

## Made in Danube

Transnational Cooperation to transform knowledge into marketable products and services for the Danubian sustainable society of tomorrow

# Final Report

**Title of service:** Detailed and customized analysis of economic, production and reproduction data of dairy and beef cattle operations of AGB Beňuš

**Service provider:** Tritikum, s.r.o.

<b>Work package Number</b>	WP5
<b>Work package Title</b>	Implementation of pilot projects
<b>Activity Number</b>	A 5.1
<b>Activity Title</b>	Common sustainable innovation partnership projects
<b>Deliverable Number</b>	D 5.1.1
<b>Deliverable Title</b>	Pilot implementation of the Local Action Plan for Smart and Innovative Precision Farming Final Report

## **The initial services provided:**

Detailed and customized analysis of the economic, production and reproduction data of dairy and beef cattle operations of AGB Beňuš, grange (Client).

## **Main results from cooperation:**

More insight into the production and economic impact of different on-farm management strategies related to beef and dairy cattle operations. The scenarios and calculations provided will serve as a bottom-line for improved decision-making process in the future.

## **The rationale of the cooperation**

The client and contractor agreed that the resilient livestock production requires locally tailored solutions, meaning, that the sustainable farming is dependent on the agility of management to continuously tailor the operation according to the market projections, output and input price volatility, with respect to the animal welfare standards. However, farm business evaluation is usually quite time-consuming and at the same time very farm specific issue. The contractor has detailed and long-run cooperation with crop and livestock farms in Slovakia, focusing on economic production analysis, guidance, and consultancy. Previous data mining showed a significant difference in cattle farms in terms of scale, husbandry systems applied and management techniques used and a number of other individual characteristics. Moreover, the idea behind this cooperation is to not only evaluate the existing state but to provide also an analysis of possible changes, which the client is considering or forced to implement. We agreed to calculate the potential production and economic impact of different management scenarios at the farm-level, in terms of alternative what-if analyses comparison. The contractor will take into account farm limitations and specific requirements provided by the client and assess the financial footprint of those on the whole-farm level.

## **Client's Target:**

The general management goal of the Client is to establish a farm-specific framework to improve the current practical and acceptable precision livestock production system applied.

## **Partial steps:**

The Contractor will assess the economic and production effect of maintaining the herd of the Simmental cattle of 350 dairy cows, referring to the semi-intensive production system combining the characteristics of intensive and extensive production systems. The Contractor will build on the reports previously provided by the National Agricultural and Food Centre - Research Institute for Animal Production Nitra and develop them further, following the Client's instructions. The Contractor will provide an Interactive tool that will enable the Client to run his own scenarios regarding different farm-gate milk prices and minimal production needed.

Another point of interest is to analyze the economic and production consequences of running a Jersey dairy operation with 90 production cows. The target herd size will be achieved by the combination of expected internal growth (PD Bukovina, Strelníky) and purchases from commercial suppliers of high pregnant heifers. The Contractor will evaluate the expected input parameters of the breeding intensity, including specified parameters of reproduction and performance (proposed by the Client), and determine a detailed herd turnover and status of the animals for each category within the farm, including the determination of the nutritional requirements for all age categories of cattle. The Contractor will calculate the total requirements for feed as well as the necessary acreage to grow the forage. The analysis of the total production of marketable products will be then supplemented by a complex evaluation of the milk production costs.

Moreover, the Contractor will analyze the economic and production consequences of the expanded beef cattle operation. The Client was interested in 2 alternative sub-scenarios based on the projected acreage available in the future, namely 10 and 15 thousand ha and other 2 alternative sub-scenarios based on the decision to fatten bulls or to rear only young bulls and heifers. The Contractor will evaluate the input parameters of the breeding intensity, including specified parameters of reproduction and performance (proposed by the Client), and determine a detailed herd turnover and status of the animals for each category within the farm, including the determination of the nutritional requirements for all age categories of cattle. The Contractor will calculate the

total requirements for feed as well as the necessary storage space. The analysis of the total production of marketable products will be then supplemented by the total economic result for each sub-scenario (1-4).

### **Methodology:**

The Contractor will follow the logic provided by Krupová et al., 2012 in Scenario 1. The methodology provided by Záhradník (2017) and Záhradník et al. 2018 will be used in Scenario 2 and adapted for the beef cattle operations in Scenario 3.

### **Results provided (report)**

The kick-off meeting was focused on brainstorming activities. We have summarized the Client ideas and our remarks on future development possibilities. We have been looked at the financial aspects and production limitation of present technological equipment, housing systems, and stall capacities. We have concretized tree options that the Client's management is willing to further elaborate. The workload has been split into 3 parallel different scenarios. A number of on-farm meetings were conducted to precise the data integrity provided by the Client and to discuss the issues that arose in this context.

In Scenario 1, we have used the subtraction calculation method and the outcomes with related economics of herd turnover are provided in ANNEX 1. Moreover, we have developed an Interactive flash App to deal with the issue of milk price fluctuation on the market. It works as an add-on to the delivered detailed calculations and allows the Client to run various specific scenarios against. The tool helps the Client to better understand and further assess the impact of changed farm-gate milk price on the economic results and minimal production requirements to reach zero profitability. It is a standalone module in PDF format provided in ANNEX 2.

In Scenario 2, we have analyzed the input parameters of the breeding intensity, including specified parameters of reproduction and performance, resulting in detailed herd turnover details and status of the animals for each category within the considered 90 head Jersey dairy cow operation. We have succeeded to determine the nutritional requirements in feed doses for all categories of animals at the dairy farm. Following that, the total requirements for feed as well as the necessary acreage of soil needed to grow the forage were determined. This analysis of the total production of marketable products was supplemented by the complex evaluation of the milk production costs. Based on the feed rations for each category of animals, we had calculated the total feed needed for a year, with a 10 % reserve in the case of fodder feeds. From this data, the amount of forage (in the original matter) that needs to be grown was calculated. For each feed, the coefficient for preservation (defining the weight loss from harvest to preservation) and weight losses in preservation and storage was defined. The acreage necessary to grow the forage was based on the green matter yield. We have estimated the prices of products, feed, bedding and manure, and number of employees treating the cattle and their monthly wages (based on our consultancies and expert guidance) in order to determine the economy. Other direct costs (medications and disinfectants, other materials, repairs and maintenance, breeding and veterinary services) as well as operating costs (production and management) we also incorporated. The detailed overview of scenario 2 results is indicated in ANNEX 3.

In Scenario 3, we have followed the same logic as in Scenario 2. We have performed the modification of the methodology and used it for the evaluation of considered beef cattle farm (Limousin breed). The main driver for this activity were previous expert consultations of possible expansion plans of the Client's farming business in the region of Horehronie. Firstly, we have dealt with 2 alternative sub-scenarios based on the projected acreage available in the future, proposed by the management of the Client. The considered future on-farm conditions (labour, land availability, long term strategy and other) combined with the realistic expectations of the market trends led us to the conclusion, that the 15 thousand ha acreage option will be more profitable. This sub-scenario also served as an "upper limit" of the production potential for suckler cow herd in this area. Both alternatives are summarized in ANNEX 4. Secondly, we have focused on other 2 alternative sub-scenarios based on the decision to fatten bulls or to rear only young bulls (bull weanlings). This activity brought very similar economic results and resource requirements. The partial reports and subsequent guidance and consultancy delivered for each sub-scenarios have improved the Client's management knowledge base to tailor the farm-specific diversification strategies for the future. Both alternatives are summarized in ANNEX 5.

## **Conclusion and remarks**

AGB Beňuš, grange operates in two locations, which are located in the Horehronie region. The first location is in the village of Braväcovo and the second one is in the village of Beňuš. All the lands today - approximately 1000 ha of land, including 800 ha meadows and pastures - are characterized as mountain area. The grange is focused on honest agricultural production and natural breeding of beef and dairy cattle, which they keep in open moving herds in vast pastures. AGB Beňuš, grange is also a member of the thematic working group of the European innovation partnership. The Client's Company is continuously benefiting from the research results and independent advisory services. We have recalculated several model investment costs and set financial limits. After that, we have jointly completed the what-if scenarios that are available. We quickly agreed to the field trips which are very much linked to the better knowledge of specific circumstances, and to ensure that we are as much farm specific as possible in what we are doing, because every deviation from the real world of dairy and beef farming could be and is almost always very costly. This process was very fruitful when deciding what to do and how to do it. This approach is a straightforward way to improve decision-making regarding the dynamics of the cattle herd structure and market volatility and it opens the farm business to greater control of what they do and the same time knowing the financial and production footprint of it. Our vision is to maintain regular meeting with the Client staff, even after finishing this activity. Next step would be to think about the opportunities that we have to further develop our cooperation via possible project proposals and more detailed expert consultations in the near future.

**Annex 1: Calculations of the costs per feeding day (FD) and economic results for each cattle category on the farm**  
**(Scenario 1 – 350 head Simmental cattle herd)**

	Dairy cows		Calves		Heifers		High-pregnancy heifers	
		%		%		%		%
<b>Milk yield (kg/FD) / Daily weight gain (kg/FD)</b>	24,6500		0,7954		1,0912			
Labour costs	0,7746	8%	0,0011	0%	0,0004	0%	0,0000	0%
Own feeds	2,8815	29%	0,2880	9%	0,4726	22%	0,9260	32%
Purchased feeds	1,1541	12%	0,9443	28%	0,7065	33%	0,7714	27%
Total feeds	4,0356	41%	1,2323	37%	1,1791	55%	1,6974	59%
Other direct material	0,4448	5%	0,2908	9%	0,0134	1%	0,0000	0%
Repairs and service	0,0207	0%	0,0000	0%	0,0000	0%	0,0000	0%
Depreciation of long – term tangible property	0,5799	6%	0,3028	9%	0,0000	0%	0,0000	0%
Depreciation of basic stock	1,2085	12%	-	-	-	-	-	-
Other direct primary costs	0,7377	8%	0,0369	1%	0,0848	4%	0,0000	0%
Other direct secondary costs	0,4525	5%	0,3816	11%	0,0382	2%	0,0624	2%
Production overhead	1,2058	12%	0,8439	25%	0,6052	28%	0,8441	30%
Management overhead	0,3672	4%	0,2570	8%	0,2203	10%	0,2569	9%
Own costs	9,8273	100%	3,3463	100%	2,1414	100%	2,8608	100%
By-products	0,2762		0,0394		0,0854		0,1248	
<b>Own costs pre FD</b>	<b>9,5511</b>		<b>3,3069</b>		<b>2,0560</b>		<b>2,7360</b>	
Costs per kg of milk / weight gain	0,3875		4,4952		4,0173		-	
Cost per kg of liveweight	-		2,7947		3,9340		-	
Farm-gate price per kg with subsidies	<b>0,3274</b>		-		-		-	
Farm-gate price per kg without subsidies	<b>0,3000</b>		<b>1,8677</b>		<b>1,6290</b>		-	
<b>Profit/loss with subsidies</b>	<b>-0,0600</b>		-		-		-	
<b>Profit/loss without subsidies</b>	<b>-0,0875</b>		<b>-0,9270</b>		<b>-2,3050</b>		-	

# Economics of herd turnover and marketed milk (Scenario 2 – 350 head Simmental cattle herd)

<b>Rearing details</b>	
Cost of new-born calf (EUR)	58,05
Cost to raise a calf (EUR)	653,33
Calf weight at 6 months (kg)	178,17
Cost to raise a heifer until 7 <sup>th</sup> month of pregnancy (EUR)	928,13
Cost to Cost to raise a heifer from 7 <sup>th</sup> – 9 <sup>th</sup> month (EUR)	246,24
<b>Cost to raise a high-pregnant heifer (total)</b>	<b>1892,58</b>
Age at first calving (days)	753

Composition of feeding days a production		
Feeding days	Cows	127 750
	Calves until 6 months	79 524
	Heifers	72 698
	High-pregnant heifers	18 312
Production (kg)	Milk	3 149 038
	Calves	63 250
	Heifers	79 325

<b>Marketed milk and subsidies</b>	
Milk sold (kg)	3 101 802
Revenues (EUR)	930 541
Subsidies – TOTAL (EUR)	85 000



## Annex 2:

### Impact of changed farm-gate milk price on economic results and minimal production requirements to reach zero profitability

0,25

Economics of milk production (with and without depreciation)	year n	year n + 1
Milk yield per kg/FD	24,6500	24,6500
Farm-gate price per kg of milk	0,3000	0,2500
Cost Ceiling	7,3950	6,1625
Economic parameters (including depreciation)		
Own cost per FD	9,5511	9,5511
Own cost per kg of milk	0,3875	0,3875
Profit/loss per kg of milk	-0,0875	-0,1375
Cost rentability %	-22,6	-35,5
Underpend (+) / overspend (-) cost ceiling	-2,1561	-3,3886
Economic parameters (excluding depreciation)		
Own cost per FD	7,7627	7,7627
Own cost per kg of milk	0,3149	0,3149
Farm-gate price per kg of milk	0,3000	0,2500
Profit/loss per kg of milk	-0,0149	-0,0649
Cost rentability %	-4,7	-20,6
Underpend (+) / overspend (-) cost ceiling	-0,3677	-1,6002

#### Including depreciation

Minimal milk yield (kg/dairy cow/year) to reach zero profitability	31,84	38,20
Daily milk yield increase required (kg/cow)	7,19	13,55
Minimal milk production (kg/dairy cow/year)	11621	13945
Milk production increase required (dairy cow/year)	2623	4947

#### Excluding depreciation

Minimal milk yield (kg/dairy cow/year) to reach zero profitability	25,88	31,05
Daily milk yield increase required (kg/cow)	1,23	6,40
Minimal milk production (kg/dairy cow/year)	9444,60	11333,52
Milk production increase required (dairy cow/year)	447,35	2336,27

### Annex 3: Economics of Jersey dairy operation

<b>Reproduction parameters</b>		
<b>Dairy cows</b>		
Number of Dairy cows	90	heads
Nativity	96	%
Culling	30	%
Calving interval	400	days
Dry period	60	days
Service Period	120	days
Calving period	14	days
before calving	9	days
after calving	5	days
<b>Calves</b>		
New-born calf bodyweight (heifer)	25	kg
New-born calf bodyweight (bull)	25	kg
Calves during prophylactic rearing period (critical colostrum intake)	5	days
Mortality during prophylactic period	2	%
Calves in milk-feeding until	8	weeks
Mortality during milk-feeding	2	%
Selection at the age of 8 weeks	2	%
Mortality during solid diet	2	%
Selection after solid diet at the age of 6 month	2	%
<b>Heifers</b>		
Culling of un-mated heifers	2	%
Age at first mating	15	months
Culling of mated heifers	1	%
Culling of high-pregnant heifers	1	%
Transition of high-pregnant heifers to dry cows before calving	60	days
Gestation period	280	days
Age at first calving	24	months
<b>Performance indicators</b>		
Mature cow bodyweight	480	kg/day
Annual milk yield	5 000	l
Daily milk yield	13,70	l
Milk fat content	5,00	%
Annual milk yield	0,5	kg/day
Average weight gain of calves during milk feeding	0,7	kg/day
Average weight gain of heifers from 8 weeks until 6 months	0,7	kg/day
Average weight gain of un-mated heifers	0,6	kg/day
Average weight gain of mated heifers	0,5	kg/day
Average weight gain of high-pregnant heifers	0,6	kg/day



<b>Herd turnover</b>		
<b>Cows</b>	90	heads
Culling	27	heads
<b>Calves</b>		
Born	86	heads
Mortality during prophylactic period	2	heads
Weight on heifers at the end of period	28	kg
Weight on bulls at the end of period	28	kg
Transition to calves milk-feeding	84	heads
Period	51	days
Mortality during period	2	heads
Weight of heifers at the end of period	64	kg
Selection of heifers at the end of period	2	heads
Number of reared bulls	41	heads
Weight of reared bulls	64	kg
Transition of heifers to solid diet (8weeks-6months)	40	heads
Period	127	days
Mortality during period	1	heads
Weight at the end of period	153	kg
Selection of heifers at the age of 6 months	1	heads
<b>Heifers</b>		
Transition to un-mated heifers	38	heads
Period	275	days
Culling	1	heads
Weight at mating	318	kg
Transition to mated heifers	37	heads
Period	220	days
Culling	1	heads
Weight at the end of period	428	kg
Transition to high-pregnant heifers	36	heads
Period	60	days
Culling	0	heads
Weight at calving	464	kg
<b>Reared High-pregnant heifers</b>	36	heads
High-pregnant heifers surplus	9	heads

<b>Herd structure</b>				
<b>Cows Total</b>	<b>90</b>	<b>heads</b>	<b>32 850</b>	<b>Feeding Days (FD)</b>
Production	75	heads	27 375	FD
Dry period	11	heads	4 015	FD
Calving period	3	heads	1 095	FD
<b>Calves</b>	<b>27</b>	<b>heads</b>	<b>9 855</b>	<b>FD</b>
Prophylactic period	1	heads	365	FD
Milk-feeding	12	heads	4 380	FD
Heifers from 8 weeks - 6 months	14	heads	5 110	FD
<b>Heifers</b>	<b>56</b>	<b>heads</b>	<b>20 410</b>	<b>FD</b>
Un-mated heifers	28	heads	10 220	FD
mated heifers	22	heads	8 030	FD
High-pregnant heifers	6	heads	2 160	FD

Content of nutrients in feedstuffs									
		Content in feed							
Feedstuffs	DM content (g)	NEL (MJ)	NEV (MJ)	ME (MJ)	PDI (g)	NL (g)	Fibre (g)	Ca (g)	P (g)
Corn silage	295	1,87	1,90	3,08	14,60	24,10	76,20	0,78	0,62
Alfalfa silage	350	1,75	1,65	3,01	40,40	66,50	113,90	4,88	1,16
Alfalfa hay	863	4,20	3,96	7,26	86,20	143,70	294,00	11,73	2,14
Supplements for high-producing dairy cows	854	7,30		11,32	118,00	180,00	90,00	4,00	6,00
Calf starter feed	850	6,50		10,08	110,00	150,00	80,00	7,00	6,00
Compound feed for heifers (protein)	880	6,90		10,70	90,00	135,00	100,00	8,00	6,00
Compound carbohydrate feedstuffs for fattening	880	7,00	7,20	10,85	80,00	120,00	120,00	7,00	5,00

Nutritional requirements for cows								
Nutrients	NEL (MJ)	ME (MJ)	PDI (g)	NL (g)	Fibre (kg)	Ca (g)	P (g)	DM (kg)
Requirements for maintenance	33,02	55,07	333,28	378,93	2,05	22,56	14,97	8,72
Requirements for milk production	49,94	83,18	787,67	1339,04	1,10	47,26	28,36	4,73
Requirements for dairy cows	82,96	138,25	1120,96	1717,97	3,15	69,82	43,33	13,44
Requirements for dry cows	58,38	97,31	733,28	1058,93	2,61	46,56	29,37	11,12

Nutritional requirements for calves in milk-feeding										
Nutrients	NEL (MJ)	ME (MJ)	PDI (g)	NL (g)	Fibre (kg)	Ca (g)	P (g)	DM (kg)	Weight (kg)	Daily weight gain (kg)
Requirements	8,72	14,86	223,47	281,85	0,12	17,89	8,70	1,04	46	0,70

Nutritional requirements for heifers										
Nutrients	NEL (MJ)	ME (MJ)	PDI (g)	NL (g)	Fiber (kg)	Ca (g)	P (g)	DM (kg)	Weight (kg)	Daily weight gain (kg)
Heifers (8 weeks-6 months)	16,61	28,29	352,23	469,99	0,27	21,40	11,03	2,06	108,5	0,7
Heifers un-mated	28,12	47,91	450,58	656,16	0,95	25,23	14,03	3,80	235,5	0,6
Heifers mated	37,49	63,87	525,18	806,43	1,58	28,67	16,77	5,48	373,0	0,5

Feedstuffs requirements (t)						
Feedstuffs	Cows	Calves (milk-feeding)	Calves (solid feeding)	Heifers	Total	Total requirements (+ 10%)
Corn silage	817	2	5	176	1 000	1 101
Alfalfa silage	305			63	367	404
Alfalfa hay	62	4	8	23	97	107
Compound feedstuffs	55	4	10	23	93	
Milk compound feedstuff		2,4			2	

Forage Grow and Acreage Needed					
Feedstuffs	Green Matter production needed (t)	Preservation and Storage Losses (t)	Green Matter (t)	Yield (t/ha)	Acreage necessary to grow the forage (ha)
Corn silage	1 409	308	1 101	40,0	35
Alfalfa:					37
-silage	827	181	646	37,0	22
-hay	548	120	428	37,0	15
Acreage necessary to grow the forage (ha)					72

Storage space requirements	
Feedstuffs	m3
Corn silage	1 834
Alfalfa silage	808
Alfalfa hay	1 071
Silages Total	2 642

Total production of marketable products		
	Production	
Milk production	450 000	l
marketed milk ( 98 % z of production)	441 000	l
Culled cows	7 776	kg
Culled heifers	300	kg
High-pregnant heifers	4 014	kg
Bull weanlings	2 624	kg

<b>Manure production</b>			
	<b>Daily (t)</b>	<b>Losses (%)</b>	<b>Annually (t)</b>
Cows and High-pregnant heifers	3,9	40	573
Calves	0,2	40	25
Heifers	1,2	40	174
<b>Total</b>	<b>5,3</b>		<b>772</b>

<b>Farm-gate prices and revenues</b>			
	<b>Unit</b>	<b>EUR/Unit</b>	<b>Revenues (EUR)</b>
Milk	Litres	1,05	463 050,00
Culled heifers	kg/liveweight	2,00	599,20
Bull weanlings	kg/liveweight	3,00	7 872,00
Culled cows	kg/liveweight	1,00	7 776,00
High-pregnant heifers	kg/liveweight	3,00	12 042,00
<b>Revenues total</b>			<b>491 339,20</b>

<b>Compound feedstuffs prices (EUR/ton)</b>	
Supplements for high-producing dairy cows	350
Milk feeding	1 400
Compound feedstuffs for calves	300
Heifers	250
Fattening	280

<b>Roughage feedstuffs prices (EUR/t)</b>	
Corn silage	42
Alfalfa silage	32
Hay	80
Bedding (straw)	10
Manure	5



<b>Feeding costs (EUR)</b>					
	<b>FD</b>	<b>Own</b>	<b>Purchased</b>	<b>Bedding</b>	<b>Total</b>
Cows and high-pregnant heifers	1,98	49 018,20	19 162,50	1 159,20	69 339,90
Calves	0,94	1 277,68	7 807,14	146,00	9 230,82
Heifers	0,87	11 266,82	5 840,00	627,80	17 734,62
<b>Total</b>		<b>61 562,70</b>	<b>32 809,64</b>	<b>1 933,00</b>	<b>96 305,34</b>

<b>Depreciation of long – term tangible property (EUR)</b>		
	<b>FD</b>	<b>Year</b>
Cows and high-pregnant heifers	0,57	20 000
Calves	0,127	1 250
Heifers	0,184	3 750
<b>Total</b>		<b>25 000</b>

<b>Depreciation of basic stock (EUR)</b>		
	<b>FD</b>	<b>Year</b>
Cow depreciation	1,118	36 711,77

<b>Labour costs (EUR)</b>		
	<b>FD</b>	<b>Year</b>
Cows and high-pregnant heifers	0,66	23 184,00
Calves	0,59	5 796,00
Heifers	0,28	5 796,00
<b>Total</b>		<b>34 776,00</b>

<b>Other direct costs (EUR)</b>		
	<b>FD</b>	<b>Year</b>
Cows and high-pregnant heifers	1,98	69 239,28
Calves	0,36	3 498,53
Heifers	0,44	9 035,51
<b>Total</b>		<b>81 773,31</b>

<b>Overhead cost (EUR)</b>		
	<b>FD</b>	<b>Year</b>
Cows and high-pregnant heifers	1,09	38 083,88
Calves	0,50	4 929,47
Heifers	0,40	8 223,19
<b>Total</b>		<b>51 236,5</b>

<b>Cost of the products (EUR)</b>	
Milk per kg	<b>0,489</b>
Reared calf	458,75
Reared heifer	1 211,14
Reared high-pregnant heifer	1 669,89

<b>Manure (EUR)</b>		
	<b>FD</b>	<b>Year</b>
Cows	0,08	<b>2 863</b>
Calves	0,01	<b>125</b>
Heifers	0,04	<b>870</b>
<b>Total</b>		<b>3 858</b>

<b>Profit without by-products</b>			
	<b>Revenues</b>	<b>Costs</b>	<b>Profit</b>
Total profit (EUR)	491 339	289 091	<b>202 248</b>
<b>Cost rentability (%)</b>			69,96

<b>Profit with by-products</b>			
	<b>Revenues</b>	<b>Costs</b>	<b>Profit</b>
Total profit (EUR)	495 197	289 091	<b>206 106</b>
<b>Cost rentability (%)</b>			71,29

**Annex 4: Expansion of Beef cattle operation**  
**(15 thousand ha of suitable land available)**

<b>Reproduction parameters</b>	
<b>Cows</b>	
<b>Suckler cows number</b>	<b>2500 cows</b>
Natality	94 %
Cow Bodyweight	800 kg
Culling	20 %
<b>Calves</b>	
New-born Calf Bodyweight	35 kg
Calves Mortality until Pasture	2 %
Calves Mortality during Pasture	2 %
Calves Mortality after Pasture	1 kg
Age of Calves at the Beginning of Pasture	70 days
<b>Heifers rearing</b>	
Culling	2 %
Age at First Calving	34 months
<b>Fattening</b>	
Culling	2 %
Fattening Period	10 moths
Calving period	January, February, March
Number of Cows per Bull	35 cows
Mating period	March, April, May
Pasture season (duration)	180 days
May - October	

<b>Average Numbers of cattle</b>				
<b>Category</b>	<b>Numbers</b>	<b>Period (days)</b>	<b>Feeding Days</b>	<b>Livestock Units</b>
Cows	2500	365	912 500	2500
Calves	2304	255	587 520	922
Heifers	1149	822	419 385	689
Bulls	71	365	25 915	71
Fattening	1748	309	540 132	888
<b>Total</b>				<b>4182</b>

Forage Grow and Acreage Needed							
Forage	Green Matter production needed (t)	Preservation and Storage Losses (t)	Grow requirements			Yield In Green matter (tons/ha)	Acreage necessary to grow the forage (ha)
			Dry Matter (t)	Forage Needed (t)	Green Matter (t)		
<b>Pasture TOTAL</b>	<b>51 111</b>				<b>45 645</b>		<b>14 910</b>
Pasture land:							
Pasture	31 211	1 486	6 718	29 725	29 725	5,0	6 242
Hay	19 900	3 980	3 184	3 980	15 920	6,0	3 317
Silage	28 383	5 677	4 967	14 191	22 706	6,0	4 731
Corn Silage	12 408	2 482	2 879	9 926	9 926	20,0	620

Storage space requirements		
Forage	tons	m <sup>3</sup>
Grass Hay	3 980	44 222
Corn Silage	9 926	24 815
Hay Silage	14 191	141 910
Straw (bedding)	5 786	57 860

Farm-gate prices and Revenues			
	Unit	€/kg liveweight	Revenues (€)
Slaughter animals	head	3,0	2 980 620
Culled cows	kg of liveweight	1,5	480 000
<b>Revenues Total</b>			<b>3 460 620</b>

Economic result	
Loss in cattle breeding	-907 184 €
Total Subsidies per ha	200 €
<b>Acreage necessary to grow the forage</b>	<b>14 910 €</b>
Total Subsidies	2 982 000 €
<b>Economic result</b>	<b>2 074 816 €</b>

**Expansion of Beef cattle operation**  
**(10 thousand ha suitable land available)**

<b>Reproduction parameters</b>	
<b>Cows</b>	
<b>Suckler cows number</b>	<b>1700 cows</b>
Natality	94 %
Cow Bodyweight	800 kg
Culling	20 %
<b>Calves</b>	
New-born Calf Bodyweight	35 kg
Calves Mortality until Pasture	2 %
Calves Mortality during Pasture	2 %
Calves Mortality after Pasture	1 kg
Age of Calves at the Beginning of Pasture	70 days
<b>Heifers rearing</b>	
Culling	2 %
Age at First Calving	34 months
<b>Fattening</b>	
Culling	2 %
Fattening Period	10 moths
Calving period	January, February, March
Number of Cows per Bull	35 cows
Mating period	March, April, May
Pasture season (duration)	180 days
May - October	

<b>Average Numbers of cattle</b>				
<b>Category</b>	<b>Numbers</b>	<b>Period (days)</b>	<b>Feeding Days</b>	<b>Livestock Units</b>
Cows	1700	365	620 500	1700
Calves	1567	255	399 585	627
Heifers	781	822	285 065	469
Bulls	49	365	17 885	49
Fattening	1189	309	367 401	604
<b>Total</b>				<b>2845</b>



Forage Grow and Acreage Needed							
Forage	Green Matter production needed (t)	Preservation and Storage Losses (t)	Grow requirements			Yield In Green matter (tons/ha)	Acreage necessary to grow the forage (ha)
			Dry Matter (t)	Forage Needed (t)	Green Matter (t)		
<b>Pasture TOTAL</b>	<b>34 767</b>				<b>31 049</b>		<b>10 142</b>
Pasture land:							
Pasture	21 232	1 011	4 570	20 221	20 221	5,0	4 246
Hay	13 535	2 707	2 166	2 707	10 828	6,0	2 256
Silage	19 308	3 862	3 379	9 654	15 446	6,0	3 218
Corn Silage	8 439	1 688	1 958	6 751	6 751	20,0	422

Storage space requirements		
Forage	tons	m <sup>3</sup>
Grass Hay	2 707	30 078
Corn Silage	6 751	16 878
Hay Silage	9 654	96 540
Straw (bedding)	3 935	39 350

Farm-gate prices and Revenues			
	Unit	€/kg liveweight	Revenues (€)
Slaughter animals	head	3,0	2 027 100
Culled cows	kg of liveweight	1,5	326 400
<b>Revenues Total</b>			<b>2 353 500</b>

Economic result	
Loss in cattle breeding	-618 758 €
Total Subsidies per ha	200 €
<b>Acreage necessary to grow the forage</b>	<b>10 142 €</b>
Total Subsidies	2 028 400 €
<b>Economic result</b>	<b>1 409 642 €</b>

**Annex 5: Diversification of Beef cattle operation**  
**(Bull weanlings)**

<b>Reproduction parameters</b>	
<b>Cows</b>	
<b>Suckler cows number</b>	<b>1500 cows</b>
Natality	94 %
Cow Bodyweight	800 kg
Culling	20 %
<b>Calves</b>	
New-born Calf Bodyweight	35 kg
Calves Mortality until Pasture	2 %
Calves Mortality during Pasture	2 %
Calves Mortality after Pasture	1 kg
Age of Calves at the Beginning of Pasture	70 days
<b>Heifers rearing</b>	
Culling	2 %
Age at First Calving	34 months
<b>Fattening</b>	
Culling	2 %
Fattening Period	10 months
Calving period	January, February, March
Number of Cows per Bull	35 cows
Mating period	March, April, May
Pasture season (duration)	180 days
	May - October

<b>Average Numbers of cattle</b>				
<b>Category</b>	<b>Numbers</b>	<b>Period (days)</b>	<b>Feeding Days</b>	<b>Livestock Units</b>
Cows	1400	365	511 000	1400
Calves	1382	255	352 410	553
Heifers	689	822	251 485	413
Bulls	43	365	15 695	43
<b>Total</b>				<b>2409</b>

<b>Forage Grow and Acreage Needed</b>							
Forage	Green Matter production needed (t)	Preservation and Storage Losses (t)	Grow (production) requirements			Yield In Green matter (tons/ha)	Acreage necessary to grow the forage (ha)
			Dry Matter (t)	Forage Needed (t)	Green Matter (t)		
<b>Pasture TOTAL</b>	<b>25 536</b>				<b>23 833</b>		<b>5 635</b>
Pasture land:							
Pasture	17 021		3 847	17 021	17 021	5,0	3 404
Hay	8 515	1 703	1 362	1 703	6 812	6,0	1 419
Hay Silage	16 236	3 247	2 435	8 118	12 989	20,0	812

<b>Farm-gate prices and Revenues</b>			
	Unit	€/kg liveweight	Revenues (€)
Slaughter animals	head	3,5	994 028
Culled cows	kg of liveweight	1,5	288 000
<b>Revenues Total</b>			<b>1 282 028</b>

<b>Economic result</b>	
Loss in cattle breeding	-297 779 €
Total Subsidies per ha	200 €
<b>Acreage necessary to grow the forage</b>	<b>5 635 ha</b>
Total Subsidies	1 127 000 €
<b>Economic result</b>	<b>829 221 €</b>

## Diversification of Beef cattle operation (Fattening)

<b>Reproduction parameters</b>	
<b>Cows</b>	
<b>Suckler cows number</b>	<b>1000 cows</b>
Natality	94 %
Cow Bodyweight	800 kg
Culling	20 %
<b>Calves</b>	
New-born Calf Bodyweight	35 kg
Calves Mortality until Pasture	2 %
Calves Mortality during Pasture	2 %
Calves Mortality after Pasture	1 kg
Age of Calves at the Beginning of Pasture	70 days
<b>Heifers rearing</b>	
Culling	2 %
Age at First Calving	34 months
<b>Fattening</b>	
Culling	2 %
Fattening Period	10 months
Calving period	January, February, March
Number of Cows per Bull	35 cows
Mating period	March, April, May
Pasture season (duration)	180 days
May - October	

<b>Average Numbers of cattle</b>				
<b>Category</b>	<b>Numbers</b>	<b>Period (days)</b>	<b>Feeding Days</b>	<b>Livestock Units</b>
Cows	1000	365	365 000	1000
Calves	922	255	235 110	369
Heifers	459	822	167 535	275
Bulls	29	365	10 585	29
Fattening	700	309	216 300	356
<b>Total</b>				<b>1673</b>

<b>Forage Grow and Acreage Needed</b>							
Forage	Green Matter production needed (t)	Preservation and Storage Losses (t)	Grow requirements			Yield In Green matter (tons/ha)	Acreage necessary to grow the forage (ha)
			Dry Matter (t)	Forage Needed (t)	Green Matter (t)		
<b>Pasture TOTAL</b>	<b>20 456</b>				<b>18 268</b>		<b>5 967</b>
Pasture land:							
Pasture	12 491	595	2 688	11 896	11 896	5,0	2 498
Hay	7 965	1 593	1 274	1 593	6 372	6,0	1 328
Silage	11 358	2 272	1 988	5 679	9 086	6,0	1 893
Corn Silage	4 969	994	1 153	3 975	3 975	20,0	248

<b>Farm-gate prices and Revenues</b>			
	Unit	€/kg liveweight	Revenues (€)
Slaughter animals	head	3,0	1 193 640
Culled cows	kg of liveweight	1,5	192 000
<b>Revenues Total</b>			<b>1 385 640</b>

<b>Economic result</b>	
Loss in cattle breeding	-363 522 €
Total Subsidies per ha	200 €
<b>Acreage necessary to grow the forage</b>	<b>5 967 ha</b>
Total Subsidies	1 193 400 €
<b>Economic result</b>	<b>829 878 €</b>