The model of beef cattle keeping in the Szigetköz floodplains

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SUMMARY FINDINGS, CONCLUSIONS, RECOMMENDATIONS

Pasture management in floodplains, adjusting to the natural cycles, has important environmental and social welfare functions. It can only be implemented if there is a balance between the interests of society and those of economy. This paper uses a theoretical model to assess the profitability aspects and results. This information can provide theoretical input for the actual use of floodplain pastures. On the basis of our calculations we reckon that our elaborated model is worth realizing in practice. However, we have to emphasize that our calculations cover only the evaluation of the economic rewards of pasture management in floodplains, the investigation of its social usefulness will constitute the following chapter of our work.

INTRODUCTION

In recent years farming in floodplains, flourishing in the middle ages, has been an important issue of several professional studies, forums and organisations. They are unanimous in their opinion that the use of floodplains should be determined by an old-new approach. The protection of floodplains is an essential task since these areas should provide the safe leading of floods. By finding the function and the degree of intensity fitting the landscape and the environment, the complex use of the areas along the river can be achieved ensuring the intactness of natural systems and ecological processes related to them. Fruit production and meadow management in floodplains may have a significant role (*Aradi, 2004*). In the crucial flood leading zones in Szigetköz the latter, the recovery of the formerly traditional grazing management would be reasonable because by maintaining active pastures, the scrubbing and the necessity of deforestation can be avoided making it possible for floods to lead at a lower level. This requirement is included in the flood protection plan of the village Dunakiliti in the upper Szigetköz. Our study presents the theoretical model of a beef cattle farm meeting the above requirements. It describes the main technological features of the modellized farm briefly, and shows the results of investment economic analysis in detail. At the same time, our study examines what economic conditions, stimuli business circumstances make the realization of the model worthwhile.

DESCRIPTION OF THE MODEL

The species and its breeding

In Szigetköz one of the above mentioned crucial zones is the 70-hectare parent grassland under the access bridge of the dam weir in Dunakiliti, where the development of grass and pasture management close to nature is also proposed by the North Transdanubian Environment and Water Management Directorate. According to the phenological observations performed in the surrounding areas, cattle can utilize the grass due to its botanical composition because the grass is rich in sprouts and leaves, and it is moderately high in growth (*Schmidt, 2003*).

Taking tradition and breeders' opinions into consideration, Hungarian Simmental Cattle were chosen for the examination since they become fertile easily, they graze well and they endure the rigours of weather also well. The above mentioned observational data provided the basis for determining the size of the stock, in other words, for estimating the optimal animal keeping ability of the pasture. The average yield calculated from these data corresponds to the yield distribution of fresh wet grasslands. The unevenness of distribution (Table 1) is caused by (such) disturbing factors like irregular floods (icy floods, spring floods), the scorching period at the end of summer and incidental losses because of trampling.

Table 1

The average green grass yield of the observed area per increment (1998-2007)

Number of increments	Average green grass yield (t/ha)	Distribution (%)
1	3.07	20
2	5.38	35
3	3.07	20
4	0.77	5
5	3.07	20
	15.36	**100**

Source: own calculation based on data of Koltay's measurement

The area could keep 51 animals in the whole grazing period. However, considering *Nyiri's (1993)* data, the value of 120 kg nitrogen per hectare, which can be applied with the livestock manure maximum and which is determined by the Right Farming Practice (*Regulation 4/2004. FVM*), can just be kept with 42 animals. The gazing period lasts for about 220 days, from the beginning of April to the middle of October. During this time 54 hectares of grassland can be entirely grazed five times in periodic grazing adjusting to the natural productivity of the area. Because of the bigger animal keeping capacity of the area and the intensive grass growth in spring the stock cannot graze the whole grass yield of each period, so mowing is needed in order to avoid undergrazing, which is the interest of both farmers and conservationists (*Ángyán, 2003*). The grass hay dried in swath turned over and baled is sufficient supplementary fodder for cattle in drought and flood periods (Fig. 1).

Furthermore, by storing the 2-ton per hectare hay yield of an additional 130-hectare damside area in small bales in the wintering area, the fodder supply can be provided during the 145-day winter period. The winter accommodation of the herd kept in rough circumstances is the 16-hectare wintering area encompassed by shrubs and trees, where the cattle stock grazes until the frosts in autumn or snowfall (*Vinceffy, 1993*), and the animals are fed by meadow hay as winter fodder. Fig. 1 is the satellite picture of the grazing island surrounded by water. The size and form of the individual parts are determined by the features of the ground like access roads, shrubby zones, etc. The location of the parts, their increment yields and the number of grazing days are shown in bar charts.

Figure 1

The parts of the grazing area in the floodplain, their increment yields, and the number of grazing days

Notation: Növedék = increment; Telelőkert = wintering yard; K = grass yield of the certain area units, harvested by reaping; szakasz = part of the grazing area; hektár = hectare; nap = days of grazing; t = ton
Source: satellite picture: Google Earth, graph: own calculation

In the beef stock, mating is natural and continuous because young bulls are in the herd during the whole year. According to practical experience and reproduction biological data in the professional literature, a special mating cycle lasting from the beginning of February to the middle of May exists is this way. As a result of this, the majority of calves are born in March or April and at the end of October, when they are 6-8 months old young cattle, they can be weaned. The economic efficiency of beef cattle production is determined by progeny. Carrying out investment economic examinations is also reasonable because economic efficiency and profitability are among the main purposes besides flood control and nature conservation preferences.

Expenditures and costs

Assets, among them the breeding stock, a account for the major part of the investment expenditures (Table 2). In order to place the cattle safely, the grazing parts are separated by electric fences. The windbreak in the wintering area is shelter for the cattle and a place for calving. The weighing scales and the selection and treatment corridor that can be found here are aids for identification, pregnancy examination and for other veterinary treatments and control. The replacement of the discarded cattle stock requires 450 thousand Forints every year. Launching the farm is reasonable in spring adjusting to the biological cycle of the sexually mature cattle stock.

In this way, taking calf growth into account we can expect profit and income in the first economic year already. Accordingly, there are operating costs in the so called 'zero' or scrap year already but in a lesser extent as compared to the following years (Table 3).

Table 2

Demand for investment by the farm

Investment costs	**'zero' year /thousand Ft/***
Invested assets	
Brood heifer, 41 pieces	6150
Brood bull, 1 piece	324
Electric fence system	250
Windbreak board + cab for medical treatments	50
Animal scale	100
Services connected to investment	
Installation of electric fence	100
Transport of breed animals	200
Addititonal investments	
Refuse replacemen	-
Total investment costs	7174

* price in 2009
Source: own calculation based on the data of the Association of Breeders of Hungarian Simmental

Table 3

Operating costs of the farm in type of cost and yearly distribution

Operating costs	0th year	1st year	2nd year	3rd-4th yr.	5th year	6th year	7th year	8th year
	thousand Ft *							
Material costs								
Salt lick	14.58	36.45	36.45	36.45	36.45	36.45	36.45	36.45
Material costs of medical treatment	103.40	193.60	193.60	193.60	193.60	193.60	193.60	193.60
Wage and common charges	1143.88	1372.65	1372.65	1372.65	1372.65	1372.65	1372.65	1372.65
Claimed services								
Costs of veterinary services	139.70	185.90	185.90	185.90	185.90	185.90	185.90	185.90
Cost of machine service	548.00	868.00	868.00	868.00	868.00	868.00	868.00	868.00
Other	80.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00
Costs of repair	-	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Total operating costs	2029.56	2826.60	2826.60	2826.60	2826.60	2826.60	2826.60	2826.60

* prices in 2009
Source: own calculation based on the data of the Hungarian Veterinary Chamber, Geoproduct Ltd., www.agroinform.com

The tasks of caring, maintaining and controlling the herd and the equipment can be performed by an experienced full-time worker. Stock farmers have the unanimons opinion that the most valuable fodder for animals kept in pastures is given by the plants of grasslands. Therefore salt licks are the only supplementary food that is bought. The costs of the basic, preventive and medical treatments[1] performed by veterinarians mainly include material and labour costs assuming that the stock kept in rough circumstances is relatively healthy.

The costs of hay harvesting processes appear as external machine service because of the lack of an own machine stock. On the basis of our calculations and considering present market prices, these costs are so high that they fully query the economic grounds of the cattle farm, which has, anyway, a lot of elements of uncertainty. At present the mowing and harvesting jobs in the area, which are identical in the model farm too, are carried out by the responsible water management authority from the state budget. Supposing our fictive model is realized, it would be a beneficial agreement for both the state and the farms if, the mowing costs of the given area were financed by the state through the water management authority. At the same time the farm would undertake the costs of the other jobs. In this way, the expenses of both parties would decrease simultaneously not to mention the organizational tasks and the work load, which are completely borne by the farm. Expressing the difference numerically, the cost of the external machine service[2] provided for the farm would be 1 898 thousand Forints in the first year, and from the second year it would be 2 668 thousand Forints, which means a 1 350 thousand Forint decrease in expenses in the first year and 1.800 thousand Forints in the following years for both parties due to the agreement mentioned above. For the state this saving is obviously smaller than for the farm. However, it has to be emphasised that in this way the state can support an activity which is useful not only economically but also environmentally.

Economic results

The output due to the investment appears later and it is not known with total certainty. Table 4 shows the incomings from the sales of young and discarded live cattle calculated by considering the reproductive indices most typical of Hungarian Simmental Cattle species. As it can be seen in the table our model calculates with the same selling prices after the first year, not considering the unanticipated changes. Agreeing with *Keszthelyi's (2000)* statements, we ignore inflation in our calculations because the prices of income and expenditures change in the same proportion, thus it does not have an effect on profitability. In addition, we also ignore the calculation of residual value due to the longevity of the investment.

[1] Since the occurrence of the diseases in the future cannot be precisely calculated in advance,(therefore) we calculated with a 10% increase of the material and labour costs of the preventive treatments. (It is referred to later in this paper.)
[2] price in 2009

Table 4

Incoming distribution expectancy

Incomings *	0^{th} year	1^{st} year	2^{nd} year	3^{rd}-4^{th} yr.	5^{th} year	6^{th} year	7^{th} year	8^{th} year
	thousand Ft *							
Incoming from the sales of young cattle [(a)]	-	4158.00	4158.00	4158.00	4158.00	4158.00	4158.00	4158.00
Incoming from the sales of discarded brood cow[(b)]	-	441.00	493.50	525.00	577.50	630.00	630.00	630.00
Total incomings [(a+b)]	-	4599.00	4651.50	4683.00	4735.50	4788.00	4788.00	4788.00

* price in 2009
[(a)] body weight revised for 205 days of age (young bull: 246 kg, young heifer: 243 kg), mean sale prices: young bull: 600 Ft/kg, young heifer: 500 Ft/kg [(b)] mean sale price of discarded cow: 350 Ft/kg
Source: own calculation based on the data of KSH and the Association of Breeders of Hungarian Simmental, 2009

Table 5

Economic results

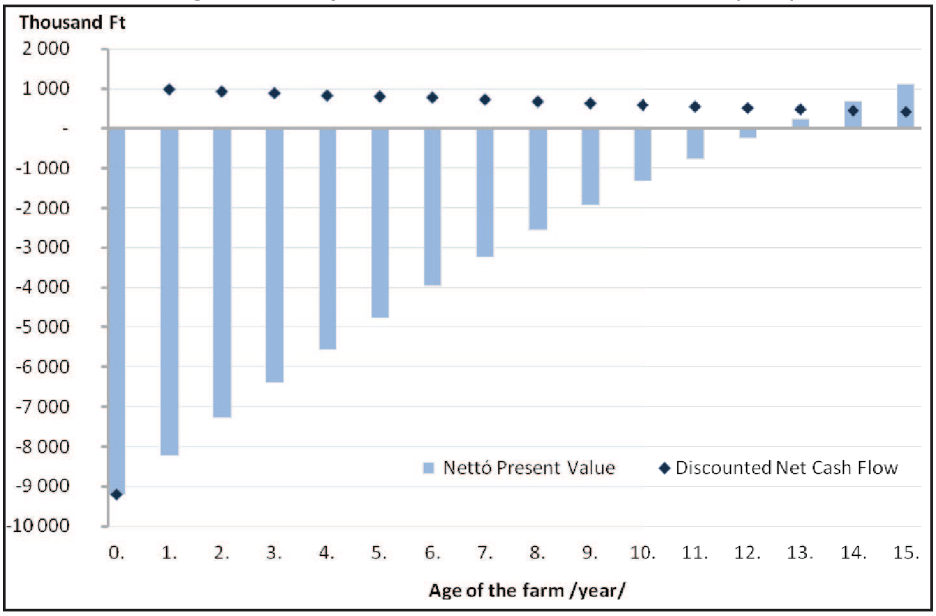
Name	0^{th} year	1^{st} year	2^{nd} year	3^{rd}-4^{th} yr.	5^{th} year	6^{th} year	7^{th} year	8^{th} year
	thousand Ft *							
Rateable value of ACT [(a)]	-	1272.39	1324.89	1356.39	1408.89	1461.39	1461.39	1461.39
Planned depriciation [(b)]	-	186.25	36.25	36.25	36.25	36.25	32.50	-
ACT (16% + 4%) [(c)]	-	217.23	257.73	264.03	274.53	285.03	285.78	292.28
Profit [(a – b – c)]	-	868.91	1030.91	1056.11	1098.11	1140.11	1143.11	1169.11
Cash flow [(a – c)]	-9203.56	1055.16	1067.16	1092.36	1134.36	1176.36	1175.61	1169.11

* price in 2009 (Thousand Ft)
[(a)] Annual Corporation Tax = total incoming of sale – total operating costs [(b)] depriciation calculated with linear method
Source: own calculation

The difference between the amount of money come in and that of paid is the clear income i.e. the annual cash flow counted at present value (Table 5). In order to evaluate the investment objectively the time value of money should be taken into account, which is expressed by the calculation interest rate. Its size is influenced by both objective conditions (profit lost of alternative investment possibilities) and subjective ones (individual needs, uncertainty of future) (*Keszthelyi, 2000*). On the basis of *Szűcs's (2004)* recommendations and considering the proceeds of long-term commercial papers we determined a 7% value. Our present analysis covers 15 years (0^{th} year + 15 years). We would like to remark, however, that in the real case only economic difficulties can set back a stock farm that can operate for unlimited time, since the number of livestock can be kept at the same level by replacement, the biotope typical of the given soil type remains in the case of grazing management (*Bodó – Mihók, 2003*), and grass yield, as it has already been referred to, improves from time to time in both quantity and quality.

Figure 2

Changes of the net present value and discounted cash-flow (r=7%)



Source: own calculation

Taking time values into consideration, the cash flow results discounted and cumulated in the periods give the net present value (NPV). When this value becomes positive, the investment returns as it has reached the covering point. From the curve of Fig. 2 it can be read that in our model it happens after 13 years. In the last i.e. 15th analysed year the NPV is 1 112 thousand Forints.

Expressing it in present value, the farm produces that more income than the amount of investment cost would yield if it was invested in state bonds of 7% interest rate. In reverse – as it is shown by the internal rate of return (IRR) – the yearly capital proportional profitability is 8.82%, that is, investing the capital for launching the farm into state bonds having such return would give income that equals to the income of the stock farm. According to the profitability index (PI) the capital returns only 1.121 times. On the basis of indices, the farm – under the known average circumstances – can become profitable only after a long time when it can be worthwhile in the economical sense.

Studying the conditions differing from the average

Our model reflects the most likely, realistic economic and natural conditions. In order to calculate the investment risk, the unexpected values of the factors with the greatest effect on the result of farming should also be presented. Replacing the values of yield and operating costs with more favourable (optimistic) and less favourable (pessimistic) values, we developed variations with extreme outcome. The determination of the new parameters is based on subjective, special estimation. In our case, the yield – the sold calves in a year – in optimistic outcome is 6% higher in pessimistic one it is 6% lower compared to the original variation. Among the operating costs, the animal health costs seem to be the most variable so we calculated a deviation of ± 10% from the most likely value of costs as the two extremes. Finally, we counted the long-term investment economic indices for both the optimistic and the pessimistic variations of the model (Table 6).

Due to the decreased yield and the increased costs the price of 500 or 600 Forints per kilogram is not sufficient for the return of the investment in 15 years. However, with the more favourable yield and cost calculations, the results are much better. We can hope for the return of the investment in the 10th year. In the 15th year the return of the present value per invested capital unit is 1 364-fold, and the result of 3 347 thousand Forints is equivalent with the return of a risk-free investment of 12.27% interest rate.

Table 6

The investment economic results of the stock farm under differing conditions

Dinamic financial valuation methods	Outcome		
	Optimistic	Realistic	Pessimistic
Discounted Payback Period	10 years	13 years	15 years <
	in the 15th year		
Net Present Value	3346.228 thousand Ft	1112.0 thousand Ft	-2436.708 thousand Ft
Internal Rate of Return	12.27%	8.82%	2.53%
Profitability Index	1.364	1.121	0.7359

Source: own calculation

Making farming more calculable and profitable, and changing the form of financing, we also made the calculations for all the three outputs by involving a currently active investment support[3], which can be applied for by the farm with a great chance. The data of Table 7 show the efficiency of non-refundable support for profitable growth. We can count on the return of the investment in the 9th year even in unfavourable circumstances (Fig. 3).

Table 7

The investment economic results of the stock farm with support

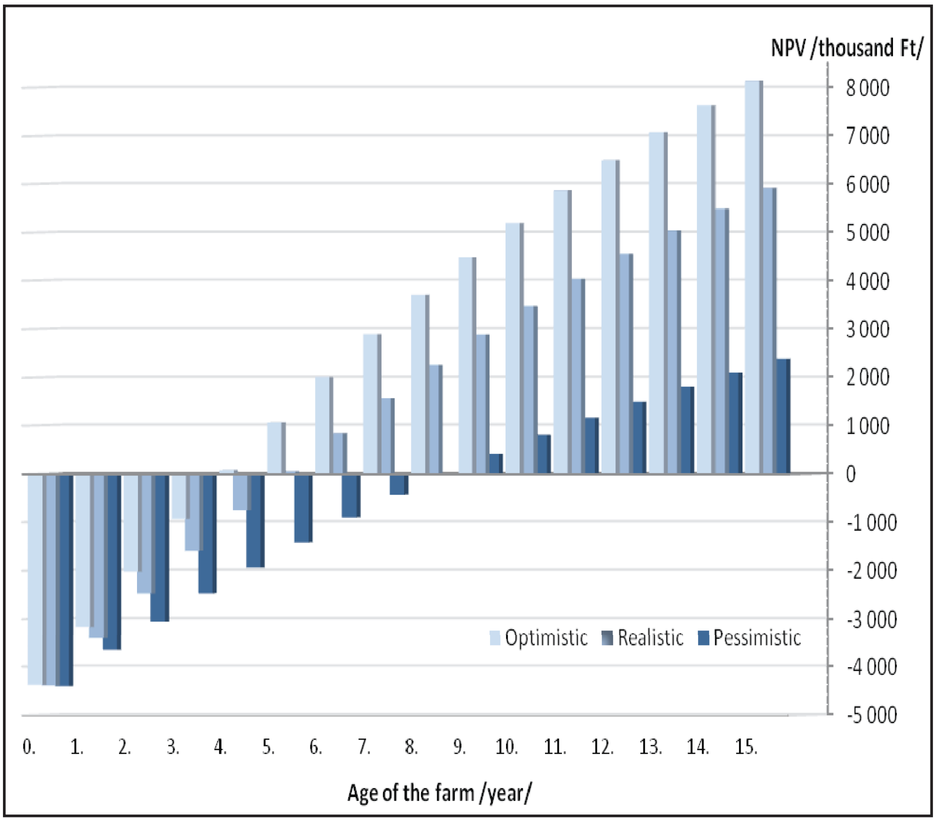
Dinamic financial valuation methods	Outcome		
	Optimistic	Realistic	Pessimistic
Discounted Payback Period	4 years	5 years	9 years
	in the 15th year		
Net Present Value	8146.228 thousand Ft	5911.998 thousand Ft	2363.292 thousand Ft
Internal Rate of Return	30.12%	24.21%	14.64%
Profitability Index	2.859	2.343	1.533

Source: own calculation

[3] "Support for young agricultural farmers", the amount involved in the calculation is 4800 thousand Forint (it is the minimal degree of support).

Figure 3

Changes of the net present value with investment support (r=7%)



Source: own calculation

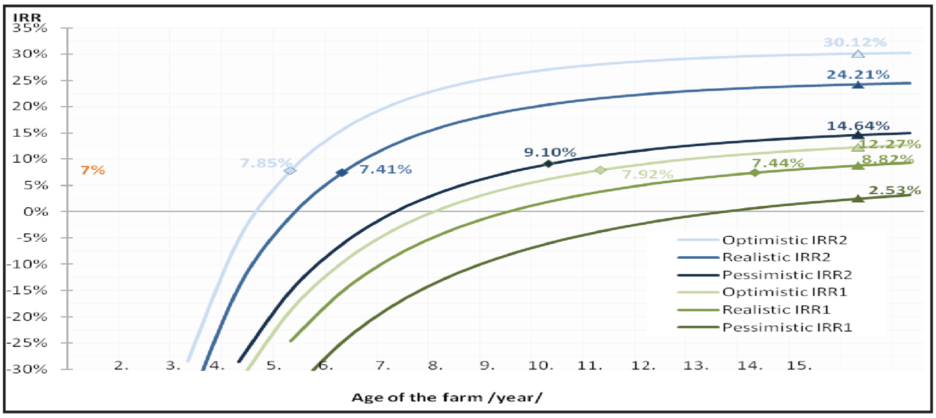
On the basis of the internal rate of return (IRR_2) the investment can be regarded as really profitable as it is shown in Fig. 4. Nevertheless, we should emphasize that in our case we only calculated with the return of the own invested capital[4], as the profit of the farm. The return of the amount of support as national economic profit can only be realized in an indirect way – in the form of taxes and contributions.

The question arises which of the advantages of grazing in floodplains referred to in the introduction (flood and environment protection, profitability) influences the preferences of decision maker(s) and to what extent. On the basis of the results so far, we find that it is worth realizing the model, emphasizing that our calculations refer to the measurement of the values from the direct use of floodplains, and they do not include the values related to the indirect use, or the values and yields independent of the usage.

[4] the part of the investment demand decreased by the amount of support

Figure 4

The internal rate of return without support (IRR_1) and with support (IRR_2)



Source: own calculation

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