

INCOME AND VALUE-ADDED ANALYSIS OF COW'S MILK-PROCESSED IN CIBUNGBULANG SUBDISTRICT, BOGOR

Elpawati^{1*}, Dewi Rohma Wati², and Nabilah Nurshalihah³

^{1,2,3} Departement of Agribusiness, Faculty of Sains and Technology, State Islamic University Syarif
Hidayatullah Jakarta
Email: elpawati@uinjkt.ac.id
Corresponding Author

DOI: 10.15408/aj.v16i2.29381

Abstract

This study aims to determine the operating income and added value of processed cow's milk products in the agro-industry of the Cibungbulang Dairy Farming Business Area (KUNAK), Bogor. The location used was selected purposively, namely Papajo and Etzel agroindustry in Cibungbulang District. The sample population consists of business owners and employees, who served as respondents. Data was collected using a list of questions or questionnaires to obtain information, followed by analysis using Microsoft Excel. Subsequently, the income and R/C ratio were calculated, while the Hayami method was used to determine the added value of each product. The results showed that the incomes for yogurt, kefir, and ice cream were IDR29,973,500/month, IDR13,648,334/month, and IDR39,204,167/month, respectively. The R/C ratio of yogurt was $1.4 > 1$, kefir $1.6 > 1$, and ice cream $3.1 > 1$, which indicates that the cow's milk processing business is profitable and feasible. The added value of yogurt, kefir, and ice cream products was IDR14,291/liter, IDR5,619/liter, and IDR 53,900/liter with value-added ratios of 44.66%, 23.41%, and 74.86%, respectively.

Keywords: Cow's Milk Agroindustry; Business Income; Added Value.

INTRODUCTION

Agro-industry involves the use of agricultural products to produce processed commodities with higher economic value. It is also a stage of prolonged agricultural development (Nugroho *et al.*, 2017). Some of its major goals are to elevate the GDP of the food and beverage processing industry as well as the creation of export mainstay and prospective commodities. It also aims to increase the number of certifications for exported agricultural products and to develop the agro-industry, especially in rural areas (Renstra, 2015). Previous reports show that there are 7,229 industrial businesses, of which 2,408 are engaged in processing (Ditjenbun, 2012).

Indonesia's Gross Domestic Product (GDP) contributed 1.57% of the national GDP in 2017 (Raditia, 2020). Dairy cows are the main milk-producing livestock that can sufficiently meet the world's needs when compared to others. Therefore, their level of maintenance is indicated by the increase in milk production (Al-amin *et al.*, 2017).

Table 1. Dairy Cow Milk Production in The Top Five Provinces in Indonesia

Province	Year (tons)				
	2015	2016	2017	2018	2019
East Java	472.212	492.460	498.915	512.846	521.123
West Java	249.946	302.559	310.461	319.003	300.337
Central Java	95.512	99.996	99.606	100.998	102.948
IN Yogyakarta	6.187	6.225	6.124	4.059	5.925
Jakarta	4.768	4.725	5.417	5.097	5.100

Source: Central Statistics Agency (2016-2019)

Table 1 shows that West Java Province is the second largest milk producer and the

production fluctuates but tends to increase with an average volume of 296,461 tons. The province has mountains and plateaus, which makes it suitable for dairy cattle development. It also has a relatively large land for the availability of animal forage, feed factories, advanced milk processing industry, and institutions for farmers who are members of GKSI (Karuniawati & Fariyanti, 2013). One of the dairy cattle centers in West Java Province is Bogor Regency.

Bogor Regency is an area designated by the government to improve the management of cows. It is also known as the Dairy Business Area (KUNAK), which is in the Cibungbulang District and has two MSMEs. The processing technology used is relatively simple, but the income and the added value of each product are unknown. Therefore, this study aims to determine the income and added value of each dairy product in the province.

RESEARCH METHODS

Research Location and Time

This study was carried out at two agro-industries processing cow's milk in Cibungbulang District, Bogor: Papajo *the real yogurt* and Etzel *ice cream* from December 2020 to April 2021. This location was selected purposively because it is one of the dairy farming centers in Bogor Regency.

Data Source Type

This study aims to determine the business income and the added value of dairy milk processed products. Data collection was carried out using interviews and observations to obtain information from respondents, followed by analysis with *Microsoft Excel*. The data taken from the respondents include business characteristics, equipment used, main and supporting raw materials, and labor costs.

Data Analysis

Revenue Analysis and Business Efficiency

Income is the separation between receipts and total costs so that it can be formulated as follows;

$$\pi = TR - TC$$

Where:

π = Operating Income (IDR)

TR = Total Recipients (IDR)

TC = Total Cost (IDR)

R/C Ratio Analysis

The calculation is carried out to determine the feasibility of a project by comparing the amount of revenue obtained and the amount of costs that must be incurred for five years (Istianah, Fitriadinda and Murtini, 2019: 105).

$$RCR = TR/TC$$

Where;

RCT = Return cost of ratio

TR = Gross Revenue (IDR/Production)

TC = Production cost (IDR/ Production)

Value Added Analysis

Hayami's analysis is used in generating some information to calculate added value. Estimated added value in rupiah (IDR), Ratio of value added to value of finished products (%), Labor service rewards (IDR), Labor share (%), profits received by the company (IDR), and The level of profit of the enterprise (%).

RESULTS AND DISCUSSION

The dairy industry involves a series of economic activities in the form of milk production and processing, which starts from animal husbandry to the production of consumable commodities (Taufik, 2019). Fresh milk can be processed into various products that are popular and have a relatively long shelf life, including yogurt, kefir, and ice cream. Yogurt is often produced through the fermentation of milk by lactic acid bacteria. Furthermore, it has a distinctive taste, semi-dense, smooth texture, compact, and a fresh taste (Usmiati & Bakar, 2009). The fermentation is often carried out using lactic acid bacteria, namely *Lactobacillus bulgaricus* and *Streptococcus thermophilus* (Wahyudi, 2016). Yogurt has a higher antioxidant potential than milk due to the presence of antioxidant peptide probiotics. This also applies to other fermentation products, but antioxidant activity is highly dependent on the type and amount of probiotics added (Fardet & Rock, 2018). Kefir has a consistency and appearance that is similar to that of yogurt with a slight alcohol flavor (Julianto *et al.*, 2016). Its seeds also contain lactose-fermenting yeast, namely *Kluyveromyces marxianus* and those that cannot ferment lactose, including *Saccharomyces unisporus*, *cerevisiae*, and *exiguus* (Yusriyah & Agustini, 2014). A previous study revealed that kefir has a sour taste as well as a soft consistency (Gul *et al.*, 2015). Ice cream is a frozen food made from cow collar products, such as cream (Hartatie, 2011), and it can be distinguished by its components and content. Its most important components include milk fat, skim milk, sweeteners, *hydrocolloids*, emulsifiers, flavorings, and dye substances (Durmaz *et al.*, 2020).

Cost, Revenue, Revenue, and R/C Ratio Analysis

Revenue Analysis

Cost is the use of production resources to achieve a certain goal, which is measured by the unit of money value that can be obtained and provide benefits for the future (Ishak & Sugiono, 2015). Livestock income is the amount of money made from livestock products that were sold and consumed, minus the production costs (Luna *et al.*, 2020). Revenue is the difference between receipts and total costs incurred during one production cycle (Supartama *et al.*, 2013). The total costs consist of the fixed and non-fixed costs. Each of these production inputs is then multiplied by its price (Hanafie, 2010). The total receipts are a multiplication between the selling price per unit (P) and the amount of production (Q) (Hidayat *et al.*, 2012).

Efficiency is a comparison between revenue and costs obtained by a business. Furthermore, it helps to determine whether the total receipt is greater than the total costs incurred (Mudmainah & Wahyudi, 2019). The definition of production efficiency is a comparison between output and input related to the achievement of maximum output. This indicates that if the output ratio is large, then the efficiency is said to be higher (Processing *et al.*, 2014). Cost efficiency can be calculated using the formula R/C ratio, which is known as *Return Cost Ratio* (Winandhoyo *et al.*, 2015). It is often used to determine the feasibility of a business by comparing the number of receipts and the number of costs that must be incurred (Istianah *et al.*, 2019).

The business feasibility analysis can help companies to estimate the potential profit. A business is said to be profitable when the revenue is greater than the costs incurred.

Table 2. Analysis of Income And R/C Ratio of Dairy Products

No	Information	Yogurt	Kefir	Ice Cream
1	Admission (IDR)	110,500,000	38,400,000	57,600,000
2	Agro-industrial Costs			
	Fixed Costs			
	Depreciation Fee (IDR)	17,473,750	1,671,666	915,833

No	Information	Yogurt	Kefir	Ice Cream
	Variable Costs			
	Raw material cost (IDR)	22,750,000	11,200,000	5,600,000
	Cost of other materials (IDR)	6,702,750	1,113,600	336,000
	Supporting fee (IDR)	28,100,000	17,096,000	8,544,000
	Labor wages (IDR)	5,500,000	3,000,000	3,000,000
	Total Cost (IDR)	80,526,500	25,751,666	18,395,833
3	Revenue (IDR)	29,973,500	13,648,334	39,204,167
4	R/C Ratio	1.4	1.6	3.1

Source: Primary Data (Processed)

The amount of costs considered in analyzing the cow's milk processing business is known as the real cost, which was incurred to produce the three products. Furthermore, it comprises fixed costs, such as equipment depreciation as well as the variable costs, namely price of raw materials and other input needed, supporting costs, and labor wages. The amount needed to for yogurt production consists of the price of ingredients, such as whole milk, sugar, flavorings or pasta, yogurt seeds, and labor wages. There are other costs, such as packaging, LPG, labels, transportation, electricity, as well as depreciation for the tools and machines. The amount needed to produce kefir include whole milk, granulated sugar, kefir seeds, labor, packaging, labels, transportation, electricity, and depreciation. Meanwhile, whole milk, granulated sugar, cornmeal, emulsifiers, labor, packaging, labels, transportation, electricity, and depreciation were needed for ice cream production. The analysis results show that to produce 250 liters of yogurt or 1000 bottles of 250ml, IDR80,526,500 was needed for one month. The production of 200 liters of kefir, which was packaged into 800 bottles of 250 ml size costs IDR24,751,666 for one month. Meanwhile, to produce 300 liters of ice cream into 1,200 cups with a size of 250 ml, IDR39,204,167 was required.

Based on the calculation of the costs for the three products, the amount needed to produce yogurt is more than that of kefir and ice cream, but the number of products produced by ice cream was greater than that of yogurt and kefir products. The capital for yogurt production was because the variable costs was greater than kefir and ice cream. Therefore, the selling price of yogurt products is more expensive.

The production results show that the receipt obtained for the sales of all yogurt products was IDR110,500,000/month with a selling price of IDR8,500/bottle. The total kefir sales were IDR38,400,000/month with a selling price of IDR6,000/bottle. Meanwhile, the total receipt for ice cream was IDR 57,600,000/month with a selling price of IDR6,000/cup and a size of 250 ml for each product. The variation in the selling price was due to the difference in the total costs incurred in producing the product, where the production cost of yogurt products was greater than that of kefir and ice cream. This indicates that the price of yogurt products is higher at IDR8,500/ bottle.

Based on the receipts obtained and capital required, the sale of yogurt generated a revenue of IDR29,973,500. The income indicates that the business is worth running because it is profitable. This was also supported by the analysis results of the R / C ratio, which was more than 1, namely 1.4. This shows that for every IDR1 cost incurred by the company, a receipt of IDR1.4 is received to provide a profit of IDR0.4.

From the revenue obtained and the costs incurred, the sale of kefir generated a revenue of IDR13,648,334, which indicates that the business is feasible to run because it is profitable. This was also supported by the R/C ratio, which was greater than 1, namely 1.6. For every IDR1 cost incurred by the company, a receipt of IDR1.6 is received to obtain a profit of IDR 0.6.

Based on the receipts obtained and costs incurred, the sale of ice cream generated a

revenue of IDR39,204,167, which shows that the business is worth running because it is profitable. This was also supported by the results of the R/C *ratio*, which was more than 1, namely 3.1. For every IDR1 cost incurred by the company, a receipt of IDR3.1 is received to obtain a profit of IDR2.1.

From the results of the calculation analysis, the 3 product businesses are feasible to run. The income earned in producing ice cream is greater than that of kefir and yogurt. However, the difference between kefir and yogurt products is relatively small, but the ice cream products have a fairly large difference. This was indicated by the R/C ratio result where the difference for ice cream products was greater than IDR 2.1 per IDR 1, as issued by the company.

Value Added Analysis of Dairy Products

A commodity has an added value because it has undergone processing, storage, and transportation during the production process (Hamidah *et al.*, 2015). Furthermore, value is added to the raw product by processing it to the next stage (Groot, 2011). One of the activities that must be carried is the processing of agricultural products, which include fisheries and marine, animal husbandry, forestry, and plantations. It is often performed to increase the added value, improve the quality of yields, increase labor absorption, improve skills, and increase the producer income (Ngamel, 2012). Hayami method can be used for the processing process of agricultural products, as well as to determine the added value, output, amount of repayment of services to labor, the contribution of other inputs, and profits (Zaini *et al.*, 2019).

Table 3. Value Added Analysis of Yogurt, Kefir and Ice Cream

No	Variable	Yogurt	Kefir	Ice Cream
Output, Input and Pricing				
1	Output (liters/month)	3,250	1,600	2,400
2	Milk (liters/month)	3,250	1,600	800
3	Direct labor (HOK/month)	110	44	44
4	Conversion factors	1	1	3
5	Direct labor coefficient (HOK/liter)	0.03	0.03	0.06
6	Output Price (IDR/liter)	32,000	24,000	24,000
7	Direct labor wages (IDR/HOK)	50,000	68,182	68,182
Reception and Benefits				
8	Milk price (IDR/liter)	7,000	7,000	7,000
9	Other input prices (IDR/liter)	10,709	11,381	11,100
10	Output Value (IDR/liter)	32,000	24,000	72,000
11	a. Added value (IDR/liter)	14,291	5,619	53,900
	b. Value-added ratio (%)	44.66	23.41	74.86
12	a. Direct labor income (IDR/liter)	1,692	1,875	3,750
	b. Direct labor share (%)	11.84	33.37	6.96
13	a. Profit (IDR/liter)	12,599	3,744	50,150
	b. Profit rate (%)	39.37	15.60	69.65
Repayment of The Owner of The Production Factor				
14	Margin (IDR/liter)	25,000	17,000	65,000
	a. Direct labor income (%)	6.77	11.03	5.77
	b. other input donations (%)	42.84	66.95	17.08
	c. Company profit (%)	50.39	22.02	77.15

Source: Primary Data, 2021 (Processed)

The results of the value-added analysis of yogurt, kefir, and ice cream products are presented in Table 3. Furthermore, the input for yogurt processing was 250 liters. The conversion factor was obtained by dividing the amount of yogurt by the number of inputs. The production volume of yogurt for one month was 3,250 liters. The input of milk raw materials

used in production for one month was 3,250 liters, where the volume between yogurt and input was still fixed because there was no additional water in the production process. The value of the labor coefficient in the business was 0.03, which indicates that each labor force can produce 0.03 liters of raw materials within 1 working day.

The value of yogurt was obtained from the multiplication between the conversion factor and the price of the product. It is also equal to the gross receipt of effort for every 1 liter of input used. The analysis showed that the added value is IDR14,291/liter with a value-added ratio of 44.66%. This ratio is equal to the profit rate, which indicates that IDR14,291 of the yogurt value accounts for 44.66% of the profit.

The labor income obtained was IDR1,692/liter of raw materials with a labor share of 11.84%. The processing of yogurt with an input of 3,250 liters yielded a profit of IDR12,599/liter of raw materials with a profit rate of 39.37%. The margin was obtained from the value of yogurt reduced by the price of raw materials, then distributed to production factors. The largest repayment came from the distribution of the company's profits, which was 50.39%, the next was from the contribution of other inputs, namely 42.84%. Meanwhile, the lowest was obtained from direct labor income, namely 6.77%.

Input for kefir processing was 200 liters, and the conversion factor was obtained by dividing the number of kefirs with the number of inputs. The production for one month was 1,600 liters, which is equal to the volume of milk input. The volume between kefir and input is still fixed because there is no additional water in the production process as well as yogurt processing. The value of the labor coefficient was 0.03, which indicates that each labor in 1 working day can process raw materials of 0.03 liters.

The kefir value was obtained from the multiplication between the conversion factor and the price. It is also equal to the gross receipt of effort for every 1 liter of input used. The added value of kefir was IDR5,619/liter with a value-added ratio of 3.41%. The ratio value is equal to the profit rate, which indicates that IDR5,619 of the kefir value accounts for 23.41% of the profit.

The labor income was IDR1,875/liter of raw materials with a labor share of 33.37%. The processing of kefir with an input of 1,600 liters yielded a profit of IDR3,744/liter of raw materials with a profit rate of 15.60%. The margin was obtained from the kefir value reduced by the price of raw materials, then distributed to the production factor. The largest repayment was recorded from the distribution of other input contributions of 66.95%, the next was from the company's profit of 22.02%, and the lowest was labor income of 11.03%.

The input for ice cream processing was 100 liters, and the conversion factor was obtained by dividing the amount of ice cream by the number of inputs. The production volume for one month is 2,400 liters with an input of 800 liters. The volume between the product and inputs increased due to additional water and development during the production process. The labor coefficient was 0.06, which indicates that each worker in 1 working day can process 0.06 liters of raw materials.

The value of ice cream was obtained from the multiplication between the conversion factor and the price. It is also equal to the gross receipt of effort for every 1 liter of input used. The added value of ice cream is IDR 53,900/liter with a value-added ratio of 74.86%. Furthermore, this ratio is equal to the profit rate, which indicates that IDR 53,900 of the value of ice cream contains 74.86% of the profit.

The labor income obtained was IDR 3,750/liter of raw materials with a labor share of 6.96%. The processing of ice cream with an input of 800 liters yielded a profit of IDR 50,150/liter of raw materials with a profit rate of 69.65%. The margin was obtained from the value of the product minus the price of raw materials, then distributed to production factors. The largest repayment was recorded from the distribution of the company's profits at 77.15%, followed by other input contributions at 17.08%, and the lowest was direct labor deposition at

5.77%.

According to Hubeis in Nabilah *et.al*, there are three indicators of value-added ratio, namely: (1) if the magnitude of the value-added ratio < 15%, then it is low; (2) if the magnitude of the value-added ratio is 15 % - 40%, then it is moderate; (3) if the magnitude of the value-added ratio >40%, then it is high. Based on calculations, yogurt and ice cream products have a high ratio, because the value is >40%, namely 44.66% and 74.86%, respectively. Meanwhile, kefir has a moderate value-added ratio, namely 23.41%.

CONCLUSION AND SUGGESTION

Revenue for yogurt, kefir, and ice cream products was IDR 29,973,500, IDR 13,648,334, and IDR 39,204,167 per month, respectively. The R/C ratio of yogurt milking was 1.4; kefir 1.6, and ice cream 3.1. This indicates that the cow's milk processing business is profitable and feasible to run because the values obtained were more than 1 (R/C ratio > 1). The added-value generated from the business was positive, namely IDR14,291, IDR5,619, and IDR53,900 for yogurt, kefir, and ice cream, respectively. The value-added ratio for yogurt was 44.66% >40% and 85.64% >40% for ice cream, which shows that they are in the high category. Meanwhile, 23.41% >15%-40% was recorded for kefir, indicating a moderate category. The agro-industry processing cow's milk need to increase the production for ice cream products because it has a great added value.

BIBLIOGRAPHY

- Al-Amin, Ahmad Fauzy, Hartono, M., & Suharyati, S. (2017). Factors Affecting Calving Interval of Dairy Cows on People's Farms in Several Regencies/Cities of Lampung Province. *Indonesian Livestock Research*, 1(1), 33–36.
- Central Statistics Agency (BPS). 2021. *Fresh Milk Production By Province, 2015-2019*. (Internet). (Accessed June 1, 2021, 12:42 pm).
- Directorate General of Plantations (Ditjenbun). (2012, April 13). Updating the Directory of Agricultural Companies. Diakses on December 12, 2020.
- Durmaz, Y., Kilicli, M., Toker, O. S., Konar, N., Palabiyik, I., & Tamtürk, F. (2020). Using spray-dried microalgae in ice cream formulation as a natural colorant: Effect on physicochemical and functional properties. *Jurnal Algal Research*, 47(January), 1–8.
- Elida S., & Hamidi, W. (2009). Agroindustry Income Analysis of Cassava Rengginang in Kampar Regency, Riau Province. *Journal of Economics*, 17(02).
- Fardet, A., & Rock, E. (2018). In vitro and in vivo antioxidant potential of milks, yogurts, fermented milks and cheeses: A narrative review of evidence. *Nutrition Research Reviews*, 31(1), 52–70.
- Groot, J. De. (2011). *Financial Analysis of a Value Added Dairy Operation in California* (Issue June). California Polytechnic State University.
- Gul, O., Mortas, M., Atalar, I., Dervisoglu, M., & Kahyaoglu, T. (2015). Manufacture and characterization of kefir made from cow and buffalo milk, using kefir grain and starter culture. *Journal of Dairy Science*, 98(3), 1517–1525.
- Hafidzoh, N., & Agustini, R. (2014). The Effects Of Fermentation and Concentration Of Kefir Grains Of Quality Of Cow's Milk Kefir. *UNESA Journal of Chemistry*, 3(2), 53–57.
- Hamidah, M., Yusra, A. H. A., & Jajat, S. (2015). Value Added Analysis of Yam Kripik Agroindustry in Pontianak City. *Journal of Social Economic of Agriculture*, 4(2), 60–73.
- Hanafie, R. (2010). *Introduction to Agricultural Economics* (R. Fiva (ed.)). CV. Andi Offset.
- Hartatie, E. S. (2011). Study of Formulations (Raw Materials, Eating Materials) and

-
- Manufacturing Methods on the Quality of Ice Cream. *Gamma Journal*, 7(1), 20–26.
- Hidayat, S., Marimin, Suryani, A., Sukardi, & Yani, M. (2012). Modification of the Hayami Method for Value-Added Calculation in the Palm Oil Agro-Industrial Supply Chain. *Journal of Agricultural Industry Technology*, 22(1), 22–31.
- Isaac, & Sugiono, A. (2015). *Information Accounting in Decision Making*. Gramedia Widiasarana Indonesia.
- Istianah, N., Fitriadinda, H., & Murtini, E. S. (2019). *Design of Factories for the Food Industry*. UB Press.
- Julianto, Budi, Evy Rossi, Y. (2016). Chemical and Microbiological Characteristics of Cow's Milk Kefir with the Addition of Soy Milk. *Journal of Jom Faperta*, 3(1), 1–9.
- Karuniawati, R., & Fariyanti, A. (2013). Factors Affecting Dairy Cow Milk Production in Megamendung District, Bogor Regency, West Java Province. *Agribusiness Forum*, 3(1), 73–86.