

## **A Review: Should small holder dairy farms rear own young stock?**

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### **Abstract**

In South-East Asian countries, including Malaysia, most dairy farm owners (62%) are small holders. Consequently, the current self-sufficiency of fresh milk in Malaysia was reduced from 127.98% (2012) to 60.91% (2016) within the 5-year period. The government has adopted production strategy to improve the production and economics of small holder dairy farms. The average number of dairy cows was reported at 85 dairy cows per farm while on average, 30% of dairy cows are culled each year. To replace the culled dairy cows, on average 26 first calving dairy heifers are needed per farm. Poor young stock management is one of the major problems in most small holder dairy farms that cause replacement heifers not to be available. Inability to perform proper young stock management occurs to farmers who fail to realize that management throughout the rearing period directly influences income of the farm. Thus, rearing young stock is an expensive investment that needs attention, but farmers in Malaysia are less aware on costs of rearing. Young stock rearing could be viewed as a profit (or loss) centre for the small holder dairy farms which entail decision to outsource. This decision can be supported using partial budgeting and cost benefit analysis methods and needs inputs such as costs of rearing and price of heifers. Estimating costs of rearing a young stock in dairy farms in Malaysia could improve awareness to farmers, improve the decision making either rearing own young stock or purchasing dairy heifers, and could increase economic sustainability and milk production of dairy farms in Malaysia.

**Keywords:** young stock, dairy heifer, costs, economic sustainability

### **Introduction**

In South-East Asian countries including Malaysia, most dairy farm owners (62%) are small holders with less than 50 dairy cows per farm (Boniface et al., 2009). For small holder farmers, dairying was viewed as a source of good income occupation (Moran,

2009). As demand for dairy products in Malaysia continues to rise, the production of fresh milk was insufficient to meet the growing domestic demand. Consequently, the current self-sufficiency of fresh milk in Malaysia was reduced from 127.98% (2012) to 60.91% (2016) within 5-year period (DVS, 2018) as shown in Table 1.

Table 1: Output, consumption and self-sufficiency of fresh milk in Malaysia from 2012 to 2016 based data provided from Department of Veterinary Services (DVS)

| Fresh Milk               | 2012   | 2013  | 2014  | 2015  | 2016  |
|--------------------------|--------|-------|-------|-------|-------|
| Output (mil. litres)     | 27.0   | 28.8  | 34.1  | 36.5  | 36.7  |
| Consumption(mil. litres) | 23.7   | 37.6  | 47.4  | 56.6  | 56.6  |
| Self-sufficiency (%)     | 127.98 | 71.55 | 66.79 | 59.87 | 60.91 |

The Malaysian Government views the development of dairy industry as one of the means to increase local milk production and in enhancing smallholder's income. The government has adopted three main strategies: production strategy (i.e., animal husbandry and National Dairy Development Programme); trade strategy (i.e., imposing restrictions on imported milk and dairy products) and integration strategy (i.e., establishing strategic partnerships with foreign based companies) (Sim and Suntharalingam, 2015). For example, in October 2018, Ministry of Agriculture and Agro-based Industry (MOA) has announced the livestock industry development programme (*Projek Rintis*) (MOA, 2018).

On a dairy farm, three different enterprises exist: land, dairy cows and young stock rearing. Land enterprise produces forage and manages waste from the other two enterprises. In a dairy cow enterprise, the main output are milk and culled dairy cows. In Malaysia, the average number of dairy cows was reported at 85 dairy cows per farm (Boniface et al., 2009) while on average, 30% of dairy cows are culled each year (Mohd Nor et al., 2014). To replace the culled dairy cows, on average 26 first calving dairy heifers are needed per farm per year. Young stock rearing enterprise that manages new-born heifer calves and provides high quality replacements is a crucial enterprise in dairy farm.

#### *Total costs of young stock rearing*

Rearing young stock from birth to first calving is an expensive investment that needs attention (Boulton et al., 2017). The total costs of rearing young stock in Netherlands is €1,567 (RM7,421.52) (Currency convert 28<sup>th</sup> November, 2018) (Mohd Nor et al., 2012) and the UK is £1,819 (RM9,719.23) (currency convert 28<sup>th</sup> November, 2018) (Boulton et al., 2017). If small holder farmers in Malaysia are aware about the total costs of rearing young stock, they can make decision if rearing young stock is economically beneficial to their farms. However, rearing costs are difficult to calculate as firstly, it takes at least two years to rear a young stock with different management categorized into calving and new born calf management, colostrum management, milk feeding, weaning, calf and heifer housing and general and health monitoring (Vasseur et al., 2010). Secondly, the costs are correlated with variation in growth rate and disease uncertainty (Mohd Nor et al., 2012). Table 2 summarises the contribution of input costs. The cost components in rearing young stock are feed costs, barn costs, labor costs, healthcare costs, costs of breeding, mortality costs (Boulton et al., 2017) and reproduction failure costs (Mohd Nor et al., 2012).

Young stock rearing enterprise has always been neglected by farmers as compared to dairy cows enterprise (Mohd Nor et al., 2012) as farmers perceived young

stock as non-income generating resources (Verbruggen, 2014). Inability to perform proper young stock management occur to farmers who fail to realize that management and care of young stock throughout the rearing period will directly influence productivity and income of the farm (Heinrichs et al., 2013). Poor young stock

management is one of the major problems in most small holder dairy farms (Moran, 2005). According to (Moran, 2011), strategies needed for improving young stock management including good colostrum management, good hygiene of calf pens and equipment, appropriate feeding management and close attention to the animals.

Table 2: The value (in RM) and contribution (%) of variables in total costs of young stock rearing in The Netherlands and United Kingdom

| Variable           | Value (RM) <sup>1</sup> | Contribution to total rearing cost (%) | Sources               |
|--------------------|-------------------------|--|-----------------------|
| Feed               | 3,328                   | 44.5                                   | Mohd Nor et al., 2012 |
|                    | -                       | 36.8                                   | Boulton et al., 2017  |
|                    | 1,268                   | 13.5                                   | Verbruggen, 2014      |
| Labour             | 2,380                   | 31.84                                  | Mohd Nor et al., 2012 |
|                    | 2,365                   | 25.21                                  | Verbruggen, 2014      |
|                    | -                       | 22.3                                   | Boulton et al., 2017  |
| Building           | 858                     | 11.84                                  | Mohd Nor et al., 2012 |
|                    | 1,035                   | 11.03                                  | Verbruggen, 2014      |
| Machinery          | 725                     | 7.72                                   | Verbruggen, 2014      |
| Grazing            | -                       | 6.9                                    | Boulton et al., 2017  |
| Reproduction       | 191                     | 2.55                                   | Mohd Nor et al., 2012 |
|                    | 200                     | 2.13                                   | Verbruggen, 2014      |
|                    | -                       | 4.4                                    | Boulton et al., 2017  |
| Health and disease | 229                     | 3.06                                   | Mohd Nor et al., 2012 |
|                    | 200                     | 2.13                                   | Verbruggen, 2014      |
|                    | -                       | 4.1                                    | Boulton et al., 2017  |
| Electricity        | -                       | 1.6                                    | Boulton et al., 2017  |
| Water              | 100                     | 1.06                                   | Verbruggen, 2014      |

<sup>1</sup>€1=RM4.77 (29 November 2018)

#### *Supporting decision to rear own young stock on small holder farms*

The replacement enterprise can be viewed as a profit (or loss) centre for the dairy farm (Quigley, 2014) which could entail decision to outsource. In a previous study, some of the reasons to outsource young stock rearing in UK were variable feed

costs, farm gate milk price (Boulton et al., 2017) and in The Netherlands were manure legislation and excessive work pressure (Verbruggen, 2014). In Malaysia, problems faced by ruminant industry were insufficiency of land, high feed cost, feed quality and formulation that was not optimal and poor adoption to new raising method (Devendra, 1984). In addition, in a previous

study on dairy farms (Mohd Suhaimi et al., 2017), it showed that most of the dairy farms in Malaysia had high scores of technical insufficiency categorized into managerial and programme inefficiency. Factors affecting inefficiency were different types of inputs (feed, labor, land and herd size) and production systems (intensive system and semi intensive system). Farm efficiency in

small holder dairy farms could be improved if farmers were not rearing own young stock. In addition, significant reduction in price of bought heifers could make this option to be attractive. Smallholder farms may want to assess the impact of change of not rearing own heifer in comparison to the price of bought heifers using partial budgeting framework (Table 3).

Table 3: Partial budget example on decision to switch from rearing young stock to buying heifers adapted from Iowa State University Extension and Outreach notes

Partial Budget Example: Switch from rearing young stock to buying heifers

| Added income due to change:                       | Value (RM) <sup>1</sup> | Added costs due to change:    | Value (RM) <sup>1</sup> |
|---|-------------------------|-------------------------------|-------------------------|
| Sell raised heifer calf:                          | 2,515.80                | Purchase bred heifer:         | 5,031.60                |
| Reduced costs due to change:                      |                         | Reduced income due to change: |                         |
| Pasture maintenance                               | 83.86                   | Assume similar quality        | 0                       |
| Grain fed   | 167.72                  |                               |                         |
| Supplement and mineral                            | 188.68                  |                               |                         |
| Hay fed   | 503.16                  |                               |                         |
| Health, utilities and other costs                 | 230.61                  |                               |                         |
| Labor   | 209.65                  |                               |                         |
| Subtotal added gains                              | 3,899.48                | Subtotal added costs          | 5,031.60                |
| NET CHANGE=RM3,899.48 - RM5,031.60 = (RM1,132.12) |                         |                               |                         |

<sup>1</sup>USD1=MYR4.0194 Currency Covert 29 November 2018

Partial budgeting provides an information of the economic consequences of a particular change in farm procedure without any specific time pattern (Dijkhuizen et al., 1995). The quantification for partial budget that influences farm profitability is made up of two components: identify changes in the farm procedure that will increase profits and identify changes in the farm procedure that will decrease profits. This allows farmers to know the cost of production changes that determine the profit margins and it is critical to ensure the sustainability of dairy enterprise (Rabin and McGarrin, 2015) The limitations of partial

budgeting are: first, it is restricted to evaluate only two alternatives, second, the results are only estimates, third, it does not include the time value of money and finally cost and returns that are not affected by intended changed are not included (Rabin and McGarrin, 2015).

If there is a need to determine the probability of the proposed change in farm procedure over a time period, a cost-benefit analysis can be employed in addition to partial budget to support the decision making process. The cost-benefit analysis gives an advantage that shows the time preference of money (Kingston, 2001). This illustrates the

future costs and benefits in the present value (discounted) of the proposed alternatives (Kingston, 2001; Jemberu et al., 2016). This gives clarity to delve into farmers spending specifically to their farm procedure. The disadvantage of the cost-benefit analysis is the results depend on the accuracy of the predicted costs and benefits related to the predicted discount rate assumption. Inaccuracy of unforeseen costs and benefits will give an illusion of the specific change. In addition to clarity of inputs, simulation using a sensitivity analysis is needed to overcome the constraints.

#### *Future work on young stock rearing in Malaysia*

It is needed to estimate costs of rearing young stock in dairy farms in Malaysia, for example using survey and stochastic modelling. A stochastic model main advantage is the ability to include variation and uncertainty in dairy farms (Mohd Nor et al., 2012). Inputs used could be based on previous literatures and by using available data (e.g., bodyweight) from available data on Mafriwal breed from government farms and inputs on feed requirement based on guidelines by DVS (Sudin et al., 2005). In addition, MARDI has developed Web-based Ruminant Feeding Decision Support System which is useful to our model and as inputs. However, this system only calculates feed cost. Other challenges to estimate costs of rearing include estimating costs of diseases (include prevalence) and reproductive failure costs relevant in Malaysia, quality and price of bought heifer, risks of disease introduction from specialized farm to other farms, and socioeconomics study on the impact of the change to small holders farms. Research collaborations in these areas are therefore needed.

## Conclusion

Estimating costs of rearing a young stock in dairy farms in Malaysia is important and could improve farmer's awareness, improve the decision making in either to rear own young stock or purchase dairy heifer, that could increase economic sustainability and milk production of dairy farms in Malaysia.

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