respectively.

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