

Evaluation of Holstein and Simmental Farms in Burdur under the IPARD Program in terms of Profitability

Burdur'da IPARD Programı Kapsamında Bulunan Holştayn ve Simental İşletmelerinin Karlılık Bakımından Değerlendirilmesi

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Abstract: In this study, In Burdur, two Holstein and two Simmental dairy cattle farms with IPARD (Instrument for Pre-Accession Assistance-Rural Development) support were evaluated in terms of profitability. In this context, the economic data records of the farms with 114 Holstein and 160 Simmental cows for 2019 constituted the material of the research. In the study, it was determined that the feed expenses (63.07%) took the first place in the proportional distribution of the cost elements that constitute the cost in the farms. The first line of income items of dairy cattle farms is milk income (70.26%). Within the scope of the research, financial profitability is 14.58%; economic profitability 0.10%; rantability factor 24.42%; expense/revenue ratio 1.11%; the cost of 1 kg milk was determined as 1.63 TL (0.29 \$). As a result, it has been determined that these IPARD supported farms are profitable and sustainable.

Keywords: Cost, Holstein, Income, Profitability, Simmental.

Öz: Bu araştırmada, Burdur ilinde IPARD (Katılım Öncesi Yardım Aracı- Kırsal Kalkınma) desteği almış iki adet Holştayn ve iki adet Simental süt sığırçılık işletmesi, karlılık bakımından değerlendirilmiştir. Bu kapsamda, 114 baş Holştayn ve 160 baş Simental ırkı ineğin bulunduğu işletmelerin 2019 yılına ait ekonomik veri kayıtları araştırmanın materyalini oluşturmuştur. Yapılan çalışmada, işletmelerde maliyeti oluşturan masraf unsurlarının oransal dağılımında yem giderlerinin (%63,07) ilk sırayı aldığı tespit edilmiştir. Süt sığırçılık işletmelerinin gelir kalemlerinin ilk sırasında ise süt geliri (%70,26) yer almaktadır. Araştırma kapsamında mali rantabilite %14,58; ekonomik rantabilite %0,10; rantabilite faktörü %24,42; masraf/hasıla oranı %1,11; 1 kg süt maliyeti 1,63 TL (0,29 \$) olarak tespit edilmiştir. Sonuç olarak, IPARD destekli bu işletmelerin karlı ve sürdürülebilir olduğu tespit edilmiştir.

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Introduction

IPARD (Instrument for Pre-Accession Assistance-Rural Development); it is the rural development component of IPA, which was created by the EU to support candidate and potential candidate countries. IPARD aims to support the harmonization preparations and policy development for the implementation and management of the EU's common agricultural policy, rural development policy and related

policies. This program is implemented through the Agriculture and Rural Development Support Institution (ARDSI), which is the EU accredited institution.

In dairy cattle breeding, the yield is mainly on obtaining calves and milk. The fact that milk yield is at a certain level depends on the fertility. Therefore, profitability is directly related to the level of fertility and milk yield.

In recent years, the proportion of cultured cattle and hybrids has been increasing in Turkey. In parallel, the milk yield per animal is also increasing. This situation also contributes positively to the profitability of the enterprise.

Dairy cattle breeding requires long-term planning, taking into account income and expenses. Considering the expense, the investment in the period of construction, machinery, equipment and animal costs; in the period of production, feed, labor, veterinary-medicine, electric, water, insurance, maintenance and depreciation costs come to the fore. The income item, basically comes from the sale of milk. In addition, reformed cattle, calves, breeding animals and fertilizer sales and government incentives constitute other sources of income (Alyeşil and Özer, 2018).

Considering that the main purpose of dairy cattle breeding farms is the production of milk, the animals in the farm should be used as soon as possible for breeding, and then start production. The transition of dairy cattle to the period of yielding is important for the profitability of the farm (Akbaş, 2011).

For the development and profitability of livestock, enterprises should provide quality and inexpensive roughage feed. Considering that feed costs account for 60-70% of the total cost of dairy cattle breeding farms, the inclusion of quality roughage feed in the ration also reduces costs. Therefore, roughage feeds, which are more suitable for the nutritional physiology of animals than concentrate feed, should be met by dairy farms from meadows, pastures or by planting fodder plants. Lack of quality roughage feed; it causes high prices of animal products, low animal yields, and therefore people's insufficient intake of animal protein (Avcioğlu et al., 2000).

Şahin et al. (2014) in their study "A Study on Ways to Increase Profitability in Cattle Breeding Farms in Iğdır Province"; A one-on-one survey was conducted on 233 cattle breeding farms located in Iğdır province and the data for 2012 were obtained and evaluated. According to the research result, it

was found that feed costs accounted for 79.9% of the changing costs. This was followed by the foreign labor force with 11.8% healthcare with 4.7% electricity and water with 1.8% and other expenses with 1.8%.

Semerci et al. (2015) in the province of Hatay, it was aimed to evaluate the dairy cattle farms from the economic point of view. The data obtained from 141 dairy farms located in 24 settlements constituted the research material. As a result of the study, the average number of cattle in farms was found to be 11.04 head, the number of dairy cattle was 4.87 head, and the average milk yield per dairy cattle was 18.73 lt (liter). It was determined that 64.26% of the variable expenses and 35.74% of the fixed expenses had a share in the total expenses. Feed costs are in the first place with a share of 80.56% in total expenses, followed by 4.54% pharmaceuticals, 3.47% veterinarians, 3.04% repair and maintenance, 2.44% electricity, 1.73% water and cleaning materials, 1.65% infestation and seeding, 1.39% salt and litter, 0.86% insurance and 0.32% machine costs. The income elements in the examined farms consist of milk income, increase in fixed assets, fertilizer income and milk incentive income. The proportions of these in the total income are 82.98%; 11.03%; 3.82% and 2.17% respectively. The cost of 1 liter of milk was 0.94 TL. According to the research, financial rantability was determined as 6.05% and economic rantability was determined as 7.65%.

In the study conducted by Aşkan and Dağdemir (2016), 182 surveys were conducted in Erzurum, Erzincan and Bayburt provinces located in TRA1 Level 2 Region, 111, 57 and 14, respectively. It is aimed to calculate the cost of 1 kg (kilogram) of milk in dairy cattle breeding farms that benefit from incentives and supports provided by the state. As a result of the study, Bayburt, Erzincan, Erzurum and TRA1 average milk costs were found to be 0.616; 0.545; 0.600; 0.593 TL/kg with incentives and 0.877; 0.717; 0.859; 0.820 TL/kg without incentives, respectively. The highest share in production costs, respectively 67.69%; 74.97%; 71.29%; 72.67% with feed costs; second place,

respectively, 15.86%; 10.32%; 12.86%; 12.13% permanent labor costs was formed.

In their study titled “Economic Analysis of Dairy Cattle Breeding Activity of Kazova Vasfi Diren Agricultural Farm”, Aleyşil and Gözener (2018) used the accounting and business records of 2016 belonging to the livestock farm. As a result of the research; among the cost elements of the enterprise, 52.09% of the total costs are for feed expenses, 17.17% for labor costs, 12.63% for depreciation, 2.11% for medicine costs and 16.00% for other expenses conclusion has been reached. It was reported that the sources of income were milk income, male calf income, insurance damage income and support, which were 71.27%; 7.62%; 16.53% and 4.58% respectively. The income/expense ratio was 13.16% and the operating profit was 5.28%.

In this study; it is aimed to evaluate the profitability of Holstein and Simmental cattle breeds farms established within the scope of IPARD (Instrument for Pre-Accession Rural Development) Program in Burdur province.

Materials and Methods

Material

Supported by the Agriculture and Rural Development Support Institution with IPARD funds, Burdur Province; as of 31 December 2019, the economic data of the 2019 financial year of the 4 breeding cattle breeding enterprises in Altınyayla, Bucak, Karamanlı and Kemer districts constitute the material of the research. These dairy farms have 157 and 120 Holstein breed cattle, Simmental breed cattle 260 and 117 in each dairy farm.

Method

Obtaining Data

Within the scope of the research, the method of face-to-face interviews with farms owners was carried out for the provision of economic data. In addition, the accounting documents held by the

farms have been examined. The obtained economic data were evaluated using the Microsoft Excel program.

Table 1 economic analysis table has been created to be used in obtaining economic data from farms and calculating the results of economic analysis (Murat, 2011).

Feed Expenses: The feed expenses of the enterprise are evaluated separately as roughage and concentrated feed. Purchased feeds were calculated at the purchase price, with the yard cost if the feeds produced by the enterprises themselves can be calculated, and in cases where it cannot be calculated, it was assumed that it was 80% of the market price. The yard cost was obtained by subtracting the estimated marketing costs from the market selling price of feed (Günlü, 1997).

Labor Expenses: Labor expenses have been evaluated separately as family labor and foreign labor. Payments to the foreign labor were calculated according to the statement of the owners of the farm or, in cases where this is not possible, on the minimum wage. In the family labor force, the age, gender and work of the family members who are actively involved in dairy cattle breeding are evaluated in terms of their work and calculated on the minimum wage after being converted into an adult male labor unit (Günlü, 1997).

Veterinary-Health Expenses: During the period when the farm was engaged in milk production activities, the costs of veterinary services, vaccines and medicines used, artificial insemination and disinfection were taken into account. These expense items were calculated based on the records kept at the farm or the statement of the owner of the farm (Günlü, 1997; Tandoğan, 2006).

Electricity and Water Expenses: The amounts of electricity and water used in the enterprise and the fee paid to these items were calculated by checking the bills of the relevant institutions (Murat, 2011).

Insurance Expenses: The insurance costs of the buildings and machinery equipment in the farm were evaluated by checking them over the said insurance policy (Murat, 2011).

Table 1. The table of economic analysis used for the calculation of operating results.

Informations	Year (2019)	Rate (%)
Farm Number:		
Financial Date: 1 January-31 December 2019		
1. Feed Expenses		
2. Labor Expenses		
3. Veterinary-Health Expenses		
4. Electricity and Water Expenses		
5. Insurance Expenses		
6. Credit Interest		
7. The Cost of Milk Given to Calves		
8. Other Expenses		
A. Total Expenses		
9. General Administrative Expenses		
10. Buildings		
a) Depreciation		
b) Maintenance and Repair Costs		
11. Machine-Equipment		
a) Depreciation		
b) Maintenance and Repair Costs		
12. Depreciation of Live Fixtures		
B. General Total of Expenses		
C. Total Secondary Income		
a) Calf Income		
b) Fertilizer Income		
c) Inventory Value Increase		
d) Fattening Cattle and Live Material Sales Income		
e) Incentive and Support Income		
D. Total Cost (B-C)		
E. Total Amount of Milk Produced (kg)		
a) 1 kg Milk Production Cost (D/E)		
F. Milk Sales Income		
G. Total Sales Income (C+F)		
H. Net Profit/Loss (G-D)		

Credit Interest: The interest of the credit used by the farm has been evaluated. At the same time, the statement of the farm owner was based on, and the related bank organization's interest rates were controlled and calculated (Günlü, 1997; Murat, 2011).

Inventory Value Change: Because depreciation is allocated to milking cows, calves and heifers older than 6 months of age have been evaluated for inventory value change. The end-of-year and beginning-of-year values of the calves and heifers in question were calculated, and animals under 6

months of age were included in the calf income. The following formula was used to calculate the inventory value change:

$$IVC = YHV + AVS + DAV - (YHV + AVP)$$

IVC= Inventory value change,

YHV= Year-end herd value,

AVS= Animal value sold,

DAV= Deceased animal value,

YHV= Year-beginning herd value,

AVP= Animal value purchased.

If the result of the transaction is negative (-), it is evaluated as a 'Decrease in Inventory Value' and included in the expense elements, if it is positive (+), it is evaluated as an 'Increase in Inventory Value' and included in the elements of secondary income (Günlü, 1997).

The Cost of Milk Given to Calves: It was calculated by multiplying the amount of milk given to calves in the farm by the milk price in the relevant period (Murat, 2011).

Other Expenses: Fuel, transportation, mat, animal insurance, communication, stationery etc. expenses are included in this expense item (İçöz, 2004; Murat, 2011).

Total Expenses: It consists of feed, labor, veterinary-health, electricity-water, insurance, credit interest, milk costs for calves and other expenses (Aydın, 2011).

General Administrative Expenses: As a general administrative expense in dairy cattle breeding farms, 3% of sales revenues were received (Aydın, 2011).

Maintenance and Repair Costs: The statement of the owner of the farm was based on the calculation of maintenance and repair costs. In cases where this is not possible, a total of 3% of the acquisition costs of farm buildings were taken, including 1% maintenance and 2% repair (İçöz, 2004; Tandoğan, 2006; Murat, 2011).

Depreciation of Live Fixtures: It was obtained by dividing the difference between the breeding

value of existing dairy cattle in the farm and the butchering value by the economic life (Murat, 2011).

Depreciation of Buildings and Equipment: It was obtained by subtracting the scrap value from the current acquisition value and dividing it by the economic life to calculate the depreciation of buildings and equipment in the farm (Murat, 2011).

General Total of Expenses: The total of expenses is composed of general administrative expenses, maintenance-repair expenses, building and equipment depreciation and living fixtures depreciation (Tandoğan, 2006; Aydın, 2011; Murat, 2011).

Milk Sales Income: Milk sales income, which is one of the main income elements of dairy cattle breeding farms, was calculated by multiplying the amount of milk by the milk price in the corresponding period (Tandoğan, 2006).

Secondary Income: Calf income, fertilizer income, inventory value increase, incentive and support income, income from the sale of fattening cattle and live materials, which is the main income element in dairy cattle farms, is income from calves other than milk sales income. Calf income was obtained by multiplying the number of calves younger than 6 months of age by the market price in the region where the farm is located (Aras and İzmirli 1976; Tandoğan, 2006).

Total Revenues: It consists of the sum of milk sales revenue and additional revenues (Murat, 2011).

Total Cost: Obtained by subtracting secondary revenues from the general total of expenses. The production cost of 1 kg of milk was found by dividing the obtained value by the total amount of milk produced (Tandoğan, 2006; Aydın, 2011; Murat, 2011).

Net Profit/Loss: It is obtained by subtracting the total cost from the total income (Aydın, 2011).

Determination of Operating Capital Structures

Using the data obtained as a result of face-to-face meetings and checking accounting documents, the method given in Table 2 was used (Açıl, 1970).

According to Table 2, it can be seen that the working capital consists of active, passive and equity capital.

Table 2. Operating capital inventory.

Type of Capital	2019/TL
I. Active Capital	
A. Real Estate Capital	
B. Working Capital	
1. Animal Capital	
2. Equipment Capital	
3. Material Capital	
4. Cash-Bank Assets	
II. Passive Capital	
III. Equity Capital (I-II)	

Active Capital: Consists of real estate capital and working capital.

Real Estate Capital: The barn, feed warehouse, milking parlor, manure pit, silage pit etc. used in the production flow in dairy cattle farms, consists of the sum of the acquisition costs of the buildings.

Working Capital: Consists of animal capital, equipment capital, material capital and cashier-bank capital.

Animal Capital: The total monetary value of all the animals in the dairy cattle farms.

Equipment Capital: Consists of the total cost of all machinery and equipment used in the dairy cattle breeding farm.

Material Capital: It is the capital used for the purchase of feed, medicines, vaccines, disinfectants, cleaning agents, fuel oil consumed at the farm during the production of milk.

Cash-Bank Assets: It refers to the cash in the bank or safe in order to cover the expenses elements.

Passive Capital: It refers to all debts of farms to banks, cooperatives, individuals, institutions and organizations.

Equity Capital: The difference between active capital and passive capital. It shows the farm's own resources.

Profitability Analysis

By transferring and evaluating the obtained data to the Microsoft Excel program, the input/output values and profitability ratios of farms were calculated as follows:

Financial Rantability: This value, which is considered a measure of success, is the degree of efficiency of equity capital. The net profit obtained in the same period is expressed as the ratio of the equity capital in the same period (Sakarya and Günlü, 1996).

Economic Rantability: It is an indicator of how effectively, efficiently and profitably economic resources are used throughout production. It was found that the net profit obtained and the amount of passive capital were divided by the active capital (Günlü, 1997).

Rantability Factor: It is expressed as the ratio of the net product of the enterprise to its gross product (Günlü, 1997).

Expense/Revenue Ratio (output/input): It is expressed as the ratio of the total sales revenues obtained in a certain period to the general total of expenses. The fact that this ratio is greater than 1 indicates that the farm is working profitably, and the fact that it is less than 1 indicates that the farm is losing (Aydın, 2011).

Results

Farm Expenses

The scope of the research, the cost elements that comprise the operating costs of feed, labor, veterinary-medical, electric-water, insurance, credit interest, calves given milk, other costs,

general administration, maintenance and depreciation costs. The proportional distribution of the costs that make up the operating cost is given in Table 3.

Table 3. The proportional distribution of the elements of expenses in farms (%).

Elements of Expenses	The Average of All Farms	1. Holstein Farm	2. Holstein Farm	1. Simmental Farm	2. Simmental Farm
Feed	63.07	68.52	57.31	57.03	69.42
Labor	4.77	5.08	3.49	6.36	4.13
Veterinary-Health	2.57	1.85	1.94	4.42	2.07
Electricity and Water	5.22	2.31	11.64	4.15	2.79
Insurance	0.24	0.31	0.23	0.41	0.00
Credit Interest	3.23	4.04	3.56	5.30	0.00
The Cost of Milk Given to					
Calves	1.82	1.48	1.99	1.44	2.36
Other	3.10	2.31	5.82	2.21	2.07
General Administrative	2.52	2.58	2.58	2.44	2.49
Depreciation	8.11	6.36	6.93	10.29	8.87
Maintenance and Repair	5.36	5.16	4.51	5.94	5.81

When Table 3 is examined, it is seen that the most important cost factor that creates the cost is feed input. The share of the feed expense ratio of the farms in all expenses was 63.07%. This was followed by depreciation, maintenance-repair, electricity-water, labor, credit interest, other

expenses, veterinary-health, general administration, milk given to calves and insurance, respectively. In addition, the farms with the highest and lowest feed costs are the 2nd Simmental farm and the 1st Simmental farm, respectively.

Table 4. Proportional distribution of income elements in farms (%).

Elements of Income	The Average of All Farms	1. Holstein Farm	2. Holstein Farm	1. Simmental Farm	2. Simmental Farm
Milk Income	70.26	63.90	66.46	84.21	66.48
Calf Income	6.16	4.09	3.48	9.40	7.67
Fertilizer Income	0.10	0.00	0.00	0.39	0.00
Inventory Value Increase	0.82	0.92	0.73	0.71	0.92
Fattening Cattle and Live Material Sales Income	17.20	23.72	24.39	0.00	20.71

Incentive and Support Income	5.45	7.37	4.94	5.29	4.22
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Farm Income

The income elements of the farms included in the study consist of milk income, calf income, fertilizer income, inventory value increase, fattening cattle and live material sales income, incentive and support income elements. The proportional distribution of farm income is given in Table 4.

Milk income, which is the main income element of dairy cattle farms, ranks first with a share of 70.26% in all incomes in this research. This is followed by fattening cattle and live material sales, calf income, incentive and support income, inventory value increase and fertilizer income, respectively. Among the incomes, the farms with the highest and lowest milk income ratios are the

1st Simmental farm and the 2nd Simmental farm, respectively (Table 4).

Profitability Analysis and Cost

In order to evaluate and interpret the economic performance of the farms examined within the scope of the research, profitability ratios, expense/revenue ratio and 1 kg milk cost are calculated and given in Table 5.

According to Table 5, the financial rantability, economic rantability and rantability factor ratios of farms were found to be 14.58%; 0.10 and 24.22 respectively. It is seen that the expense/revenue ratio is 1.11% the cost of 1 kg milk was calculated as 1.63 TL (0.29 US Dollars). Farms where the cost of milk 1 kg is the highest and the lowest, 1st Holstein farm and 1st Simmental farm respectively.

Table 5. Profitability ratios of farms (%), expense/revenue ratio (%) and cost of 1 kg milk (TL, US Dollars).

Economic Indicators	The Average of All Farms	1. Holstein Farm	2. Holstein Farm	1. Simmental Farm	2. Simmental Farm
Profitability Ratios					
Financial Rantability	14.58	14.93	18.60	10.01	14.76
Economic Rantability	0.10	0.08	0.11	0.11	0.09
Rantability Factor	24.42	17.80	22.79	30.87	26.21
Expense/Revenue Ratio					
	1.11	1.04	1.11	1.18	1.12
1 kg Milk Production Cost					
	1.63 (0.29 \$)	1.77	1.61	1.56	1.59

Discussion

Farm Expenses

The scope of the research, the cost elements that comprise the farm costs of feed, labor, veterinary-medical, electric-water, insurance, credit interest,

calves given milk, other costs, general administration, maintenance and depreciation costs. In this study, in accordance with the economic data for 2019, operating inputs were calculated.

It was seen that feed expenses (63.07%) take the first place among the cost elements that make up the cost. Similarly, the most studies reported that feed costs take place on the top in all costs (Günlü, 1997; Uyanık, 2000; Günlü et al., 2001; Şahin, 2001; Şahin et al., 2001; Karakaş Oğuz et al., 2011; Murat, 2011; Aşkan and Dağdemir, 2016; Algreen and Gözener, 2018). In addition, this value (63.07%) has been found similar to the results of studies conducted by Turkyılmaz and Aral (2002); higher than the results of the study conducted by Günlü (1997), Uyanık (2000), İçöz (2004), Karakaş Oğuz et al. (2011), Alyeşil and Gözener (2018); lower than the results of the study conducted by Şahin (2001), Şahin et al. (2001), Yılmaz et al. (2003), Nizam and Armağan (2006), Tokmak et al. (2011), Şahin et al. (2014), Semerci et al. (2015). Although some of the roughage and concentrate feed required for the enterprise is produced by the farms, the high share of the feed expenses in the total expenses suggests that the animals in the farms do not go to the pasture. Demir et al. (2014) in the Kars Region, it was reported that the share of feed farms in total expenses, depending on the use of pastures and meadows, is 25%. Demir et al. (2014)'s result shows the importance of pasture and pasture use in terms of livestock input costs.

The share of labor expenses (4.77%) in total expenses; other studies (Günlü, 1997; Uyanık, 2000; Günlü et al., 2001; İçöz, 2004; Karakaş Oğuz et al., 2011; Demir et al., 2014; Aşkan and Dağdemir, 2016; Alyeşil and Gözener, 2018), it was seen that it turned out to be low compared to. In this study, the low cost of labor can be explained by the fact that the scale of the enterprise is large, the level of mechanization and technology of the farms are high modern enterprises, and the architectural structures of the farms are suitable for functioning. For these reasons, it can be said that the high productivity due to the labor force reduces labor costs.

The share of veterinary-health expenditures in total costs was found to be 2.57% on average. It was found that this value was low when compared with similar studies (Günlü, 1997; Günlü et al.,

2001; İçöz, 2004; Nizam and Armağan, 2006; Karakaş Oğuz et al., 2011; Tokmak et al., 2011; Demir et al., 2014; Semerci et al., 2015). The low level of this value can be explained by the high level of education of farm owners, the implementation of preventive medicine practices at farms, the high standards of animal welfare of farms, the good conditions for care-feeding-breeding.

The share of electricity and water expenses in total expenses was determined as 5.22% on average. This value was found to be higher than the results of the study by Şahin (2001), Karakaş Oğuz et al. (2011), Murat (2011), Şahin et al. (2014), Semerci et al. (2015). It is thought that this situation is caused by the high level of machinery and technology of farms in general. In addition, all farms store their own milk in milk storage tanks after passing it through the pre-cooling system, which increases the cost of electricity.

The share of insurance expenses in total expenses was determined as 0.24% on average. This result found is lower than the reports of Uyanık (2000), Karakaş Oğuz et al. (2011), Semerci et al. (2015); it is higher than the declaration of Murat (2011).

The share of credit interest expenses in total expenses was determined as 3.23% on average. This value is higher than the study results of Uyanık (2000), İçöz (2004), Murat (2011); It was found lower than the study results of Karakaş Oğuz et al. (2011), Demir et al. (2014).

It was determined that the cost of milk given to the calves is 1.82% in total costs. This result was found to be lower than the results of the study conducted by Karakaş Oğuz et al. (2011) and Murat (2011).

It was determined that the share of depreciation expenses in total expenses was 8.11% on average. This value was found to be close to what Tandoğan (2006) and Murat (2011) reported; higher than the values reported by Günlü (1997), Günlü et al. (2001), Turkyılmaz and Aral (2002),

İçöz (2004) and lower than the values reported by Alyeşil and Gözener (2018).

The share of maintenance-repair expenses in total expenses was determined as 5.36% on average. It was observed that this result was higher than the results of the studies conducted by Günlü (1997), Uyanık (2000), İçöz (2004), Tandoğan (2006), Karakaş et al. (2011), Murat (2011), Tokmak et al. (2011), Demir et al. (2014), Semerci et al. (2015). It is thought that the value found in this study is high due to the fact that the buildings are high-cost structures since they are made of steel and reinforced concrete, the machinery-equipment is modern and technological tools, and the depreciation of live fixtures is added to the depreciation account.

Farm Income

In the study, the income elements of the farms were determined as milk income, calf income, fertilizer income, inventory value increase, fattening cattle and live material sales income and incentive and support income. in accordance with the economic data for 2019, operating revenues were calculated.

In the dairy cattle farms where the study was conducted, it was determined that the average milk income (70.26%) was the income item with the highest rate among all income items. This result was found to be high according to the results of the study conducted by Günlü (1997), Uyanık (2000), Günlü et al. (2001), Şahin et al. (2001), Türkyılmaz and Aral (2002), İçöz (2004), Nizam and Armağan (2006), Tandoğan (2006) and low according to the results of the study conducted by Murat (2011), Semerci et al. (2015), Alyeşil and Gözener (2018). It is seen that milk income takes the first place among the elements that make up the income items of dairy cattle farms. This is supported by similar studies (Günlü, 1997; Uyanık, 2000; Günlü et al., 2001; Şahin et al., 2001; Türkyılmaz and Aral, 2002; İçöz, 2004; Nizam and Armağan, 2006; Tandoğan, 2006; Murat, 2011; Semerci et al., 2015).

It was concluded that calf income has an average of 6.16% share among farms income items. This result was found to be consistent with what Tandoğan (2006) and Murat (2011) reported. On the other hand, while it was higher than the results of the study by Uyanık (2000), it was found to be lower than the results of the study by Günlü et al. (2001), Türkyılmaz and Aral (2002), İçöz (2004), Karakaş Oğuz et al. (2011). In this study, it was observed that the calf income was higher in the simmental farms than in the holstein farms (Table 4).

The share of fertilizer income among operating income items was determined as 0.10% on average. It was found that this value is lower than the results of the study conducted by Günlü (1997), Şahin (2001), Uyanık (2000), Türkyılmaz and Aral (2002), İçöz (2004), Nizam and Armağan (2006), Karakaş Oğuz et al. (2011), Semerci et al. (2015). In this study, it was determined that only one of the four farms included in the scope of the study receives income from the sale of fertilizers, while the other farms use farm fertilizer to improve the soil. Therefore, the fertilizer income ratio was found to be low compared to similar studies.

It was determined that the increase in inventory value has an average of 0.82% share in income items. This value was found to be low when compared to the values reported by Günlü (1997), Günlü et al. (2001), Türkyılmaz and Aral (2002), İçöz (2004), Tandoğan (2006).

It was found that the income from the sale of fattening cattle and live materials has an average share of 17.20% within the income items. The income from the sale of fattening cattle and live materials, meat income from male cattle that have reached the time of slaughter, and the sale of breeding heifers have been evaluated. When the literature was examined, it was seen that the result of the study conducted by Karakaş Oğuz et al. (2011) was lower than the value found in this study.

It was determined that the incentive and support income has an average share of 5.45% within the income items. It was found that this result was close to the result reported by Karakaş Oğuz et al. (2011) and higher than that reported by Semerci et al. (2015).

Profitability Analysis and Cost

In order to evaluate and interpret the economic performance of the farms examined within the scope of the study, profitability ratios, expense/revenue ratio and 1 kg milk cost were calculated.

In the study, the financial rantability ratio of farms was determined as 14.58% on average. It was found that this result was close to the results found by Günlü et al. (2001) and İçöz (2004). In addition, it was determined that this result was higher than the research results reported by Uyanık (2000), Tandoğan (2006), Karakaş Oğuz et al. (2011), Murat (2011), Tokmak et al. (2011), Semerci et al. (2015) and lower than the research result reported by Türkyılmaz and Aral (2002). The financial rantability ratio can be considered as an indicator of what remains of the profit from the farm that arises after deducting taxes and interest. The higher it is for the farm, the better in terms of profitability. If it is negative, it is considered as an indication that the farms is making a loss (Karakaş Oğuz et al., 2011). In the study, the financial rantability rate was determined as 14.93% in the 1st Holstein farm, 18.60% in the 2nd Holstein farm; 10.01% in the 1st Simmental farm, 14.76% in the 2nd Simmental farm. According to this, while the profitability of the farm is the 2nd Holstein farm; the lowest is the 1st Simmental farm. In addition, the fact that financial rantability is higher than economic rantatability can be evaluated as a more effective and efficient use of equity capital. Accordingly, it was the 2nd Holstein farm that used its equity capital more effectively and achieved higher profitability.

The economic rantability rate of farms was determined as 0.10% on average. This ratio was found to be higher than that reported by Uyanık

(2000) and Tandoğan (2006), and lower than that reported by Günlü et al. (2001), İçöz (2004), Karakaş Oğuz et al. (2011), Murat (2011), Tokmak et al. (2011), Semerci et al. (2015). Economic rantability is the total capital of farms and is an indicator of the ratio at which the sum of resources makes a profit. The profitability of resources is directly proportional to the high output of this ratio (Karakaş Oğuz et al., 2011). In the study, the economic rantability rate was determined as 0.08% in the 1st Holstein farm, 0.11% in the 2nd Holstein farm; 0.11% in the 1st Simmental farm, 0.09% in the 2nd Simmental farm.

Another ration determined within the scope of the research is the rantability factor. The rantability factor of farms was found to be 24.42% on average. While this value is higher than some research findings (Günlü, 1997; Uyanık, 2000; Türkyılmaz and Aral, 2002; Tandoğan, 2006; Murat, 2011; Karakaş Oğuz et al., 2011), it is lower than a research finding (İçöz, 2004).

In the research, the rantability factor rate was determined as 17.80% in the 1st Holstein farm, 22.79% in the 2nd Holstein farm; 30.87% in the 1st Simmental farm, 26.21% in the 2nd Simmental farm. The rantability factor found is higher in Simental farms than in Holstein farms.

The expense/revenue ratio was determined as an average of 1.11%. This value; higher than the value found by Tandoğan (2006); close to the values found by the İçöz (2004) and Murat (2011); It was found to be lower than the values found by Türkyılmaz and Aral (2002) and Karakaş Oğuz et al. (2011). In the research, the expense/revenue ratio rate was determined as 1.04% in the 1st Holstein farm, 1.11% in the 2nd Holstein farm; 1.18% in the 1st Simmental farm, 1.12% in the 2nd Simmental farm. It can be seen that the values found are close to each other in all farms.

As in all enterprises, the main purpose of dairy cattle enterprises is to make profit. For a sustainable and profitable farms, minimizing the costs and thus reducing the milk production cost as much as possible is an important situation in

terms of profitability. In the study, the average cost of 1 kg of milk was 1.63 TL (\$ 0.29), in market conditions where the average selling price of milk in 2019 was 1.90 TL. In some studies conducted on the subject, the cost of 1 liter of milk was Nizam and Armağan (2006) 0.571 TL, İkikat Tümer and Birinci (2011) 0.35 TL, Karakaş Oğuz et al. (2011) 0.65 TL, Murat (2011) 0.495 TL, Semerci et al. (2015) 0.94 TL, Demir et al. (2014) reported it as 0.70 TL. In the study, the cost of 1 kg of milk was found to be close to each other in all four farms studied (Table 5).

As a result of the research, all farms were found profitable. Because the profitability ratios (financial rantability, economic rantability, rantability factor) are all positive values.

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