



Effects of Some Breeding Criteria on Financial Evaluation Indicators for Dairy Cattle Investment Projects

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ABSTRACT

This study was conducted with the aim of determining the probable effects of different real interest rates (RIR: 5, 6 and 7%), some key breeding criteria such as calving rate (CR: 80, 85 and 90%) and mean lactation milk yield per milking cow (MLML: 5000, 6000 and 7000 kg) on the financial evaluation indicators such as Benefit Cost Ratio (BCR) for a dairy cattle farm investment project taken as model, consisted of 100 heads of Holstein cows, which was established and operated during 20 years period in Turkey. In the study, firstly, current investment and annual operating costs for that kind of dairy cattle farm were determined according to optimal workmanship, housing, maintenance, feeding and health protection and then revenues were calculated from current sale prices of raw milk, slaughtered/breeding animal and manure. For each assumed different real interest rate, calving rate and mean lactation milk yield per milking cow, the parities of unit (1 kg) sale price of raw milk to unit (1 kg) cost of concentrate feed (M/F-parity) (current unit cost of concentrate feed was assumed as to be 1.00 Turkish Lira (TL) were calculated to make BCR that is one of the financial evaluation criteria for the investment projects, as to be 1.00. Calculations showed decreasing each 1% of the real interest rate in Turkey, increasing each 5% of calving rate and increasing each 1000 kg of mean lactation milk yield per milking cow had, separately, about 5-12% positive effect on the parity of unit (1 kg) sale price of raw milk to unit (1 kg) cost of concentrate feed.

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Süt Sığırcılığı Yatırım Projeleri İçin Bazı Yetiştirme ve Mali Değerlendirme Kriterlerinin Belirlenmesi

MAKALE BİLGİSİ

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ÖZET

Bu çalışma ile ülkemizde 100 baş Holstein inek kadrolu model olarak kurulacak ve 20 yıl işletilecek bir süt sığırcılığı işletmesinde farklı reel faiz oranı (%5, 6 ve 7), doğum oranı (%80, 85 ve 90) ve laktasyon süt verimi (5000, 6000 ve 7000 kg/inek) için yatırım projelerinin mali değerlendirme kriterlerinden birisi olan Fayda Masraf Oranı (FMO) üzerindeki muhtemel etkilerinin belirlenmesi amaçlanmıştır. Çalışmada, öncelikle bu özellikteki bir süt sığırcılığı işletmesi için optimum işçilik, yetiştirme, barındırma, bakım, besleme ve sağlık giderleri için güncel yatırım ve yıllık işletme giderleri hesaplanmış, daha sonra da çiğ süt, kasaplık veya damızlık hayvan ve hayvan gübresi satış fiyatlarından da işletme gelirleri hesaplanmıştır. Belirlenen bu değişkenler (reel faiz oranı, doğum oranı ve laktasyon süt verimi) için çiğ sütün kg satış fiyatının kesif yemin kg maliyetine (1 TL/kg alınmıştır) ait pariteleri üzerinden FMO'yu 1,00 yapacak çiğ sütün kg satış fiyatları hesaplanmıştır. Hesaplamalar reel faiz oranındaki her %1'lik düşüşün, doğum oranındaki her %5'lik artışın ve laktasyon süt verimindeki her 1000 kg'lık artışın ayrı ayrı olarak çiğ sütün kg satış fiyatı ile kesif yemin kg maliyetine ait parite üzerinde %5-12'lik bir olumlu etkisi olduğunu göstermiştir.

Introduction

In addition to its strategic importance, agricultural production is one of the most important sectors in developing countries like Turkey for many reasons such as rural overpopulation, traditional production concept and employment opportunities etc. Besides, it is well known that animal production (livestock sector) is also one of the two main branches of agricultural production system with plant production (Ünalán et al., 2013; Ünalán et al., 2015).

Especially, dairy and beef cattle breeding have a major role in the livestock sector of Turkey like many other countries in the world. Because, Turkey has 14.2 million heads of cattle (5.5 million milking cows) and annual 16.9 million tons of cow milk production. A large amount of total milk production (91.1%) and meat production (88.3%) are provided from cattle breeding sector in Turkey (URL, 2016a). Beside, that sector has also a great deal of importance in order to develop and supply raw material to the leather industry (3.8 million heads of annual slaughtered cattle) in Turkey.

Profitability and economic sustainability of dairy cattle investments are determined by many factors. These factors can be broadly categorized as external (out of farm) and internal (within farm). External factors can be listed as politics of the Government (indented supports with production and marketing, subvention, credits, legacy regulations of imports and exports etc.) related to the dairy cattle farming, stability of supply and demand, current real interest rate in the country and availability/effectiveness of breeders' organization etc. Internal factors can be listed as financial power of owner, sufficient knowledge and technology usage, farm size, cattle breed, breeding/production type of the farm and some key deterministic breeding criteria (rates of conception, pregnancy, calving and mortality, periods of service and drying, length of lactation and mean lactation milk yield per milking cow), farm's condition and duties (housing type, management, maintenance, feeding system, health protection and welfare), sale prices of products, marketing status and, cost and providing status of the main inputs (especially the costs of concentrate feed and purchasing breeding heifers/cows stock) etc. (Ünalán and Cebeci, 2007; Ünalán, 2016a).

Some researchers reported that large amount of revenues of the dairy cattle farms came from sale of produced milk (55-65%) and sale of breeding or slaughtered animals (35-45%) and large of annual operating cost became feeding costs (60-70%) and the other costs (30-40%) (Türkyılmaz and Aral, 2002; Ünalán, 2016b).

In the present study, it was firstly assumed that establishment of a modern dairy cattle farm as model, consisted of 100 heads of Holstein cows, would be operated during 20 years period. Then, the costs of fixed investment and annual operating for that kind of dairy cattle farm investment which were determined according to the costs of current optimal management, workmanship, housing, maintenance, feeding and health protection, and then revenues of the investment were calculated from current sale prices of raw milk, breeding or slaughtered/reformed animals and cowpat that would

be produced from that farm during the operation period.

Consequently, this study was conducted with the aim of determining the probably effects of different real interest rates (5, 6 and 7%), some different key breeding criteria such as calving rates (80, 85 and 90%) and mean lactation milk yields per milking cow (5000, 6000 and 7000 kg) on the profitability and economic sustainability of a dairy cattle farm investment assumed as a model farm in Turkey.

Material and Method

Firstly, animal material of this study was assumed as all of animals produced from a dairy cattle farm which was thought as a model dairy cattle farm investment in our country (Turkey), consisted of 100 heads of breeding dairy cows (with purchasing 100 heads of pregnant heifers in the first year of the investment), and it was assumed that the established farm would be operated during 20 years period. Then a special Software called as "Financial Evaluation Software for Dairy Investment-Turk: FESDI-Turk Ver. 1.0" was developed using by Microsoft Excel (Ver. 2010) in order to create herd projection (changes and number of animals in the herd according to some optimal breeding assumptions during the operation period of the investment) and calculate the aiming of financial evaluation criteria of the investment project. Finally, it was determined the effects of different real interest rates (5, 6 and 7%), some different key breeding criteria in dairy cattle farms such as calving rates (80, 85 and 90%) and mean lactation milk yields per milking cow (5000, 6000 and 7000 kg) on the profitability and economic sustainability of the dairy cattle farm taken as model using that Software.

In the present study, firstly, current (November, 2016) investment and annual operating costs for a dairy cattle farm were determined according to optimal workmanship, housing, maintenance, feeding and health protection and then revenues of the farm were calculated from current sale prices of raw milk and slaughtered/breeding animal and manure. For each assumed different real interest rate, calving rate and mean lactation milk yield, the parities of raw milk sale price to concentrate feed cost (M/F-parity, current feed cost was assumed as to be 1.00 Turkish Lira: TL/kg) were calculated to make Benefit Cost Ratio (BCR) that is one of the financial evaluation criteria for the investment project, as to be 1.00, apart from Net Present Value (NPV) and Internal Rate of Return (IRR). All those financial criteria are directly related to each other. Therefore, if the BCR is 1.00, the NPV will be equal to zero (0) because the total benefit (revenues) equals total cost of the investment, and the IRR will be also equal to the assumed real interest rate in the calculations of them. In the present study, only the BCR was used as a financial evaluation criterion.

Benefit Cost Ratio (BCR) takes into account the amount of monetary gain realized by performing a project versus the amount it costs to execute the project. If this ratio equals 1.00 or over 1.00, the investment project would be operated economically. BCR formula is given below (Yurdakul, 1996).

$$BCR = \frac{\sum_{t=0}^{n=20} \frac{(\text{TotalRevenue})}{(1+r)^t}}{\sum_{t=0}^{n=20} \frac{(\text{TotalCost})_t}{(1+r)^t}}$$

Where; *t*, *n* and *r* show *t*th year (from starting year-0th to the last year-20th of the investment), total operation period of the investment (assumed 20 years) and real interest rate (assumed 5, 6 and 7% in the calculation of investment financial evaluation) in Turkey, respectively.

Results and Discussion

The current unit (head, kg or ton) sale prices of main products such as breeding heifers, slaughtered/reformed cows, slaughtered yearling male, cowpat and raw milk under the optimal breeding criteria (annual calving, mortality, herd replacement and breeding cow culling rates) produced from that farm assumed as model, and mean lactation milk yield (ton) per milking cow were

given in Table 1, and the number (head) of animals in the herd according to their ages (herd projection) during the operating period (20 years) was also shown in Table 2.

For that kind of dairy cattle farm investment taken as a model, consisted of 100 heads of breeding cows stock in our country, the current (December, 2016) investment costs (costs of fixed investment and operating capital requirement) were given in Table 3, and the current annual operating costs were also shown in Table 4, respectively.

As shown in Table 4, large amount of annual operating cost of the farm came from purchasing the required feed's (concentrate, Alfalfa hay and silage) costs (ranged from nearly 59% to 69%).

Annual operating revenues for that kind of dairy cattle farm taken as model would be operated during 20 years period was given in Table 5.

As seen in Table 5, almost total amount of annual operating revenues of the farm was obtained from raw milk (nearly 55%) and breeding or slaughtered animals (nearly 45%) sales.

Table 1 Optimal breeding criteria and products current sale prices

Criteria	Values of Criteria
Annual calving rate of breeding cows (%)	80-85-90
Annual mortality rate of breeding cows (%)	2
Annual mortality rate of heifers (%)	3
Annual mortality rate of male/female calves (%)	8
Annual herd replacement rate by heifers (%)	15
Annual culling rate of breeding cows (%)	2
Mean lactation milk yield (kg/milking cow)	5000-6000-7000
Sale price of breeding heifers (TL/head)	7.000
Sale price of reformed/culled cows (TL/head)	6.325 ¹
Sale price of slaughtered yearling males (TL/head)	4.410 ²
Sale price of raw milk (TL/kg)	1.20-1.62 ³
Sale price of cowpat (TL/ton)	20

¹ 500 kg live weight and 55% carcass efficiency and 23 TL/kg current sale price, (TL: Turkish Lira), ² 300 kg live weight and 60% carcass efficiency and 24.5 TL/kg current sale price (URL, 2016b,c; Ünalán, 2016b), ³ Raw milk current unit (kg) sale prices were determined after the financial evaluation of the investment for each different real interest rates (5, 6 and 7%), calving rates (80, 85 and 90%) and mean lactation milk yields (5000, 6000 and 7000 kg/milking cow).

Table 2 Changes and number (Head) of animals in the herd (Herd Projection)

Animals In Herd	1. year	2. year	3. year	4. year	5-20. years
No. of cow	100	96	99	98	98
No. of heifer's*	0	17	16	17	17
Annual no. of newborn male calf	40 ¹ -43 ² -45 ³	40-43-45	40-43-45	40-43-45	40-43-45
Annual no. of newborn female calf	40-43-45	40-43-45	40-43-45	40-43-45	40-43-45
Annual Animal Deaths					
No. of cows	2	2	2	2	2
No. of heifers	0	1	0	1	1
No. of male calves	3 ¹ -3 ² -4 ³	3-3-4	3-3-4	3-3-4	3-3-4
No. of female calves	3-3-4	3-3-4	3-3-4	3-3-4	3-3-4
Annual Animal Breeding Stock					
No. of heifers	17	16	17	17	17
Annual Animal Sales					
No. of slaughtered non-bred cows	0	13	15	15	15
No. of slaughtered yearling males	37 ¹ -40 ² -41 ³	37-40-41	37-40-41	37-40-41	37-40-41
No. of breeding heifers	20 ¹ -23 ² -24 ³	21-24-25	20-23-24	20-23-24	20-23-24
Annual Culled Animals					
No. of culled/slaughtered cows	2	2	2	2	2

^{1,2,3} Rounded to integer no. of animals in the herd for each 80, 85 and 90% calving rates, respectively (Ünalán, 2016b), * No. of heifer's replacement for stability of herd's cow capacity to 100 heads of cows

Table 3 Investment Costs

A. Investment Costs				
A.1. Fixed Investment Costs	Quantity	Unit	Unit Cost (TL [*])	Total Cost (TL)
Investment project and etude cost	1	Once	20.000	20.000
Farmland purchasing cost (3rd grade agricultural land)	7	Decare	10.000	70.000
Farmland arrangement cost (25% of farmland purchasing cost)	1	Once	17.500	17.500
Semi-opened free style barn buildings cost ^{***}	1.450	m ²	1.044	1.513.800
Equipment cost for the barn units ^{****}	All	Various	36.250	36.250
Calf huts cost	50	Unity	800	40.000
Automatic milking unit building cost (2x8 heads of cows capable)	1	Once	125.000	125.000
Management building cost (60 m ² total closed area)	60	m ²	507	30.420
Equipment cost for the management building	All	Various	25.000	25.000
Employee house building cost (80 m ² total closed area)	80	m ²	507	40.560
Equipment cost for the employee house	All	Various	25.000	25.000
Concentrate feed storage building cost (400 m ³ total closed area)	100	m ²	108	10.800
Roughage storage building cost (150 m ² / 600 m ³ total closed area)	150	m ²	108	16.200
Cowpat storage building cost (300 tons total capable)	100	m ²	108	10.800
Silage storage building cost (320 m ² / 640 m ³ total capable, as 4 units)	320	m ²	108	34.560
Other required machines cost (tractor, trailer, generator etc.)	All	Various	100.000	100.000
Breeding heifers stock purchasing cost ^{*****}	100	Head	7.000	700.000
Unexpected costs (3% of total fixed investment cost)				63.477
Total Fixed Investment Costs				2.879.367
A.2. Operating Capital Requirements (only in the first year of the investment; assumed as 25% of Annual Operating Costs given in Table 4)				201.044 ¹
				225.595 ²
				242.513 ³
Total				3.080.411¹
				3.104.962²
				3.121.898³

(References: Balaban and Şen, 1988; Arıcı et al., 2001; URL, 2016c; Ünal, 2016b), *TL: Turkish Lira, **AU (Large Animal Unit): It was cumulatively calculated from no. of available different aged animals (in Table 2) in the head multiplying by 1.0, 0.7, 0.5 and by 0.3 for cows, heifers, yearling males/females and calves, respectively (URL, 2016a,b; Ünal, 2016b). *** (1450 m² total closed area and 2500 m² total paddock area), **** (automatic water bowl, locking system, animal mats etc., 145 AU**x250 TL), ***** (assumed in the first year of the investment)^{1,2,3} Those costs related to the given variables were calculated for each 5000, 6000 and 7000 kg mean lactation milk yields per milking cow, respectively.

Table 4 Annual Operating Costs

B. Annual Operating Costs	Quantity	Unit	Requirement	Duration	Unit Cost (TL [*])	Total Cost (TL)
Concentrate feed cost	145	AU**	5.00 kg/AU/day	365 days	1.00	264.625 ¹
			6.00 kg/AU/day			317.550 ²
			7.00 kg/AU/day			370.475 ³
Roughage (Alfalfa hay) cost	145	AU	2.86 kg/AU/day	365 days	0.54	81.656 ¹
			3.43 kg/AU/day			97.898 ²
			4.00 kg/AU/day			114.318 ³
Silage cost	145	AU	10.71 kg/AU/day	365 days	0.23	130.424 ¹
			12.86 kg/AU/day			156.507 ²
			15.00 kg/AU/day			182.591 ³
Animal mats cost	4	Times	-	Annual	500	2.000
Electric cost	5	Unit	10 KW/h/Unit/day	365 days	0.65	11.863
Drinking and utility water cost	145	AU	60 liters/AU/day	365 days	0.001	3.176
Fuel cost for vehicles	All	Liter	15 liters/day	365 days	3.40	18.615
Personal (workers) cost	4	Person	person/month	12 months	2.500	120.000
Artificial insemination cost	150	Dose	dose/year	Annual	100	15.000
Vaccinations and drugs cost	145	AU	AU/year	Annual	50	7.250
Veterinary services cost	4	Times	times/year	Annual	250	1.000
Reparation (5% of all buildings, machines and equipment costs)	1	Times	times/year	Annual	24.730	24.730
Amortizations (5% of all buildings, machines and equipment costs)	1	Times	times/year	Annual	100.420	100.420
Unexpected costs (3% of total cost)	1	Times	times/year	Annual	23.432	23.432 ¹
					26.283	26.283 ²
					29.143	29.143 ³
Total						804.178¹
						902.379²
						970.052³

*TL: Turkish Lira, AU** (Large Animal Unit): It was cumulatively calculated from no. of available different aged animals (in Table 2) in the herd multiplying by 1.0, 0.7, 0.5 and 0.3 for cows, heifers, yearling males/females and calves, respectively (URL, 2016b,c; Ünal, 2016b), ^{1,2,3} These values related to the given variables were calculated for each 5000, 6000 and 7000 kg mean lactation milk yields per milking cow, respectively.

Table 5 Annual operating revenues (TL*)

Revenues-Years	1. Year	2. Year	3-19. Years	20. Year
Reformed/culled cows sale	12.650	94.875	107.525	107.525
	163.170 ¹	163.170	163.170	163.170
Slaughtered yearling males sale	174.195 ²	174.195	174.195	174.195
	180.810 ³	180.810	180.810	180.810
Breeding heifers sale	140.000 ¹	147.000	140.000	140.000
	157.500 ²	164.500	157.500	157.500
	168.000 ³	175.000	168.000	168.000
Raw milk sale	500.000 ¹	500.000	500.000	500.000
	531.250 ²	531.250	531.250	531.250
	768.600 ³	768.600	768.600	768.600
Manure sale	10.220 ¹	10.220	10.220	10.220
	10.403 ²	10.453	10.453	10.453
	10.585 ³	10.585	10.585	10.585
Remaining operating capital at the end of the last year	0	0	0	201.044 ¹
				225.595 ²
				242.513 ³
All animals sale in the herd at the end of the last year	0	0	0	917.125
Farmland sale at the end of the last year	0	0	0	70.000
Salvage of buildings sale**	0	0	0	80.589
Salvage of machines and equipment sale***	0	0	0	17.563
Total	826.040 ¹	915.265	920.915	2.207.236
	885.998 ²	975.223	980.873	2.267.193
	1.140.645 ³	1.229.870	1.235.520	2.563.310

* TL: Turkish Lira, revenues were assumed apart from all of the deductions such as taxes, charges etc. (Unalan, 2016b), ** (5% cost all of their total costs) at the end of the last year, *** (5% of all of their total costs) at the end of the last year, ^{1,2,3} These values related to the given variables were calculated for each 80, 85 and 90% calving rates, respectively.

Table 6 Net Cash Flows (NCF) (TL*)

MLMY (kg)	5000								
CR (%)	80			85			90		
RIR (%)	5	6	7	5	6	7	5	6	7
Years	NCF			NCF			NCF		
0.	-2.179.367 ¹	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367
1.	-779.182 ²	-755.182	-731.182	-776.725	-755.475	-734.225	-770.677	-748.177	-725.677
2.	211.087	235.087	259.087	213.545	234.795	256.045	219.592	242.092	264.592
3-19.	216.737	240.737	264.737	219.195	240.445	261.695	225.242	247.742	270.242
20.	1.503.058	1.527.058	1.551.058	1.505.516	1.526.766	1.548.016	1.511.563	1.534.063	1.556.563
M/F-Parity	1.50	1.56	1.62	1.35	1.40	1.45	1.25	1.30	1.35
MLMY (kg)	6000								
CR (%)	80			85			90		
RIR (%)	5	6	7	5	6	7	5	6	7
Years	NCF			NCF			NCF		
0.	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367
1.	-805.933	-781.933	-753.133	-805.126	-779.626	-754.126	-802.528	-775.528	-748.528
2.	208.886	232.886	261.686	209.694	235.194	260.694	212.291	239.291	266.291
3-19.	214.536	238.536	267.336	215.344	240.844	266.344	217.941	244.941	271.941
20.	1.525.408	1.549.408	1.578.208	1.526.215	1.551.715	1.577.215	1.528.813	1.555.813	1.582.813
M/F-Parity	1.45	1.50	1.56	1.31	1.36	1.41	1.21	1.25	1.31
MLMY (kg)	7000								
CR (%)	80			85			90		
RIR (%)	5	6	7	5	6	7	5	6	7
Years	NCF			NCF			NCF		
0.	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367	-2.179.367
1.	-818.284	-790.284	-779.084	-882.477	-792.727	-762.977	-822.679	-797.479	-759.679
2.	221.086	249.086	260.286	216.893	246.643	276.393	216.691	241.891	279.691
3-19.	226.736	254.736	265.936	222.543	252.293	282.043	222.341	247.541	285.341
20.	1.562.157	1.590.157	1.601.357	1.557.964	1.587.714	1.617.464	1.557.762	1.582.962	1.620.762
M/F-Parity	1.44	1.49	1.51	1.30	1.35	1.40	1.20	1.24	1.30

* TL: Turkish Lira, MLMY: Mean Lactation Milk Yield (as kg, per milking cow); CR: Calving Rate (%); RIR: Real Interest Rate (%); NCF: Net Cash Flow (it was calculated from difference of total revenue and total cost in each year of the investment); M/F-Parity: the parity of unit (1 kg) sale price of raw milk to unit (1 kg) cost of concentrate feed (current cost of concentrate feed was taken as 1.00 TL/kg and the parities given above were determined by making as to be at least 1.00 of Benefit Cost Ratio (BCR)). ¹This amount was calculated by removing the purchasing cost (700.000 TL) of the pregnant breeding heifer stock from Stable Investment Cost (2.879.367 TL) in starting year (0th) of the investment because of assuming they would be bought in the first year of the investment. ²This amount was calculated by adding the purchasing cost (700.000 TL) of breeding pregnant heifers stock in the 1st year of the investment to the Annual Operating Costs.

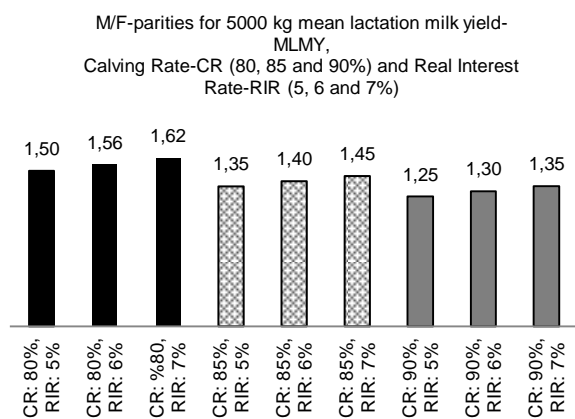


Figure 1 M/F-parities for MLMY (5000 kg), CR (80, 85 and 90%) and RIR (5, 6 and 7%)

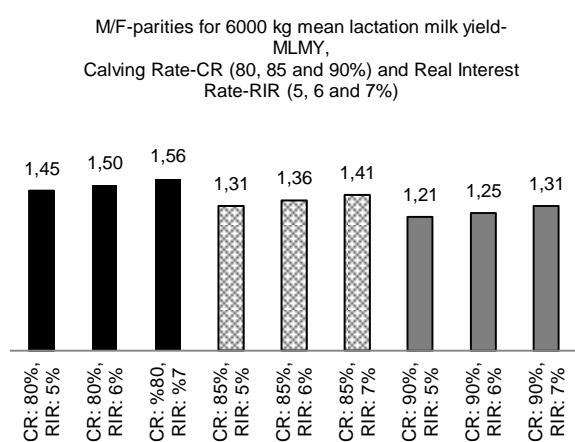


Figure 2 M/F-parities for MLMY (6000 kg), CR (80, 85 and 90%) and RIR (5, 6 and 7%)

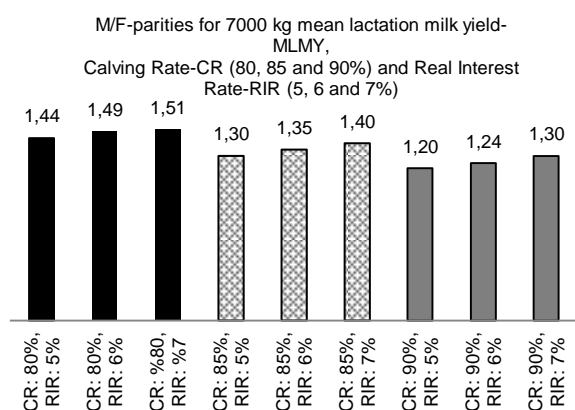


Figure 3 M/F-parities for MLMY (7000 kg), CR (80, 85 and 90%) and RIR (5, 6 and 7%)

Financial Analysis Results

Benefit Cost Ratio (BCR), is one of the financial evaluation criteria, for each used variables (5, 6 and %7 for Real Interest Rate-RIR, 80, 85 and %90 for Calving Rate-CR and 5000, 6000 and 7000 kg for Mean Lactation Milk Yield-MLMY) were calculated from Net Cash Flows (NCF) given in Table 6 for that kind of dairy cattle farm investment.

As seen in the Table 6 and Figures 1-3, calculations by using the Software (FESDI-Turk) showed that if mean lactation milk yield per milking cow was 5000 kg and calving rate was 80% in the herd, the M/F-parity had to be at least 1.50, 1.56 and 1.62 for 5, 6 and 7% of real interest rates, respectively. In other word, the result of 1.50 for the M/F-parity of them could be interpreted that with the assumptions of mean lactation milk yield per milking cow was 5000 kg, calving rate was 80% and real interest rate was 5%; if the cost of concentrate feed's one kg was also 1.00 TL, raw milk kg sale price had to be at least 1.50 TL for economic sustainability of the farm. While the other variables were constant, if calving rates increased to 85%, the parity had to be at least 1.35, 1.40 and 1.45, and if calving rate increased to 90%, the parity had to be at least 1.25, 1.30 and 1.35. Besides, if mean lactation milk yield per milking cow was 6000 kg and calving rate was 80%, the parity had to be at least 1.45, 1.50 and 1.56, if calving rate increased to 85%, the parity had to be at least 1.31, 1.36 and 1.41, and if calving rate increased to 90%, the parity had to be at least 1.21, 1.25 and 1.31. In addition, if mean lactation milk yield per milking cow was 7000 kg and calving rate was 80%, the parity had to be at least 1.44, 1.49 and 1.51, if calving rate increased to 85% the parity had to be at least 1.30, 1.35 and 1.40, and if calving rate increased to 90%, the parity had to be at least 1.20, 1.24 and 1.30.

Conclusion

Many various financial evaluation models or approaches can be used in terms of profitability or sustainability of long-term agricultural or livestock investments in order to determine farm management information systems (Fauntas et al., 2015). But, one of the things that is important in these kind of studies is, of course, that the evaluation is done in accordance with current financial status of the country (i.g. real interest rate etc.) and the other related key factors (i.g. some key breeding criteria, input and output costs etc.). However, unfortunately, it has been seen that the studies made on these topics, especially on dairy cattle farming in Turkey are too inadequate. For this reason, in the present study, it was aimed to contribute some useful information to the Turkish dairy cattle industry and academicians working on this issue.

Consequently, financial evaluation results obtained from the study with the acceptable assumptions of some different key breeding criteria (80, 85 and 90% for calving rate and 5000, 6000 and 7000 kg for mean lactation milk yield per milking cow) and different real interest rate (5, 6 and 7%) showed that decreasing each 1% of the real interest rate in Turkey, increasing each 5% of calving rate and increasing each 1000 kg of mean lactation milk yield per milking cow had, separately, about 5-12% positive effect on the M/F parity.

References

Arcı İ, Şimşek E, Yashloğlu E. 2001. Planning of Dairy Cattle Barns. SÜTAŞ Education Center Publications, Livestock Series: 4, Bursa, Turkey.
Balaban A, Şen E. 1988. Agricultural Buildings. Ankara Univ. Agriculture Faculty, No: 845, Ankara, Turkey.

- Fountas S, Carli G., Sørensen CG, Tsiropoulos Z, Cavalaris C, Vatsanidou A, Liakos B, Canavari M, Wiebensohn J, Tisserye B. 2015. Farm management information systems: Current situation and future perspectives. *Computers and Electronics in Agriculture* 115(2015): 40-50.
- Türkyılmaz MK, Aral S. 2002. Efficiency of resource usage in dairy herds in Aydın province and their marketing and organization problems. *Journal of the Faculty of Veterinary Medicine, Kafkas University* 8(1): 41-48.
- URL, 2016a. Turkish Statistical Institute (TÜİK). <http://www.tuik.gov.tr/UstMenu.do?metod=temelist>. [Accessed 11 November 2016].
- URL, 2016b. Price Statistics. <http://www.dsymb.org.tr/>. [Accessed 11 November 2016].
- URL, 2016c. Scale for the Cost of Normal Buildings Square Constructions in 2016. http://www.gib.gov.tr/sites/default/files/fileadmin/user_upload/Tebliğler/Emlak_Vergisi/66_serno_emlak_vergenteb_ek.pdf. [Accessed 22 November 2016].
- Ünalın A, Cebeci Z. 2007. HerdGuide-Turk: A herd management for dairy cattle breeding. *Journal of Agriculture Faculty, ÇÜ* 22(1): 81-88.
- Ünalın A, Serbestler U, Çınar M, Ceyhan A, Akyol E, Şekeroğlu A, Erdem T, Yılmaz S. 2013. The current status, main problems and solutions of dairy cattle farms in Nigde. *Turkish Journal of Agriculture-Food Science and Technology* 1(2): 67-72.
- Ünalın A, Ceyhan A, Şekeroğlu A, Akyol E. 2015. A study on comparatively investigation of satisfaction levels of dairy cattle, sheep and goat breeders in Nigde. Paper session presented at the meeting of the 9th National Animal Science Congress, 3-5 September, 2015, Konya, Turkey.
- Ünalın A. 2016a. Seasonal effects on behavioral estrus signs and estrus detection efficiency in Holstein heifers. *Indian Journal of Animal Research* 50(2): 185-189.
- Ünalın A. 2016b. A model study on determination of economic criterions for dairy cattle farms. Paper session presented at the meeting of the 3rd National Agriculture Congress, 5-8 October, 2016, Afyon, Turkey.
- Yurdakul O. 1996. Project Preparation and Assessment. Çukurova University, Agriculture Faculty, General Publication No: 147, Course Books Publication No: 48, Adana, Turkey.