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ECONOMIC EFFICIENCY ON OVERSEEDING GRASSLANDS FROM PREAJBA - GORJ COUNTY IN 2014

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Abstract: *This study was achieved using the support of strategic project "Support Scholarships University in Romania by the European Doctoral and Post-doctoral (SCHOLARSHIPS DOC-POSTDOC)", ID 133255. The paper emphasizes the importance of meadows and hayfields production, considering that their value can be increased using over-seeding and organic-mineral fertilizers. Experience is located in the Experimental Center for Meadows Culture -Preajba, Gorj County, on natural meadow of Agrostis capillaris, over-seeded with Red clover. The production have increase with fertilizer dose, but maximum economic efficiency was found on variant that use only organically fertilizer. It should be noted that organic fertilizers are used in the first year only partially by plants.*

The indicators of economic efficiency used are: raw product, variable costs, fixed costs, production costs, and the indices: total expenditure rate of profit, income taxes, net profit and net profit rate.

Key words: pastures, manure, fertilizers, profit, gross profit margin

1. Introduction

Permanent grasslands of *Agrostis capillaris* can be may be used as grazing and hay fields, hay obtained is of average quality. By over-seeding with Red clover and utilization of manure, pasture quality increase and other valuable leguminous reappear [1].

In developing culture technologies is follow the maximizing yields per hectare, avoiding depreciation of feed quality, increased mechanization of work, labor productivity growth, reducing the unitary cost [4].

Farmers can use better the manure obtained in their household and must bear in mind that this fertilizer is green and a good plant enhancer [2].

Natural pastures and hayfields have shares of 22% and 10% of agricultural land, and taking into account the distribution of land suitability classes, that only 17.8% of natural grasslands belong to Classes I - III, which suggests measures to improve the land occupied by these uses [3].

The goal of this study is to determine which of the variants of fertilization is better in terms of economic, using a set of indicators (raw product, variable costs, fixed costs, production costs, and the indices: total expenditure rate of profit, income taxes, net profit and net profit rate) .

2. Economic efficiency

For determining the efficiency a number of 8 variants are used, arranged in 3 repetitions:
Var. 1 = unfertilized;
Var. 2 = 5 t/ha manure;
Var. 3 = 10 t/ha manure;
Var. 4 = 15 t/ha manure;
Var. 5 = 20 t/ha manure;
Var. 6 = 10 t/ha manure + 50 kg/ha N + 50kg/ha P_2O_5 + 50kg/ha K_2O;

Var. 7 = 15 t/ha manure + 50 kg/ha N + 50kg/ha P_2O_5 + 50kg/ha K_2O;
Var. 8 = 20 t/ha manure + 50 kg/ha N + 50kg/ha P_2O_5 + 50kg/ha K_2O.

The crude product was made by adding of grants (amounting to 156.89 euro / ha) to the main production,

Table 1 shows the economic indicators value on each variant used, main production being maximum (3556 lei) for variant 7, and minimum for variant 1 (1572 lei). In this condition the total production expenses growth from 877, 28 lei (variant 1) to 1449, 63 lei (variant 8).

Table 1: Economic efficiency of natural grassland of Agrostis capillaris, over-seeded with Red clover in 2014

No.	**Specification**	**Variant**	**Quantity** *tones, kg, liters*	**Unitary price** *Lei*	**Value** *Lei*
1.	**CRUDE PRODUCT**	-	-	-	
1.1.	**Main production (average yield – kg/ha)**	unfertilized	3,93	400	1572
		5 t/ha manure	4,75	400	1896
		10 t/ha manure	5,56	400	2224
		15 t/ha manure	5,97	400	2388
		20 t/ha manure	7,51	400	3004
		10 t/ha manure + 50N 50 P_2O_5 50K_2O	8,31	400	3324
		15 t/ha manure + 50N 50 P_2O_5 50K_2O	8,89	400	3556
		20 t/ha manure + 50N 50 P_2O_5 50K_2O	8,22	400	3288
1.2.	**Secondary production – kg/ha**	-	-	-	
1.3.	**Gross product from the marketable production**	unfertilized			1572
		5 t/ha manure			1896
		10 t/ha manure			2224
		15 t/ha manure			2388
		20 t/ha manure			3004
		10 t/ha manure + 50N 50 P_2O_5 50K_2O			3324
		15 t/ha manure + 50N 50 P_2O_5 50K_2O			3556
		20 t/ha manure + 50N 50 P_2O_5 50K_2O			3288
1.4.	**Subsidies**	156,89 €/ha, 1 € = 4,44 lei	-		696,59
1.5.	**Total gross product, including subsidies**	unfertilized			2268,59
		5 t/ha manure			2592,59
		10 t/ha manure			2920,59
		15 t/ha manure			3084,59
		20 t/ha manure			3700,59
		10 t/ha manure + 50N 50 P_2O_5 50K_2O			4020,59
		15 t/ha manure + 50N 50 P_2O_5 50K_2O			4252,59
		20 t/ha manure + 50N 50 P_2O_5 50K_2O			3984,59
2.	**VARIABLE EXPENSES**				-
2.1.	***Seeds*** **Dose - kg/ha**		15	20	300
2.2	***Fertilizers***	unfertilized	-	-	-
	Fertilizers, manure	5 t/ha manure	5	10	50
	Fertilizers, manure	10 t/ha manure	10	10	100
	Fertilizers, manure	15 t/ha manure	15	10	150
	Fertilizers, manure	20 t/ha manure	20	10	200
	Fertilizers **NPK (15:15:15)** ***manure***	10 t/ha manure + 50N 50 P_2O_5 50K_2O	150 kg 10 tone	2 10	400

	Fertilizers **NPK (15:15:15)** ***manure***	15 t/ha manure + 50N 50 P_2O_5 50K_2O	150 kg 15 tons	2 10	450
	Fertilizers **NPK (15:15:15)** ***manure***	20 t/ha manure + 50N 50 P_2O_5 50K_2O	150 kg 20 tons	2 10	500
2.3.	***Mechanical works with own means*** **(diesel / lubricants, spare parts, repair)**	unfertilized	36 liters	6 15	231
		5 t/ha manure	37 liters	6 15	237
		10 t/ha manure	38 liters	6 15	243
		15 t/ha manure	38 liters	6 15	243
		20 t/ha manure	39 liters	6 15	249
		10 t/ha manure + 50N 50 P_2O_5 50K_2O	40 liters	6 15	255
		15 t/ha manure + 50N 50 P_2O_5 50K_2O	40 liters	6 15	255
		20 t/ha manure + 50N 50 P_2O_5 50K_2O	40 liters	6 15	255
2.4.	***Crop insurance***	-	-		40
2.5.	***Seasonal labor expenses***	-	3 Z.O.	60	180
2.6	**TOTAL VARIABLE EXPENSES**	unfertilized			751
		5 t/ha manure			807
		10 t/ha manure			963
		15 t/ha manure			919
		20 t/ha manure			969
		10 t/ha manure + 50N 50 P_2O_5 50K_2O			1175
		15 t/ha manure + 50N 50 P_2O_5 50K_2O			1225
		20 t/ha manure + 50N 50 P_2O_5 50K_2O			1275
3.	**FIXED EXPENSES**				-
3.1.	***Expenditure related to permanent employee workforce =*** **Mechanical work = No. hours x Rate / hour**	unfertilized	10	10	100
		5 t/ha manure	11	10	110
		10 t/ha manure	11	10	110
		15 t/ha manure	11	10	110
		20 t/ha manure	12	10	120
		10 t/ha manure + 50N 50 P_2O_5 50K_2O	12	10	120
		15 t/ha manure + 50N 50 P_2O_5 50K_2O	13	10	130
		20 t/ha manure + 50N 50 P_2O_5 50K_2O	13	10	130
3.2.	**General expenses (3.5% of variable expenses)**	unfertilized			26,28
		5 t/ha manure			28,25
		10 t/ha manure			30,20
		15 t/ha manure			32,17
		20 t/ha manure			33,91
		10 t/ha manure + 50N 50 P_2O_5 50K_2O			41,13
		15 t/ha manure + 50N 50 P_2O_5 50K_2O			42,88
		20 t/ha manure + 50N 50 P_2O_5 50K_2O			44,63
3.6.	**TOTAL FIXE EXPENSES**	unfertilized			126,28
		5 t/ha manure			138,25
		10 t/ha manure			140,20
		15 t/ha manure			142,17
		20 t/ha manure			153,91

		10 t/ha manure + 50N 50 P_2O_5 50K_2O			161,13
		15 t/ha manure + 50N 50 P_2O_5 50K_2O			172,88
		20 t/ha manure + 50N 50 P_2O_5 50K_2O			174,63
4.	**TOTAL PRODUCTION EXPENSES**	unfertilized			877,28
		5 t/ha manure			945,25
		10 t/ha manure			1003,20
		15 t/ha manure			1061,17
		20 t/ha manure			1122,91
		10 t/ha manure + 50N 50 P_2O_5 50K_2O			1336,13
		15 t/ha manure + 50N 50 P_2O_5 50K_2O			1397,88
		20 t/ha manure + 50N 50 P_2O_5 50K_2O			1449,63

Source: own calculation

Table 2 summarizes the indicators and presents rates of profitability. Gross margin had a value of 3027.59 lei to variant 7, 2845.59 lei for variant 6, 2731.59 lei variant 5, 2709.59 lei variant 8. The variants 2, 3 and 4, did not exceed 2200 lei, while the witness was had a gross margin of 1517.59 lei.

Gross profit, calculated as the difference between gross margin and fixed costs, had good values for the last 4 variants (2854.71 lei - variant 7, 2684.46 lei - variant 6, 2577.68 lei - variant 5 and 2534.96 lei - variant 8), satisfactory for variants 3 and 4 (1917.39 and 2023.42 lei) and lower levels for witness and variant 2 (1391,31 – 1647,34 lei).

The gross profit rate exceeds 200% for variants 5, 6, 7 and have values lower than this limit for the other variants.

Net profit recorded for unfertilized variant was 1168.7 lei, increasing with the applied doses up to 2397.96 lei for fertilization by 15 t / ha manure + 50N 50P_2O_5 50 K_2O, and starting to decline over this limit (2129.37 lei to 20 t / ha manure + 50N 50P_2O_5 50 K_2O).

Table 2: Synthetic indicators

Specification	Variant	Value (Lei), %
Crude product	unfertilized	2268,59
	5 t/ha manure	2592,59
	10 t/ha manure	2920,59
	15 t/ha manure	3084,59
	20 t/ha manure	3700,59
	10 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	4020,59
	15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	4252,59
	20 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	3984,59
Variable expenses	unfertilized	751
	5 t/ha manure	807
	10 t/ha manure	863
	15 t/ha manure	919
	20 t/ha manure	969
	10 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	1175
	15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	1225
	20 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	1275
Gross margin	unfertilized	1517,59
	5 t/ha manure	1785,59
	10 t/ha manure	2057,59
	15 t/ha manure	2165,59
	20 t/ha manure	2731,59
	10 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	2845,59
	15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	3027,59
	20 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	2709,59
Fixed expenses	unfertilized	126,28
	5 t/ha manure	138,25
	10 t/ha manure	140,20
	15 t/ha manure	142,17

	20 t/ha manure	153,91
	10 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	161,13
	15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	172,88
	20 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	174,63
Gross profit	unfertilized	1391,31
	5 t/ha manure	1647,34
	10 t/ha manure	1917,39
	15 t/ha manure	2023,42
	20 t/ha manure	2577,68
	10 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	2684,46
	15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	2854,71
	20 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	2534,96
Total expenditures	unfertilized	877,28
	5 t/ha manure	945,25
	10 t/ha manure	1003,20
	15 t/ha manure	1061,17
	20 t/ha manure	1122,91
	10 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	1336,13
	15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	1397,88
	20 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	1449,63
The gross profit rate (%)	unfertilized	158,59
	5 t/ha manure	174,27
	10 t/ha manure	191,12
	15 t/ha manure	190,67
	20 t/ha manure	229,55
	10 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	200,91
	15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	204,21
	20 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	174,86
Income tax	unfertilized	222,61
	5 t/ha manure	263,57
	10 t/ha manure	306,78
	15 t/ha manure	323,75
	20 t/ha manure	412,43
	10 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	429,51
	15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	456,75
	20 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	405,59
Net profit	unfertilized	1168,7
	5 t/ha manure	1383,77
	10 t/ha manure	1610,61
	15 t/ha manure	1699,67
	20 t/ha manure	2165,25
	10 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	2254,95
	15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	2397,96
	20 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	2129,37
Net profit rate (%)	unfertilized	133,22
	5 t/ha manure	146,39
	10 t/ha manure	160,54
	15 t/ha manure	160,17
	20 t/ha manure	192,82
	10 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	168,76
	15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	171,54
	20 t/ha manure + 50N + 50 P_2O_5 + 50K_2O	146,89

Source: own calculation

Under this conditions, the net profit rate was maximum for variant fertilized with 20 t/ha manure (192,82%), being followed by variant with 15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O (171,54%), variant with 10 t/ha manure + 50N + 50 P_2O_5 + 50K_2O (168,76%) and variants fertilized only with manure in dose of 10 and 15 t/ha (160,54, 160,17%). The rest of variants recorded weights of 146.89% for fertilizing with 20t / ha + 50N + 50 P_2O_5 + 50K_2O, 146.39% to 5t / ha manure and 133.22% to unfertilized.

3. Conclusions

Taking into account the above mentioned regarding economic efficiency that the treatments have on permanent grassland of *Agrostis capillaris* in sub-mountainous area of Oltenia with chemical and organic fertilizers, or a combination of the two, we can formulate some conclusions as follows:

- Fertilizers and over-seeding increased the production obtained with 0,82 up to 4,96 tones (for variants 2 and 7), total gross product increasing from 2268,59 lei at unfertilized to 4252,59 lei for variant fertilized with 15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O;
- Total production expanses raged from 877,28 lei for witness up to 1449,63 lei for the variant fertilized with 20 t/ha manure + 50N + 50 P_2O_5 + 50K_2O;
- Gross margin knows a maximum for variant with 15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O (3027,59 lei), important levels being recorded for variant with 10 t/ha manure + 50N + 50 P_2O_5 + 50K_2O (2845,59 lei), 20 t/ha manure (2731,59 lei) and 20 t/ha manure + 50N + 50 P_2O_5 + 50K_2O (2709,59 lei) as well.;
- Net profit, after decreasing the incoming taxes, growth from 1168,7 for variant 1 to 2397,96 lei for variant 7 (15 t/ha manure + 50N + 50 P_2O_5 + 50K_2O), variants 5, 6 and 8 having levels over 2000 lei also (2129,37 lei for 20 t/ha manure + 50N + 50 P_2O_5 + 50K_2O, 2165,25 lei for 20 t/ha manure and 2254,95 lei for 10 t/ha manure + 50N + 50 P_2O_5 + 50K_2O).

In 2014, the first year of experimentation, the variant with the highest net profit rate proved to be the one fertilized with 20 t / ha manure.

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